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The Indian Journal of

HOME SCIENCE

From the Editor's desk

The field of home Science is highly concerned with building powerful community for a strong nation.It strives to achieve this through provision of holistic education so as to create accomplished individuals , especially women, with a strong sense of identity, character and individuality. With education they would be equipped to face the challenges and demands of an increasingly globalized world.

For the spread of education " THE INDIAN JOURNAL OF HOME SCIENCE-an official publication of The Home Science Association of India- has an important role to play. The researches carried out in various institutions are communicated to a wider world through it.

A systematic procedure is followed from the announcement of inviting papers till the publication of the e-journal uploading on the website of HSAI-open to all. The papers go through blind peer review process by experts in the field , who assess the papers on the set parameters for quality in merit order and give feedback having constructive suggestion for improvements .The contributors , honouring it, comply to the report and submit the improved paper along with plagiarism report. Those papers falling within the acceptable similarity index are given place in the Journal. With strict and objective implementation policy of the editorial board , comprising of experts from various field of Home Science, the Journal is able to publish , now 50 quality papers in one issue and two issues in a year !

The editorial Board wishes all the best to the researchers who would submit the papers which contribute towards enhancement of existing knowledge and have implications for societal development and policy making.

Prof. Maneesha shukul

Contents

A STUDY ON THE PREFERENCES OF GARMENTS AMONG PLUS SIZE COLLEGE GIRLS IN CHENNAI CITY

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ABSTRACT

Plus size or large size refers to those who wear garments which are larger, extra larger or above in the garment size, they do not prefer the normal size or the missy size. Size differs from one person to another based on their body structure, ratio and height. Shift in the living pattern, over eating, unhealthy eating practices, long exposure to the screens, heredity, etc. which affects the individual's body structure and weight; leads to preference of plus or large size garments. Plus size category is increasing worldwide, but the sale and production are lesser than the expected demand. There are studies which target the standard or missy size College girls clothing preferences due to highly fashion-oriented age group, ready-to-accept and spend on new fashions when compared to other age groups, but not much findings on the plus or extended size garment preferences and challenges among College girls. To understand the preferences of garments among plus size college girls in Chennai city, the self-developed questionnaires was used to study the preferences of readymade and custom-made garments and challenges faced towards garment purchase among plus size college girls in Chennai. Among various Colleges of Chennai 120 plus size girls were selected. The data reveals that the respondents prefer custom made garments for its durability, perfect fitting, good finishing when compared to the readymade garments. Prefers readymade to save time, less cost and brand availability. Plus size wear are expensive than normal size wear, unattractive fashion, often dark color garments available, limited variety in stores, promotions are ignored for plus size garments, plus size wearer avoid some styles due to body shaming, always prefer trial before purchase, often need alterations after purchase for size adjustment. The study will help the manufacturers, designers and promoters to recognize the need of this extended or plus size perceptions and buying practices.

Keywords: Challenges, Custom made, Plus size, Preferences, Readymade

INTRODUCTION

Clothing is not only for body shielding or outer casing; it has social and psychological factors devoted to the wearer. To be attractive and glamorous, wearer prefers to have a suitable fit, trendy and pleasing to the eye. Plus size or large size refers to those who wear garments which are larger, extra larger or

above in the garment size, they do not prefer the normal size or the missy size. Plus size wearers are the most disappointed buyers, facing difficulties when purchase garments due to high price, outdated collection, less variety, less design details, unsuitable fabric, fitting issues around arm, breast area and dissatisfied shopping atmosphere. The overweight and obesity rate has been raised in the fast-moving world it's vital and necessary for the manufacturer to include the garments which suits the larger women.

The shapes and sizes of women have been changing over the past decade, while standard sizing and garment proportions used by apparel industries have not changed. This has seen especially many plus-size wearers experiencing many problems with regard to the fit of clothes. The retailers are also finding it hard to keep in business as more merchandise is returned due to poor sales on clothes that have a poor fit. (Anderson et al., 2000)

Plus size apparel consumers who dress in clothes of size 16 and above. The major problem mostly experienced by this group has been the inability to find well-fitting, fashionable clothes that fulfill their functional, economic and aesthetic needs. (Meng, 2007)   Fit is an important aspect of clothing that contributes to a good feeling. Well-fitting clothes brings out an attractive appearance, freedom of movement and comfort, which in turn create positive feelings in the wearer. (Goldsberry et al., 1996)

Current sizing systems, which differ from country to country, shop to shop and from one manufacturer to another, have resulted in wide size variation in the market. The poor sizing systems used by manufacturers create more fit problems, as consumers have to try on a garment before buying it or alter the garment before wearing it to ensure a good fit (Labat et al.,1990). There is also a significant amount of returns, clothes that get dirty during the fitting process, or torn due to over-handling. These spoiled clothes return losses to the apparel retailer.

Affordable plus size clothing for women has not always been easy to find. This was because designers believed that skinny women were beautiful hence most of them dedicated time to design clothing for skinny women. Plus size clothes for women were relegated to stretchy material which was almost black in color. This was as a result of the misconception that plus size women looked thinner only in the black color. Currently no documented information on plus-size College girls' clothing preferences with regard to the size and fit of their clothes and the problems that they encounter with the fit of apparel that is available in stores.

LITERATURE REVIEW

Kaur et al., (2018) state that people vary in their body structure and size that cause fitting issues, discomfort and unattractiveness of plus size garments. There is a need for this plus size apparel in the market but only limited production and sales available, the study reveals that plus size wearer prefers readymade or off the shelf garments, needs comfortable wear, proper fit and pleasing garment.

Sontshi, et al., (2024) state that the rise in the awareness on health worldwide resulting in the more number of population involve in the sports activities to obtain a healthy life pattern. Plus size women

face problem in choosing apparel or sportswear that gives suitable fit. The purpose of this study was to understand the plus-size wearer involvement on the fit satisfaction, and insight on sportswear.

Acar, et al., (2017) state that BMI rate increases among population due to high stress, prolonged exposure to the desk, over eating and unhealthy eating practices causes to the growth in purchase of plus size garment. This research aims towards the preferences of plus size garment purchase through internet which reveals that easy and comfortable purchase, time and cost effectiveness, more variety available through e commerce.

OBJECTIVES

1. To study on the preferences of readymade and custom-made garments among plus size College girls.
2. To study the challenges faced in garment purchase among plus size College girls.

METHODOLOGY

To conduct this study, a questionnaire tool was used. Secondary data obtained from the journals, magazines and e- resources. The data collected was presented using suitable tables.

Samples and Sampling Method

This study was conducted in Chennai City of South India. Among various colleges120 plus size girls (n) were selected by purposive sampling method. To study on the preferences of garments among plus size College girls in Chennai, a self-developed questionnaire was used as a tool to gather data. The tool consisted of questions associated with readymade and custom-made garments and challenges faced towards garment purchase. The data gathered was presented using tables in simple percentage.

RESULTS AND DISCUSSION

Table 1 Preferences of readymade and custom-made garments among plus size College girls

S. No	Preferences of readymade and custom-made garments among plus size College girls		Sample size n=120	Percentage (%)
1.	Durability	Readymade	41	34.2
		Custom made	79	65.8
2.	Time & cost effective	Readymade	69	57.5
		Custom made	51	42.5
3.	Satisfied with plus size garment	Readymade	48	40
		Custom made	72	60

4.	Perfect fitting	Readymade	31	25.8
		Custom made	89	74.2
5.	Good finishing	Readymade	32	26.7
		Custom made	88	73.3
6.	Prefer casual & formal wear	Readymade	62	51.7
		Custom made	58	48.3
7.	Prefer party wear	Readymade	48	40
		Custom made	72	60
8.	More brands	Readymade	85	70.8
		Custom made	35	29.2

Interpretation

From Table 1 it shows that most of them preferred custom made garments for the durability (65.8%), satisfaction (60%), perfect fitting (74.2%), good finishing (73.3%) and prefer party wear (60%), Whereas preference of readymade garments for the time and cost effective (57.5%), prefer casual and formal wear (51.7%) and avail more brands (70.8%).

Table 2 Challenges faced in garment purchase among plus size College girls

S. No	Challenges faced towards garment purchase among plus size College girls		Sample size n=120	Percentage (%)
1.	All plus sizes are available	Yes	34	28.3
		No	86	71.7
2.	Plus size garments are expensive	Yes	75	62.5
		No	45	37.5
3.	Plus size fashions are unattractive	Yes	81	67.5
		No	39	32.5
4.	Often dark color garments are available for plus size	Yes	65	54.2
		No	55	45.8
5.	Avoid some styles due to body shaming	Yes	83	69.2
		No	37	30.8
6.	Limited variety in stores	Yes	76	63.3
		No	44	36.7
7.	Prefer trial before purchase	Yes	82	68.3
		No	38	31.7
8.	Often need alterations after purchase	Yes	77	64.2
		No	43	35.8

9.	Promotions on plus size garments ignored	Yes	90	75
		No	30	25

Interpretation

From Table 2 it shows that the plus size wearer agreed to the statement that garments are expensive (62.5%), unattractive fashion(67.5%), more of dark color garments available (54.2%), avoid some styles due to body shaming (69.2%), limited variety (63.3%) prefer trial before buying (68.3%) often need alterations after purchase (64.2%), promotions on plus size garments ignored(75%) and disagreed to the statement that all plus sizes are available (71.7%).

CONCLUSION

Due to unhealthy life style changes happen in the individual's body form and weight, which is resulting to the preference for bigger size or large size garments which refers to plus size or extended size. The plus size population is increasing day by day, but the production and sale is less than the expected demand. To understand the preferences of garments among plus size college girls in Chennai, by assessing the preferences of readymade and custom-made garments and challenges faced towards the garment purchase in stores among plus size college girls in Chennai. The data gathered was presented using tables in simple percentage. From the data it was revealed that, respondents preferred the custom-made garments for the durability, satisfaction, perfect fitting, good finishing and prefer party wear. Whereas the respondents preferred readymade garments for the time and cost effective, prefer casual and formal wear and avail more brands. Plus size wearers agreed to the statement that large size garments are expensive than normal size garment, unattractive fashion, often dark color garments are available. They avoid some styles due to body shaming, limited variety in stores; prefer trial before purchase, often need alterations after purchase for size adjustments, ignored promotions for these sizes. Based on the results of this survey, it can be recommended to the garment manufacturers and apparel designers to focus on developing apparel that is more comfortable and fashionable to plus size College girls and to improve the clothing shapes, solve the pain of the wearer and produce garments that suit the wearer in the design details, fabric type, suitable fitting by considering proper body measurements.

Scope of the Study

This study will help the garment manufacturers and fashion designers to design and manufacture the plus or large size garments with more collections and suitable fit. Readymade manufacturers must give importance on the durability and shopping atmosphere. Further study: Impulsive clothing purchase among plus size women and Comparative analysis of plus size sizing systems can also be studied.

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Below figures show the Plus size dresses availability in malls and retail stores and preferences towards the readymade and custom-made dresses by College girls.

Figure 1: Plus size dress with less variety (Mall)   Figure 2: Plus size dress unorganized (Retail shop)

Figure 3: Plus size College girl wears Readymade   Figure 4: Plus size College girl wears Custom-made

2

Eco-friendly Moth Repellent Finishes: Efficacy and Effect on the Physical Properties of Woollen Fabric

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ABSTRACT

Wool is a natural protein fibre. It is composed of keratin and susceptible to insects which can digest this complex keratin protein. This causes serious problems in the processing, manufacturing and storage of the woollen clothes as well as museum artefacts. Pests like beetles and moth attack woollens. Moth repellents are generally used for monitoring the pests attack. Most of the repellents available in the market are generally made of synthetic chemicals which are extremely effective but have adverse environmental impact. Hence, an attempt has been made to developed eco-friendly moth repellent finishes using the leaves of lemongrass, silver oak, *tulsi* and henna. Bioactive agents were extracted from the leaves through Soxhlet method. Microcapsules were prepared using the extracts as the core ingredients, sodium alginate as sheath material and citric acid as binding agent through simple coacervation technique. They were applied to the woollen fabric using pad-dry-cure method. Moth repellency of the finished fabrics was tested on the unwashed finished samples and the efficacy was analyzed after washing the fabrics for 5, 10 and 15 wash cycles and after commercially dry cleaning. The test revealed that wool fabric finished with microcapsules of lemongrass extract showed the highest moth repellency with the lowest feeding damage followed by silver oak, *tulsi* and henna respectively. The finishes were also effective upto 15 washes and dry cleaning except for *tulsi.* Hence, the finishes prepared from the plant sources namely, lemongrass, silver oak, *tulsi* and henna can be successfully applied to woollen fabrics to impart effective moth repellent property.

Keywords: Microcapsules, wool, lemongrass, silver oak, *tulsi* and henna

INTRODUCTION

The natural protein fibres like wool and silk are one of the most prominently used high value textile materials all over the world since antiquity. Wool and specialty hair fibres are constituted of the insoluble protein keratin which contains 18-19 specific amino acids with highly crosslinking disulphide bonds. Wool fibre is widely used in fashion apparels, home furnishings, industrial items and functional wears like fire resistant work wear and durable carpets (Arora and Padua 2010). Wool and specialty hair fibres, due to their protein content, are a suitable substrate for the growth and propagation for pests and micro-organisms under favourable conditions causing damage to the fabric, skin irritations and diseases (Shakyawar *et al* 2015).

Under ambient temperature and humidity conditions, woolen substrates provide

excellent breeding grounds for insects and microorganism and their proliferation. The larvae feed on these natural proteins, which cause damage to the fabric, skin irritations and diseases while using infested wool clothing (Nazari *et al* 2013). Cloth moth is the most common fabric pests. Larvae of cloth moth feed on wool resulting in heavy losses to textile industries, commercial as well as domestic stores and museum artifacts (Cox andPinniger 2007). Hence, moth proofing is necessary for the protein fibres which are susceptibleto larval attack.

Compounds such as Mitin FF, Eulan U33 and Eulan WA New are generally used as insect resistant agents. Conventional insecticides, for example, diatomaceous earth, ammonium phenate bromide, naphthalene, p-dichlorobenzene, carbamates, organophosphorus compounds, pyrethrin, and pyrethroids are used to control insects and fabric pests. Pyrethrin insecticides do not leave persistent toxic residues that makes them more appropriate for controlling cloth moth than many other products (Basuk and Behera 2018 and Brady 2019).

Lately, natural products are favored over the synthetic ones for being non-toxic on non-target organisms, easily biodegradable and environment- friendly. Natural products based on plants have repellent, antifeedant, ovicidal and insecticidal activities against various species of insect. These products are as effective as conventional pesticides when applied on stored animal products. A number of such attempts that have been reported to prevent the growth of pests and microorganism on textiles (Bhandari *et al* 2022).

Microencapsulation is a quickly growing technology that has more applicability in textiles in recent years. The controlled release of active agent is a primary prerequisite for a fabric/microcapsule system. Efficient protection of the core material, its availability and release at controlled rate with efficient embedding of microcapsules into the textile substrate is the other necessary requirements (Petrusic and Koncar 2016). Microcapsules of lavender, eucalyptus, and citronella have repellency against the larvae of *A. flavipes* (Medha *et al* 2021).

The present study is focused on developing eco-friendly, non-toxic, herbal and viable moth-repellent functional finishes for protein fibres through microencapsulated herbal extract of selected plant sources. It is expected to generate knowledge on moth repellency of the selected plant sources and their application as textile finishes on woollen fabrics.

OBJECTIVES

1. To develop microencapsulated finishes from four plant extracts and apply them on wool fabric.
2. To test the effect of the developed finishes on the physical properties and moth repellency of the finished wool fabric.

MATERIALS AND METHODS

Pure wool fabric was bought from the local market. The fabric was scoured using non-ionic detergent to remove any impurities. The fabric was tested for thread count and GSM. Leaves of lemon grass (*Cymbopogon citratus*), silver oak (*Grevillea robusta*), *Tulsi* / holy basil (*Ocimum sanctum*) and henna (*Lawsonia inermis*) were selected on the basis of having maximum moth repellent activity and availability. They were shade dried and ground and then used for extraction of bioactive materials using solvents like water, acetone, methanol and ethanol todevelop moth repellent finish. Soxhlet method was used for extraction.

Preparation of microcapsules ad their application on wool fabric

Sodium alginate, citric acid and sodium sulphate was used as sheath, binder cum cross-linking agent and pH regulator respectively for making microcapsules with the extracted bioactive material as core. Wool fabric sample was dipped in the microcapsule solution made using the optimized recipe keeping material to liquor ratio as 1:20 and padded through pneumatic padding mangle using two dips and two nips operation. The finished fabric was then dried and cured at the optimized temperature and time for each finish (Sathyanarayan *et al* 2010).

Effect of moth repellent finishes on morphology and physical properties of the finished fabric

Morphology of the finished wool fabrics was studied using the images were taken through Scanning Electron Microscopy. Physical properties namely, GSM, fabric thickness (BS 2544:954), bending length and flexural rigidity (ASTM-D1388-64), crease recovery (ASTM 1295-67), tensile strength (IS-1969-1985), whiteness index, air permeability (IS: 11056-1984 and ASTM–D737-1996) and water absorption (ASTM D 4772-97) were studied using Standard Test Methods.

Testing of moth repellency of the finished fabrics and its efficacy after washing and dry-cleaning

Fabric samples are washed according to ISO: 6330-1984E. Fabric samples were subjected to a controlled and predetermined number of washing cycles. Soap solution was prepared by taking 5 g/l of soap in a solution with liquor ratio 1:50, temperature 40° C and time 45 min. After washing the fabric in launder-o-meter using the above solution, samples are rinsed properly and dried.

Moth repellency test against the larvae of *Anthrenus flavipes*

The biological assays were done with the larvae of *Anthrenus flavipes* (LeConte) according to visual observation of the extent of damage, weight loss of the test sample and larval condition of the test larvae as per the procedure described by ISO 3998-1977(E) in the Eco Lab, Wool Research Association, Thane, Mumbai.

Testing the efficacy of the finished fabric

The efficacy of the developed moth repellent finish was analysed on both unwashed and washed samples with predetermined number of wash cycles in launder-o-meter following standard test ISO: 6330-1984E. The samples were also commercially dry cleaned. The fabric samples were then exposed to moth repellency test and the change in sample and structures were visually evaluated and the degree of change of weight of the samples was noted.

Statistical Analysis

The data was coded, tabulated and statistically analyzed using Tukey's test to study the association and variation among different parameters at 5% level of significance and values were expressed as mean ± standard deviation.

RESULTS AND DISCUSSION

Preliminary characteristics of the selected fabric

Thread count and weight of fabric were tested for the procured wool fabric (Table 1). The EPI and PPI of the wool fabric were 32 and 29 respectively whereas GSM of the wool

fabric was found to be 194 g/m^2.

Effect of the developed finishes on morphology of the finished wool fabric

The SEM images were used to analyze the binding of microcapsule and distribution on the surface of the fabric samples. Surface morphology of untreated control and treated wool samples are presented in Plate 1. It was observed from the images that the wool control had a clear substrate whereas, microcapsules were found deposited on the substrates of the finished wool fabric samples. This proved the successful implantation of the developed microcapsules on the wool fabrics.

Effect of the developed finishes on the physical properties of the finished wool fabric

Physical properties of both untreated control and treated fabric samples were evaluated to compare the changes that occurred after the treatment with the finish, in order to ensure their suitability for the intended purpose and expected quality. Table 1 shows the effect of developed finishes on GSM, thickness, overall flexural rigidity and crease recovery angle of the wool fabric.
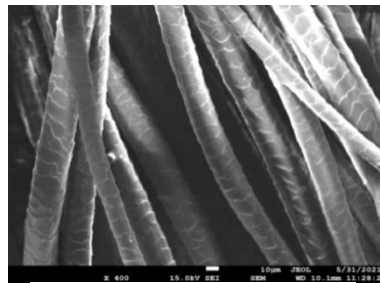
Wool control

Wool fabric finished with microencapsulated
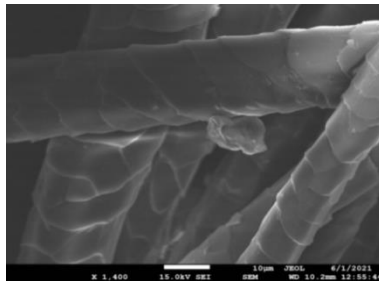
Wool fabric finished with microencapsulated silver oak extract
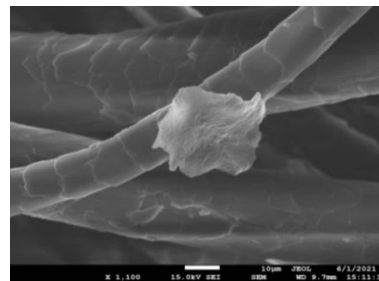
Wool fabric finished with microencapsulated *tulsi* extract
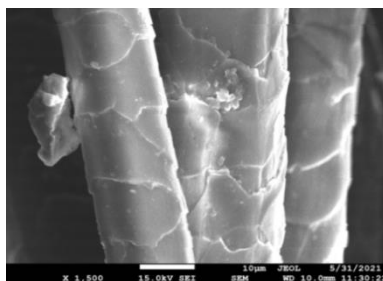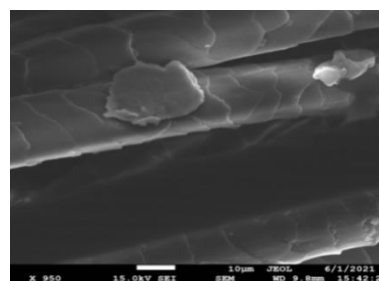
Wool fabric finished with microencapsulated henna extract

Plate 1 SEM images of control and finished wool fabric samples

Table 1 Effect of the developed finishes on the GSM, thickness, overall flexural rigidity andcrease recovery angle of the wool fabric

S. No.	Treatment	GSM (g)	Thickness (mm)	Overall flexural rigidity (Go)	Crease recovery angle (°)	
					Warp	Weft
1	Control	194.33 [b] ±4.04	0.52[a]±0.52	92.43[ab]±8.38	143.33[a]±0.63	142.33[a] ±0.58
2	Lemongrass	200.00 [a] ±1.73	0.53[a]±0.53	106.19[a]±9.66	144.33[a]±0.76	91.33[b]±0.25
3	Silver oak	199.67[a] ±0.58	0.52[a]±0.52	72.77[bc]±7.60	128.33[a]±0.76	147.33[a]±0.29
4	*Tulsi*	201.00 [a] ±1.00	0.53[a]±0.53	65.73[c]±1.82	150.33[a]±0.52	141.67[a]±1.04
5	Henna	201.67 [a] ±1.53	0.52[a]±0.52	53.52[c]±12.73	138.67[a]±0.80	140.00[a]±0.63

Values are expressed as mean±SD

Values followed with different superscripts are significantly different ($p < 0.05$) using Tukey's test

It is observed from Table 1 that GSM of the wool fabric samples finished with all the four developed finishes were significantly different ($p < 0.05$) from the GSM of the control (194.33 g). But among the finished wool fabrics, there is no significant difference in the GSM. Thus, the application of the four developed finishes on wool fabric samples has significantly increased the weight of the finished fabrics. For thickness, it is observed from the table that there was no significant difference ($p > 0.05$) between the control and the finished wool fabrics as well as among the finished fabrics.

Further, the overall flexural rigidity of the wool control was found to be 92.43 mg/cm and for wool fabrics finished with microencapsulated extracts of lemon grass, silver oak, *tulsi* and henna was 106.19 mg/cm, 72.77 mg/cm, 65.73 mg/cm and 53.52 mg/cm respectively. As observed from Table 1, there is a significant change ($p < 0.05$) in the overall flexural rigidity of the finished wool samples from the control.

The crease recovery angle of wool control (143.33˚) in warp-wise direction, was not significantly different ($p > 0.05$) from the samples finished with microcapsules of lemon grass (144.33˚), silver oak (128.33˚), *tulsi* (150.33˚) and henna (138.67˚) according to Tukey's test. The warp-wise crease recovery angle of wool sample finished with microcapsules of *tulsi* leaves extract (150.33˚) was the highest while that of silver oak (128.33˚) was the lowest as evident from Table 1. The crease recovery angle of the weft way wool fabric finished with microencapsulated lemon grass extract (91.33˚) was significantly decreased ($p < 0.05$) from control (142.33˚). Crease recovery angle of sample finished with silver oak leaves extract (147.33˚) was higher while that of *tulsi* (141.67˚) and henna (140.00˚) which were lower than the control (142.33˚) but changes were not significant ($p > 0.05$). Thus, it can be inferred that the developed finished had little effect on the warp-way wool sample which is not significant. But, significant decrease was seen in the microencapsulated lemon grass extract treated weft-way wool sample and no significant change was observed in the other three finished samples.

Table 2 Effect of the developed finishes on tensile strength, air permeability, moisture absorption and whiteness index of the wool fabric

S. No.	Treatment	Tensile strength (g/denier)		Air permeability (cc/sec/sqcm)	Moisture absorption (%age)	Whiteness Index
		Warp	Weft			
1	Control	14.37[a]±0.50	3.68[a]±0.08	59.83[a]±0.07	11.34[a]±0.46	17.93[a]±2.56
2	Lemongrass	13.18[b]±0.11	3.87[a]±0.05	60.00[a]±0.20	4.00[b]±0.00	-20.31[d]±4.76
3	Silver oak	10.34[c]±0.06	3.95[a]±0.21	56.00[b]±0.00	5.00[b]±0.12	-3.95[c]±0.38
4	Tulsi	10.26[c]±0.23	3.60[a]±0.14	60.67[a]±0.12	5.66[b]±0.17	7.66[b]±2.07
5	Henna	10.68[c]±0.23	3.76[a]±0.17	62.00[a]±0.20	5.00[b]±0.00	10.65[b] ±0.71

Values are expressed as mean±SD

Values followed with different superscripts are significantly different ($p<0.05$) using Tukey's test

The effect of the developed finishes on the tensile strength of wool fabric was studied and results are presented in Table 2. It is observed that in warp-wise direction, the tensile strength of control (14.37g/denier) was significantly different ($p<0.05$) from wool fabrics finished with microencapsulated extracts of lemon grass (13.18 g /denier), silver oak (10.47 g /denier), *tulsi* (10.06 g /denier) and henna (10.68 g /denier). Among the finished samples, except for lemon grass, there was no significant difference. In weft weft-wise direction, the tensile strength of the samples finished with microcapsules of lemon grass (3.87 g/denier), silver oak (3.95 g/denier), *tulsi* (3.60 g/denier) and henna (3.76 g/denier) were not significantly different ($p>0.05$) from control (3.68 g/denier). No significant   difference was also observed among the finished samples. It is inferred from the above observations that a decrease in the tensile strength was indicated in the warp direction of finished wool fabrics while a non-significant increase as well as a decrease was observed in the weft direction compared to the control. This result is supported by Karolia and Mendapara (2007) and Agrawal (2010) who in their studies, reported a decrease in tensile strength of the microcapsule-finished fabrics. The wool fabric samples showed more strength in warp direction than in weft. This indicated that warp yarns were stronger than weft yarns.

The air permeability of wool control was 59.83cc/sec/sq.cm. It is observed from Table 2 that the air permeability of wool fabrics samples finished with microencapsulated extracts of lemon grass (60 cc/sec/sq.cm), *tulsi* (60.67 cc/sec/sq.cm), and henna (62.00 cc/sec/sq.cm) were non-significantly increased ($p>0.05$) from control (59.83cc/sec/sq.cm). Whereas significant decrease ($p<0.05$) was observed in wool fabric finished with microcapsules of silver oak extract(56.00cc/sec/sq.cm). Again, it is observed from the table that percentage water absorption of all four finished samples was significantly decreased ($p<0.05$) from wool control (11.34). But, among the finished samples the changes in moisture absorption were non-significant ($p>0.05$). Hence, in general, air permeability was least affected by the developed finishes.

The Whiteness index (WI) of the control was 17.93. WI of all the four finished wool fabrics was significantly lower from control. The finished wool fabrics were also significantly different among them. It can be concluded from the table that whiteness of the finished wool

fabrics reduced after giving the finishing treatment.
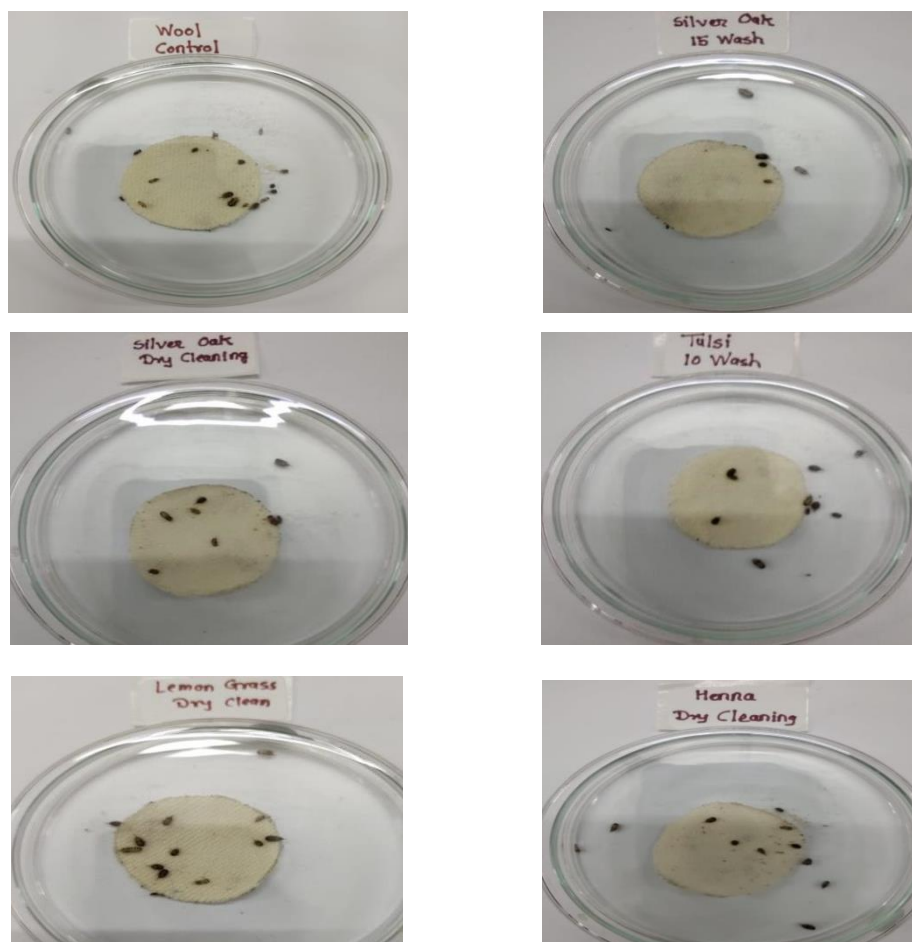
Plate 2 Images of moth repellency test for control and finished wool fabric samples

Moth repellency of the developed finishes and their efficacy after washing and dry-cleaning

Testing of resistance of wool samples treated with microencapsulated finishes against beetle *A. flavipes* was conducted as per the International Standard ISO: 3998. Images of moth repellency test for control and treated wool fabric samples are given in Plate 2. There should be less than 15 mg loss in the weight of fabric for the finish to be moth repellent.

The repellency results of the fabric finished with lemongrass finish is furnished in Table 3. It is evident that the feeding damage in the control after 14 days exposure to the beetle *A. flavipes* was 50.35 mg which means that untreated wool fabric was not resistant to the insect. Maximum feeding damage was observed in treated wool sample after 15 washes (6.85 mg) and minimum feeding damage was observed in dry cleaned sample (4.90 mg). It indicated that the finish can easily with stand the commercial dry cleaning agents and retain its effectiveness to the highest extent. Highest feeding damage among the finished samples was observed after 15 wash cycles (6.85 mg).

Table 3 Moth repellency of wool samples treated with microencapsulated lemon grass extract

S. No.	Description	Visual assessment	Feeding damage in mgs	Larval condition at the end of the test	Remarks
1	Wool control	Fibres damaged	50.35	Active	Does not pass test
2	Unwashed sample	No surface damaged	5.12	Active	Sample passes test
3	5 wash cycle	No surface damaged	6.15	Active	Sample passes test
4	10 wash cycle	No surface damaged	6.23	Active	Sample passes test
5	15 wash cycle	No surface damaged	6.85	Active	Sample passes test
6	Dry clean	No surface damaged	4.90	Active	Sample passes test

There was no surface damage in unwashed finished sample, washed samples and dry-cleaned samples. This showed that the developed microencapsulated lemon grass leaves extract finish passed the moth repellency test as per the standard and was found to be effective in preventing the wool fabrics from the attack of beetle.

The results of resistance of wool samples treated with microencapsulated silver oak leaves extract against beetle *A. flavipes* are presented in the Table 4. Maximum feeding damage was observed in treated dry cleaned sample having 14.86 mg weight loss and minimum feeding damage was observed in unwashed finished sample having 5.11 mg loss in weight. This shows that the finish is least effective after dry cleaning. The developed finish was found to be most effective in the unwashed sample with the minimum feeding damage indicating that it was least affected by the beetles.

Table 4 Moth repellency of wool samples treated with microencapsulated silver oak extract

S. No.	Description	Visual assessment	Feeding damage in mgs	Larval condition at the end of the test	Remarks
1	Wool control	Fibres damaged	50.35	Active	Does not pass test
2	Unwashed sample	No surface damaged	5.11	Active	Sample passes test
3	5 wash cycle	No surface damaged	5.30	Active	Sample passes test
4	10 wash cycle	No surface damaged	7.75	Active	Sample passes test

| 5 | 15 wash cycle | No surface damaged | 8.98 | Active | Sample passes test |
| 6 | Dry clean | No surface damaged | 14.86 | Active | Sample passes test |

Feeding damages was found to increase with the increase in number of wash cycles i.e., after 15 wash cycle (8.98 mg)> after 10 wash cycle (7.75 mg)>after 5 wash cycle (5.30)> unwashed finished sample (5.11 mg), which means the effectiveness of the finish decreases with the increase in number of washings. Studies conducted by Afzal *et al* (2019) and Shakyawar *et al* (2015) also reported that silver oak leaf extract has termiticidal properties and good anti-moth properties respectively.

The results of repellency test of microencapsulated *tulsi* extract finished wool samples are depicted in Table 5. It is clear from the table, that feeding damage of the wool control after two weeks exposure to the beetles was 50.35 mg. Maximum feeding damage was observed in dry cleaned sample with 15.76 mg loss in the weight the fabric and minimum feeding damage was observed in unwashed finished sample with 7.56 mg weight loss. Feeding damage increased in the order of unwashed sample (7.56 mg) <after 5 wash cycles (9.03mg) <after 10 wash cycles (9.13 mg) <after15 wash cycles (9.48 mg) <dry clean (15.76 mg).

Table 5 Moth repellency of wool samples treated with microencapsulated *tulsi* extract

S. No.	Description	Visual assessment	Feeding damage in mgs	Larval condition at the end of the test	Remarks
1	Wool control	Fibres damaged	50.35	Active	Does not pass test
2	Unwashed sample	No surface damaged	7.56	Active	Sample passes test
3	5 wash cycle	No surface damaged	9.03	Active	Sample passes test
4	10 wash cycle	No surface damaged	9.13	Active	Sample passes test
5	15 wash cycle	No surface damaged	9.48	Active	Sample passes test
6	Dry clean	No surface damaged	15.76	Active	Sampledoes not pass test

Table 6 depicts the moth repellency of microencapsulated henna extract finish on wool fabric. From the table it is observed that the feeding damage of the wool control after two weeks exposure to the beetles was 50.35 mg. Maximum feeding damage was observed in 15 wash cycles with 13.49 mg weight loss of the fabric sample and minimum feeding damage was observed in finished unwashed sample with 8.81 mg weight loss. Feeding damage increased with the increase in number of wash cycles except for the dry-cleaned sample.

Table 6 Moth repellency of wool samples treated with microencapsulated henna extract

S. No.	Description	Visual assessment	Feeding damage in mgs	Larval condition at the end of the test	Remarks
1	Wool control	Fibres damaged	50.35	Active	Does not pass test
2	Unwashed sample	Surface damaged	8.81	Active	Sample passes test
3	5 wash cycle	Surface damaged	12.86	Active	Sample passes test
4	10 wash cycle	No surface damaged	12.49	Active	Sample passes test
5	15 wash cycle	No surface damaged	13.49	Active	Sample passes test
6	Dry clean	No surface damaged	13.27	Active	Sample passes test

According to Shakyawar *et al* 2015, henna leaves show moderate anti-moth property. Wall nut hull and henna dyed protein wool were stated to have the highest protection against *Dermestes maculatus* (Nazari 2016). The results are in agreement with a study conducted by Anitha *et al* (2011) where microencapsulated polyester fabric showed highest mosquito repellent activity after washing as compared to direct pad dry cure method i.e., microencapsulation increases the durability of finish.

CONCLUSION

The results of the study showed that wool fabrics which are susceptible to damage by insects can be protected successfully by applying the plant-based finishes. The microencapsulated finish provided better durability i.e. till fifteen washing cycles but was not very durable to dry cleaning in some cases. The effect of the finishes on the physical properties showed that there was negative effect on the some of the properties like tensile strength, flexural rigidity, moisture absorption, air permeability etc. but it was in permissible limits. Hence, the finishes prepared from the plant sources namely lemon grass, silver oak, *tulsi* and henna can be successfully applied to woollen fabrics to impart effective moth repellent property.

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3

A SURVEY ON THE APPLICATION OF TEXTILE MATERIALS IN CIVIL ENGINEERING

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ABSTRACT

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Civil engineering is a professional field focused on the design, construction, and maintenance of the built environment. This discipline encompasses the construction of various structures, including residential buildings, public facilities, industrial complexes, dams, bridges, aqueducts, canals, highways, power generation plants, wastewater treatment facilities, and other infrastructure that supports the general public. The primary objectives of civil engineering are to enhance public safety, improve quality of life, and promote sustainable development. Textiles are versatile materials made from fibers or yarns. Historically linked to clothing and household fabrics, recent advancements have broadened their applications across multiple industries such as automotive, aerospace, and civil engineering. The intersection of civil engineering and textile materials presents an intriguing and productive synergy that merges traditional engineering principles with modern material science. This collaboration yields numerous advantages for infrastructure development, environmental sustainability, and innovative construction methodologies. In this study, a survey was conducted among civil engineers to assess their knowledge regarding the utilization of textile materials in construction projects. The questionnaire method was employed to collect data from the respondents. The gathered information was analyzed and interpreted accordingly. The survey results indicate that a significant majority of civil engineers possess awareness and understanding of incorporating textile materials into construction practices. Specifically, 53.8% reported using products such as geonets and fiber-reinforced slabs; 46.2% utilized fiber-reinforced polymeric composites; while 38.5% applied jute sacks, concrete canvas, and fiber-reinforced concretes.

Keywords: civil engineering; man-made fibers; natural fibers; questionnaire method; survey; textile materials.

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INTRODUCTION

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Textiles play a pivotal role in civil engineering, significantly enhancing both functionality and durability. The expansion of textile materials within this discipline is propelled by technological advancements, the growing demand for sustainable and durable construction solutions, as well as ongoing research and development efforts. Key factors contributing to the proliferation of textile materials include advancements in high-performance fibers, cutting-edge

manufacturing techniques such as nanotechnology, the integration of eco-friendly materials, an increased demand for infrastructure in expanding urban areas and smart cities, multifunctional capabilities, and continued research initiatives.

The application of textile materials in construction offers numerous advantages, including lightweight properties, strength, thermal and acoustic insulation, as well as resistance to sunlight, chemicals, and pollutants. Currently, the textile industry provides high-modulus and high-strength fabrics that can serve as substitutes for traditional materials such as steel, wood, and concrete (Ali Hassnain Farrukh, 2015).

The utilization of textiles in civil engineering encompasses a diverse range of fields and fulfills various functions. Specific applications include geotextiles for erosion control, fiber-reinforced concrete, architectural textiles, environmental textiles, smart textiles, composite materials for flood control, bioengineering applications, and pavement overlays (Mrudula Zalte and Anuja Patil, 2020). These applications highlight the versatility and significance of textiles in enhancing performance, sustainability, and durability within the realm of civil engineering.

Need for research work

Textile materials, particularly geotextiles, are essential in minimizing the environmental impact of civil engineering projects. Their use in erosion control and soil stabilization significantly contributes to the reduction of environmental degradation (Sitharam & Hegde, 2017). Textile materials provide a more economical alternative compared to conventional construction methods. Research indicates that the integration of geotextiles lowers construction costs while enhancing project efficiency (Banerjee et al., 2020). Ongoing advancements in technical textiles, such as geocomposites and geogrids, require comprehensive research to assess their mechanical and physical properties across various applications (Shukla, 2018). The India non-woven geotextiles market size was valued at USD 108.14 million in 2022 and is projected to grow from USD 113.55 million in 2023 to USD 460.73 million by 2030, exhibiting a CAGR of 22.1% during the forecast period. (https://www.fortunebusinessinsights.com, 2025) The increasing demand for durable and cost-effective infrastructure necessitates innovative solutions. Geotextiles have demonstrated their effectiveness in reinforcing road embankments and ensuring long-term stability (Koerner, 2012). A comprehensive understanding of the advanced applications of textile materials can lead to improved construction methodologies, cost efficiencies, and environmental advantages. The rising application of smart textiles in infrastructure development—such as sensor-embedded fabrics designed for structural health monitoring that track strain, temperature, and vibrations (Mishra, 2018)—as well as structural reinforcement textiles and intelligent coatings that repair cracks (Kumar, 2020) while enhancing water resistance underscores the necessity for extensive research in this domain. Hence a research survey has been framed and demonstrated to examine the present and prospective applications of textile materials within civil engineering. Additionally, it offer insights and recommendations for industry professionals regarding the effective incorporation of textile materials into civil engineering projects, thereby promoting sustainable and cost-effective infrastructure solutions.

OBJECTIVES

1. - To conduct a survey among civil engineers on the application of textile materials in civil works
2. - To understand the current practice of using textile materials in civil engineering

METHODOLOGY

This study utilized a survey methodology to collect data on the utilization of textile materials within the field of civil engineering. To ensure objective and representative data collection, a random sampling technique was employed to select participants. The research focused on 50 civil engineers in Coimbatore district as respondents. The survey encompassed various dimensions related to the application of textile materials in civil engineering, including:

● Awareness of textile materials used in civil engineering applications.
● Experience with geotextiles, fiber-reinforced composites, and other textile-based materials.
● Preferred types of textile materials for construction purposes.
● Technical and economic challenges associated with the implementation of textile materials.
● Recommendations for enhancing awareness and adoption of textile materials within the civil engineering sector.

The questionnaire was prepared in google form and send through mail. By employing this random selection approach, the study ensured equitable representation among the chosen respondents, thereby minimizing bias and strengthening the validity of its findings.

RESULTS AND DISCUSSION

The questionnaires collected from the respondents were consolidated and the results were discussed below:

Awareness of utilizing textile materials in civil engineering projects.
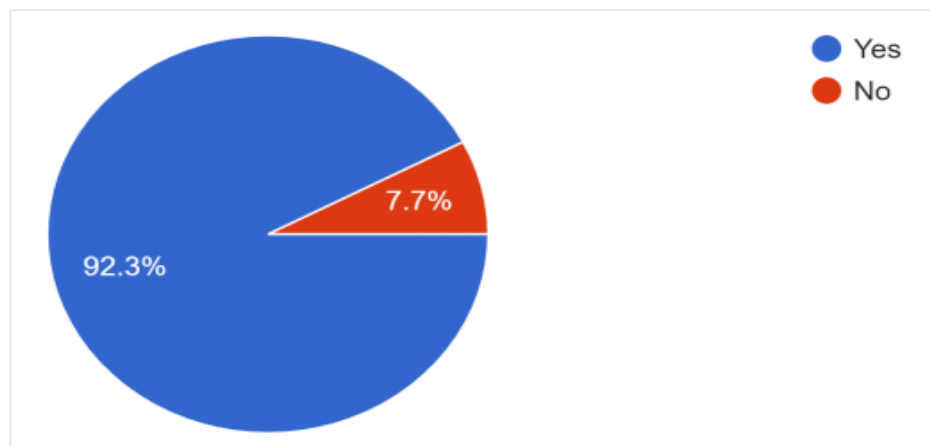
Graph 1 - Awareness of Textile Materials in Civil Engineering

Graph 1 illustrates the level of awareness among civil engineers regarding the use of textile materials in civil engineering projects. The data indicates that approximately 92.3% of engineers possess knowledge about the application of textile materials, while only a small fraction, around 7.7%, are unaware of their utilization in civil works.

Types of Textile Products Utilized in Construction
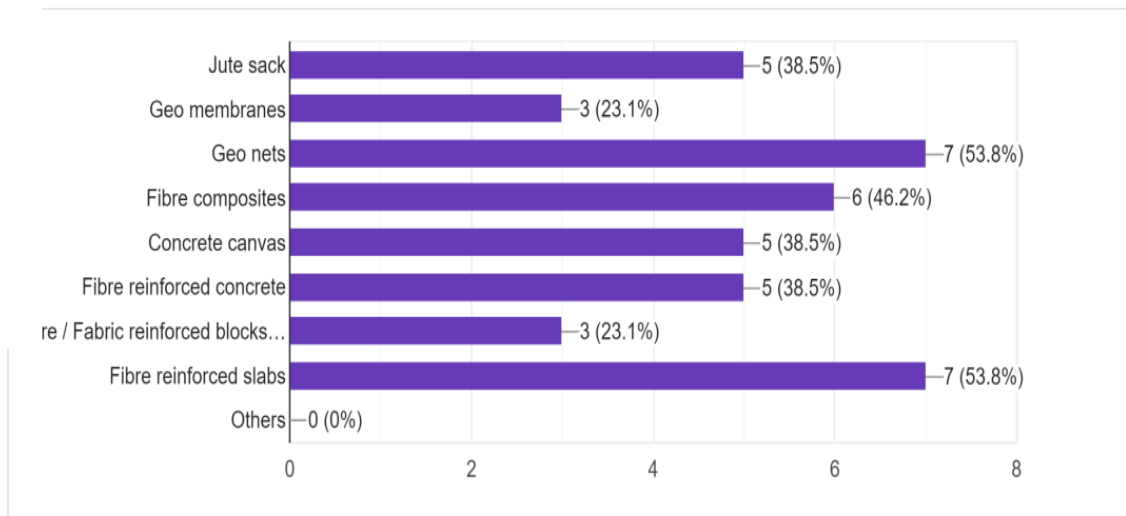
Graph 2 - Types of Textile Products Utilized in Construction

Graph 2 presents information on the various types of textile products employed in construction activities. The findings reveal that 53.8% of the products utilized include geonets and fiber-reinforced slabs, whereas 46.2% consist of fiber-reinforced polymeric composites. According to Longbiao Li et al. (2022), fiber-reinforced composites exhibit advantageous properties such as lightweight characteristics, chemical and corrosion resistance, a low ecological footprint, and thermal insulation capabilities. Furthermore, these materials can be customized and molded into complex shapes.

Additionally, it was noted that Jute sacks were used for curing purposes by 38.5% of respondents to mitigate water loss and safeguard concrete from potential damage. This method has been reported to yield satisfactory results for concrete slabs and pavements, as stated by dailycivil.com. Ragavendra et al. (2017) further indicate that fiber-reinforced concrete pavements demonstrate greater efficiency and enhanced tensile strength compared to conventional reinforced concrete pavements, leading to an increase in the application of fiber-reinforced concrete to 38.5%.

Utilization of Natural and Man-made fibres in civil works
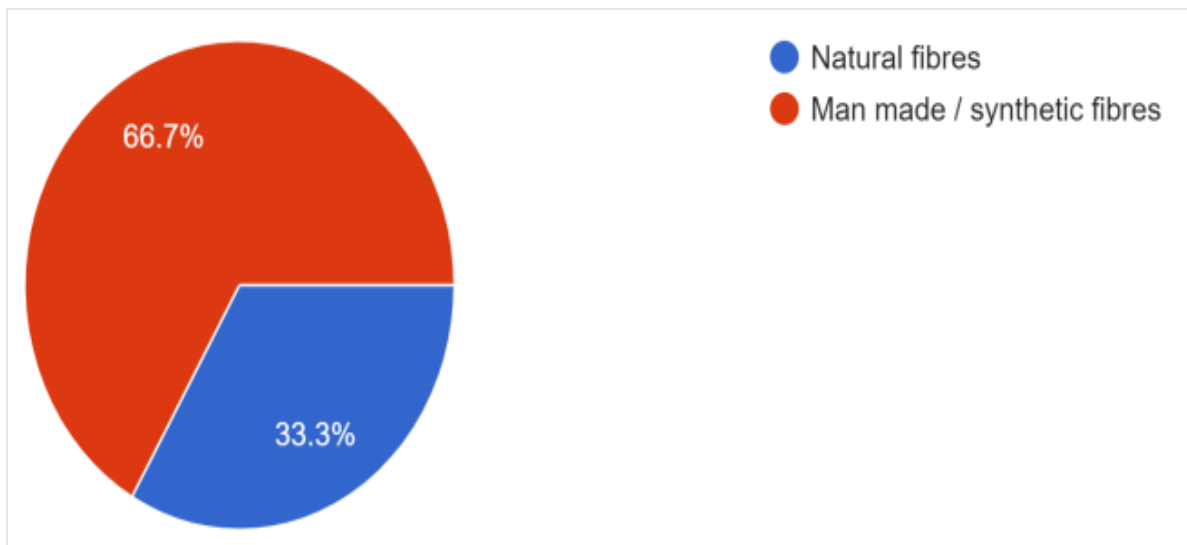
Graph 3- Utilization of Natural and Man-made fibres in civil works

The data illustrated in Graph 3 indicates that 66.7% of engineers favor the use of synthetic fibers due to their superior characteristics, including tensile strength, durability, and modulus of elasticity. In contrast, only 33.3% of engineers utilize natural fibers in civil engineering projects. Abbas Mohaherani et al. (2019) assert that natural fibers are readily available, abundant, can be sourced from nature at a low cost, and contribute to reducing environmental impact when incorporated into the construction industry.

Type of natural fibre majorly used in civil works
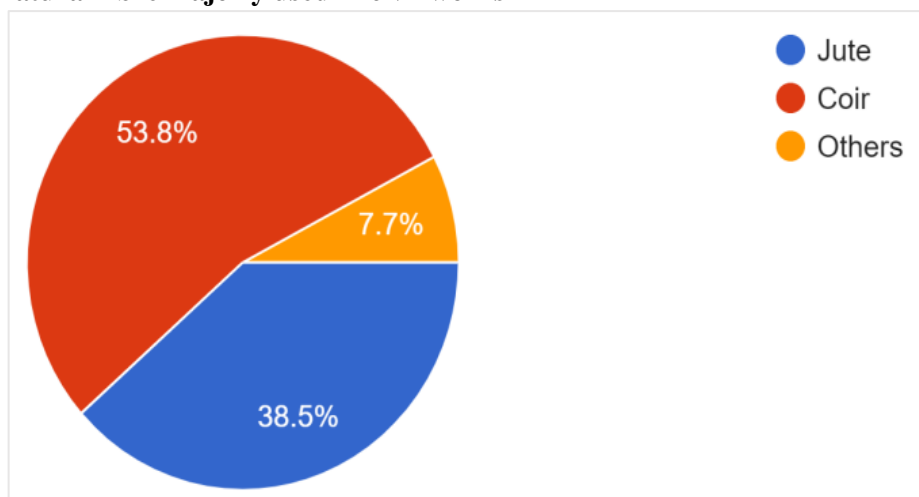
Graph 4- Type of natural fibre majorly used in civil works

The data presented in Graph 4 indicates that 53.8% of coir fibers are utilized in civil engineering applications, including composites and thermal insulation. Research by Tara Sen and H. N. Jagannatha Reddy (2011) highlights the extensive range of products developed from coir fiber. Its lower thermal conductivity and bulk density position it as a viable option for composite

materials in construction, addressing environmental and energy challenges effectively. Additionally, jute accounts for 38.5% of usage, while other natural fibers comprise 7.7%.

Type of Man-made fibres majorly used in civil works
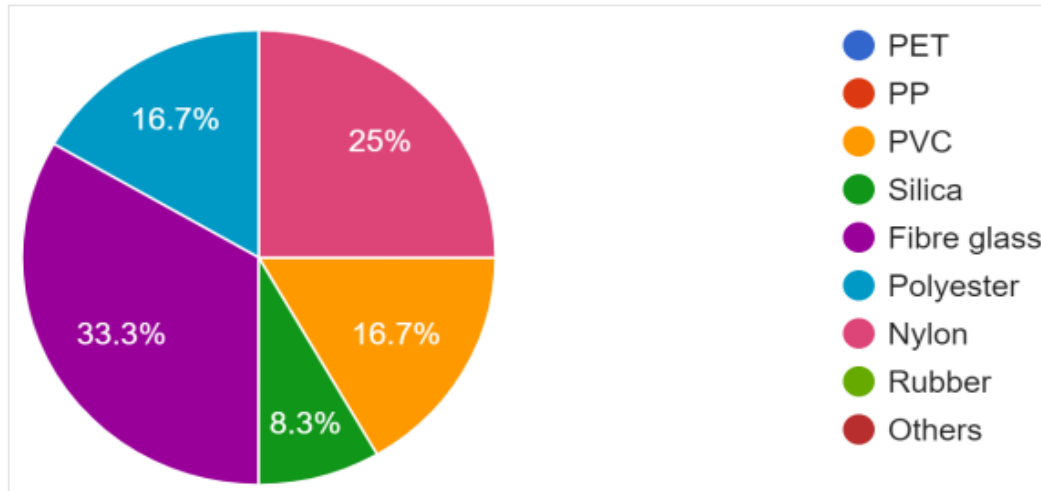
Graph 5- Type of Man-made fibres majorly used in civil works

Graph 5 clearly illustrates that fiberglass constitutes a significant 33.3% of fiber applications due to its superior mechanical properties, strength, durability, and thermal characteristics, along with excellent interfacial bonding to matrices as noted by Abbas Mohaherani et al., (2019). Furthermore, nylon represents 25%, while PET, polyester, and PVC fibers collectively account for 16.7%. Both nylon and PET exhibit commendable tensile strength and elastic modulus; however, the energy-intensive manufacturing process of PET increases costs, potentially leading to reduced utilization compared to nylon. Notably, rubber usage is limited to only 8.3%.

Different types of textile materials used in civil engineering
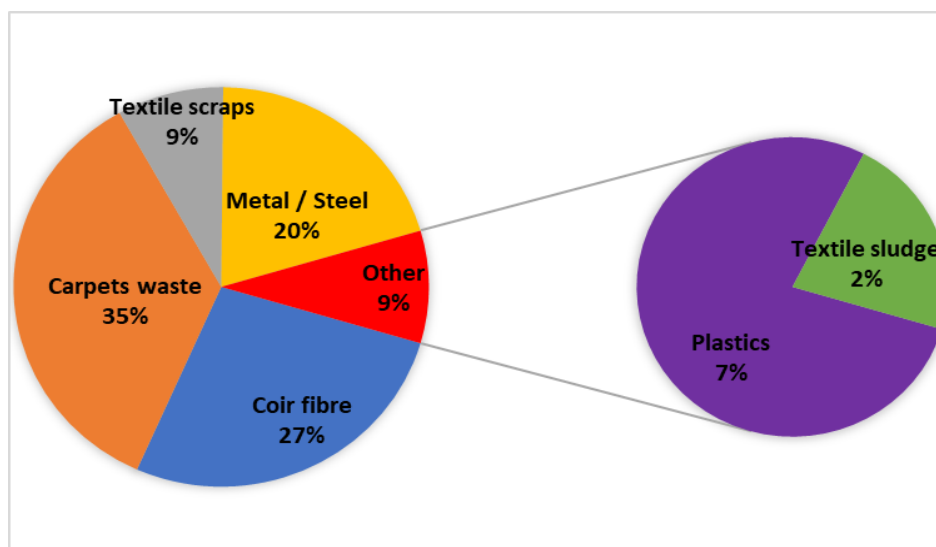
Graph 6- Different types of textile materials used in civil engineering

The utilization of various textile materials in civil engineering applications is illustrated in Graph 6. It reveals that a significant portion, specifically 35%, consists of carpet waste. According to Maria Idrees et al. (2023), incorporating carpet waste into concrete enhances its mechanical properties, notably increasing tensile strength. Moreover, the innovative application of carpet waste serves as a cost-effective and environmentally friendly alternative to traditional concrete reinforcement materials. Additionally, the graph indicates that 27% of coir fiber and 20% of metal/steel fibers were employed in construction projects. Jacek Katzre (2006) highlights that various types of steel fibers were utilized as reinforcements for concrete materials to address brittleness issues, particularly in the construction of airport runways.

Furthermore, the graph shows that 9% of textile waste was utilized, with Andreea Nistorac and Maria Carmen Loghin (2022) stating that panels made from textile waste have been adopted to replace conventional oriented strand boards in civil engineering applications. Hafsa Jamshaid et al. (2024) emphasize that employing textile wastes in varying proportions within construction materials yields numerous benefits, including enhanced thermal insulation, improved noise protection, and reduced costs. Notably, only 2% of textile sludge was applied; Balasubramanian et al. (2006) indicate that substituting textile effluent treatment plant sludge for cement—up to a maximum of 30%—is feasible in producing non-structural building materials such as flooring tiles and solid pavement blocks and bricks.

CONCLUSION

The results of this research work have proven the use of textile maretials in civil engineering. These include geotextiles for soil stabilization, fiber-reinforced composites for structural enhancement, and innovative constructions utilizing smart textiles. The study's findings indicate that 92.3% of civil engineers are knowledgeable about the application of textile materials within their field. Notably, products such as geonets, fiber-reinforced slabs, fiber composites, jute sacks, concrete canvas, and fiber-reinforced concretes are employed at a significant rate in civil projects. Additionally, it is revealed that a majority of engineers prefer man-made fibers including fiberglass, nylon, PVC, and PET. Furthermore, textile materials like carpet waste, coir fiber composites, textile scraps, textile sludge, and plastics are also finding their applications in civil engineering.

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4

INFLUENCE OF DIGITAL MARKETING ON CLOTHING PREFERENCES AMONG RURAL AND URBAN YOUTH OF ODISHA

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ABSTRACT

This study investigates the impact of digital marketing on clothing and fashion brand preferences among youth in the rural (Kandhamal) and urban (Khurda) districts of Odisha. The aim is to identify these channels and comprehend the factors affecting their efficacy in shaping clothing preferences. The objectives of the study to evaluate how income levels influence youth clothing expenditure, the role of digital marketing in shaping fashion trends, and the effect of gender on fashion choices. Primary data to illuminate the digital marketing channels favoured by youth in the area are collected. Findings reveal a diverse range of digital marketing channels favoured by youth. Social media emerges as a powerful tool for influencing brand choices among youth in both areas. The study highlights the correlation between financial factors and impact of gender on various choices. Understanding these dynamics can help clothing and fashion brands tailor their digital strategies to resonate with the preferences of youth in Kandhamal and Khurda districts, ultimately enhancing brand visibility and consumer engagement in the competitive fashion market. From the study, the findings highlight the growing importance of digital marketing in the clothing and fashion industry and its impact on purchasing decisions.

Keywords: Digital Marketing, Fashion Market, Social media, Youth, Correlation

INTRODUCTION

Digital marketing has significantly transformed the landscape of clothing and fashion brand preferences, particularly among the youth in the rural (Kandhamal) and urban (Khurda) youth of Odisha. With the proliferation of digital marketing channels, such as social media, search engines, email marketing, and influencer collaborations, the way young consumers interact with fashion brands has evolved (Smith, 2020). This study aims to explore the various digital marketing channels utilized by the youth in these regions and understand their impact on fashion brand preferences. Youth is a complex socio-demographic group characterized by a unique set of psychophysical properties and socio-cultural characteristics, playing a pivotal role in the development of social relations and societal structures. This period, typically defined as the transition from childhood to adulthood, is marked by maturation, socialization, and the acquisition of psychological traits, social norms, and values (Tokoeva & Kozhonazarova, 2023).

Understanding these channels can provide insights into the most effective platforms for reaching young consumers and influencing their purchasing decisions. Secondly, the study examines the

direct impact of digital marketing on the preference of youth for fashion brands. This involves analyzing how different digital marketing strategies, such as targeted advertisements, social media engagement, and content marketing, affect their brand choices (Johnson, 2021). This research investigates the factors that influence digital purchases among the youth. These factors may include ease of access, variety of choices, peer influence, and the convenience of online shopping. By identifying these influencing factors, fashion brands can tailor their digital marketing strategies to better meet the needs and preferences of young consumers in Kandhamal and Khurda. The study aims to provide a comprehensive understanding of how digital marketing influences fashion brand preferences among the youth in these districts, offering valuable insights for marketers aiming to capture this demographic effectively.

The justification for this study lies in the growing importance of digital marketing as a transformative force in shaping consumer behavior, particularly among the youth—a demographic that plays a crucial role in driving trends and preferences in the fashion industry. As rural areas like Kandhamal and urban hubs like Khurda in Odisha witness increasing digital penetration, understanding the nuanced impact of digital marketing channels on youth preferences becomes essential for fashion brands aiming to thrive in these diverse markets. This research is critical because it bridges the gap in literature regarding regional and socio-cultural variations in digital marketing's influence, offering actionable insights into how brands can effectively engage this dynamic group. By identifying key influencing factors and assessing the efficacy of different marketing strategies, this study provides a roadmap for leveraging digital platforms to align with the evolving expectations of young consumers, ultimately contributing to more inclusive and region-specific marketing approaches.

Digital marketing exerts a substantial influence on the purchasing decisions of both rural and urban youth in Odisha, exhibiting variations across diverse demographic segments. The accessibility and convenience provided by digital marketing platforms, such as online shopping and electronic payment methods, have expedited the purchasing process and rendered it more accessible, thereby significantly affecting consumer behavior (Hussain & Rahman, 2024). The capacity of digital marketing to precisely target specific demographics and interests enables businesses to effectively customize their advertising strategies, which proves particularly impactful among the demographic of youth (Rahmani & Sarma, 2023). Social media, e-commerce platforms, and email marketing are recognized as the most significant channels in shaping the purchasing decisions of young consumers, underscoring the critical importance of these platforms in engaging this particular market segment (B Harishchandra, 2023). Moreover, digital marketing has demonstrated its capacity to influence impulsive buying behavior, indicating that the immediacy and personalization of digital content can precipitate spontaneous purchasing decisions (Roy et al., 2024). The investigation conducted by Rahmani and Sarma reveals that digital marketing significantly impacted purchase decisions for 17.7% of the respondents, exerted a moderate influence on 24.0%, and augmented purchasing frequency by 45.5% (Rahmani & Sarma, 2023). This finding implies that while digital marketing constitutes a formidable tool, its efficacy may fluctuate based on individual consumer characteristics and preferences. Furthermore, the continuously evolving digital landscape has redefined consumer behavior, with youth increasingly depending on digital platforms for product exploration and acquisition, motivated by shifting fashion and taste preferences (Iqbal et al., 2023). In summary, digital marketing occupies a pivotal role in shaping the purchasing decisions of youth in Odisha, with its impact varying according to different demographic factors.

The objectives of this study are threefold: first, to analyse the relationship between income and expenditure on clothing among rural and urban youth, providing insights into their purchasing power

and spending patterns; second, to examine the influence of digital marketing on youth and its role in shaping fashion trends, highlighting how digital platforms drive consumer behaviour; and third, to explore the impact of gender on fashion choices, shedding light on how preferences differ between male and female youth in the context of evolving fashion trends and digital marketing strategies.

METHODOLOGY

The study investigates the Digital Marketing's Influence on clothing fashion brand preferences among youth in Odisha. These regions provide a diverse demographic backdrop, offering insights into urban and rural contrasts.

The data acquisition for the present investigation was executed utilizing a synthesis of random and purposive sampling methodologies, thereby ensuring both inclusivity and pertinence in the selection of participants. Random sampling was implemented to furnish a representative cross-section of the youth demographic in both rural (Kandhamal) and urban (Khurda) locales, thereby guaranteeing an impartial selection mechanism. Conversely, purposive sampling was employed to specifically identify youth who are actively engaged in digital platforms and demonstrate purchasing behaviours that are influenced by digital marketing strategies. This method aligns well with the project's goal of shedding light on how digital marketing influences preferences for fashion brands. A comprehensive sample size of 300 respondents was established, comprising 150 individuals from each district to ensure equitable representation. Data were gathered through a meticulously structured questionnaire survey, crafted to elicit detailed insights regarding the respondents' digital engagement and preferences for fashion brands. Subsequently, the amassed data were subjected to analysis utilizing statistical instruments, including chi-square tests and descriptive statistics, facilitated by SPSS Version 25, to uncover significant trends and correlations, thereby providing a robust foundation for comprehending the dynamics of digital marketing within these regions.

RESULT & DISCUSSION

Demographic Information of the respondents

	Component	Item	Rural (f and %)	Urban (f and %)	Total (f and %)
		Table 1: Demographic Information of the respondents (N: 300)			
1	Age Group	15 to 20 years	38(25.3)	43(28.7)	81(27)
		21 to 25 years	65(43.3)	66(44)	131(43.7)
		26 to 32 years	47(31.3)	41(27.3)	88(29.3)
2	Education	Primary	0(0)	0(0)	0(0)
		Highschool	6(4)	3(2)	9(3)
		College	144(96)	147(98)	291(97)
3	Gender	Male	73(48.7)	77(51.3)	150(50)
		Female	77(51.3)	73(48.7)	150(50)
4	Religion	Hindu	93(62)	112(74.7)	205(68.3)
		Christian	52(34.7)	29(19.3)	81(27)
		Muslim	5(3.3)	9(6)	14(4.7)
5	Annual income (INR)	Up to 25,000	14(9.3)	9(6)	23(7.7)
		25001 to 50000	10(6.7)	1(0.7)	11(3.7)
		50001 to 75000	44(29.3)	68(45.3)	112(37.3)

		75001 to 100000	82(54.7)	72(48)	154(51.3)
6	Occupation	Employed	6(4)	3(2)	9(3)
		Self-Employed	144(96)	147(98)	291(97)

Income vs Expenditure on clothing per month

Table: 2 - Income vs expenditure on clothing per month								
Monthly Expenditure (INR)	**below 2000**		**2001- 3000**		**3001 - 4000**		**Above 4000**	
Annual Income (INR)	**Rural** (f and %)	**Urban** (f and %)	**Rural** (f and %)	**Urban** (f and %)	**Rural** (f and %)	**Urban** (f and %)	**Rural** (f and %)	**Urban** (f and %)
Up to 25,000	4 (16)	1 (2.5)	8 (8.1)	6 (8.8)	2 (8.3)	2 (5.3)	0 (0)	0 (0)
25001 to 50000	2 (8)	1 (2.5)	5 (5.1)	0 (0)	2 (8.3)	0 (0)	1 (50)	0 (0)
50001 to 75000	4 (16)	18 (45)	30 (30.3)	33 (48.5)	10 (41.7)	14 (36.8)	0 (0)	3 (75)
75001 to 100000	15 (60)	20 (50)	56 (56.6)	29 (42.6)	10 (41.7)	22 (57.9)	1 (50)	1 (25)

The data (Table 2) shows a clear trend where higher income category correspond with increased spending on clothing. Urban populations generally spend more than their rural counterparts, with notable spending patterns emerging in different income groups. For individuals with a Annual income up to 25,000 INR, the majority spend below 2000 INR, with a slight variation in urban areas where spending in the 2001-3000 INR range is more common. Those earning between 25,001 to 50,000 INR show a small proportion spending below 2000 INR, but a significant 16.7% spend above 4000 INR, with rural areas displaying higher expenditure in lower brackets and urban areas showing a more balanced distribution. Among those earning 50,001 to 75,000 INR, a substantial proportion spends 2001-3000 INR (37.7%) and 3000-4000 INR (38.7%), with urban individuals spending more in the higher range. For the highest income bracket, 75,001 to 100,000 INR, a considerable 53.8% spend 2001-3000 INR and 50.9% spend 3001-4000 INR, with a significant 50.0% spending above 4000 INR, particularly in rural areas. Overall, as income rises, so does expenditure on clothing, with rural individuals more likely to spend in higher categories compared to urban individuals.

Factors influencing Digital Marketing

Table 3 – Factors influencing digital marketing					
	Component	**Item**	**Rural** (f and %)	**Urban** (f and %)	**Total** (f and %)
1	**Sales promotional strategies**	Advertisement	88(58.7)	80(53.3)	168(56)
		Discount (percentage off)	6(4)	7 (4.7)	13 (4.3)
		Buy 1 get 2/3 offer	12(8)	18(12)	30(10)
		Free gift	38(25.3)	37(24.7)	75(25)
		Point	6(4)	8(5.3)	14(4.7)

2	**Modes of Payment in online purchase**	Credit/Debit Card	6(4)	4(2.7)	10(3.3)
		Digital Wallets	4(2.7)	6(4)	10(3.3)
		Bank Transfer	14(9.3)	10(6.7)	24(8)
		Cash On Delivery	92(61.3)	84(56)	176(58.7)
		Phone Pay	34(22.7)	46(30.7)	80(26.7)
3	**Reasons for Online Shopping**	Convenience	0(0)	0(0)	0(0)
		Better price	57(38)	56(37.3)	113(37.7)
		Discounts	37(24.7)	38(25.3)	75(25)
		Saves time	47(31.3)	47(31.3)	94(31.3)
		Choices / Availability	9(6)	9(6)	18(6)
4	**Time of purchase**	During Festival	35(23.3)	5(3.3)	40(13.3)
		Discount Season	62(41.3)	48(32)	110(36.7)
		End Of Season Clearance Sale	32(21.3)	48(32)	80(26.7)
		Flash Sale	21(14)	49(32.7)	70(23.3)
5	**Sources of information about fashion trends**	Social media	39(26)	45(30)	84(28)
		Fashion magazines	0(0)	0(0)	0(0)
		Friends and family	55(36.7)	53(35.3)	108(36)
		Online fashion blogs	32(21.3)	28(18.7)	60(20)
		Fashion websites	12(8)	12(8)	24(8)
		Celebrity influences	12(8)	12(8)	24(8)

Table 3 represents the different factor associated with digital marketing the analysis of sales promotional strategies shows that advertisements are the most effective, with 56.0% of respondents using them, and a slight preference in rural areas (58.7%) compared to urban areas (53.3%). Free gifts are the second most popular strategy, used by 25.0% of the sample, with an almost equal distribution across rural (25.3%) and urban (24.7%) areas. Discounts and point systems are less common, utilized by 4.3% and 4.7% of respondents respectively, while buy-one-get-two or three offers are used by 10.0%, more in urban (12.0%) than rural (8.0%) areas. With regards to method of payment it is observed that cash on delivery is the preferred payment method for 58.7% of online purchases, with higher usage in rural areas (61.3%) compared to urban (56.0%). Phone payments are more popular in urban areas (30.7%) than rural (22.7%), while credit/debit cards and digital wallets are the least used (3.3% each), and bank transfers are moderately used, more in rural areas (9.3%) than urban (6.7%). Further it is observed that the primary reasons for online shopping are better prices (37.7%), time-saving (31.3%), and discounts (25.0%), with no respondents citing convenience. Peak shopping times are during discount seasons (36.7%) and end-of-season clearance sales (26.7%), with rural shoppers more likely to buy during festivals (23.3%) and urban shoppers favouring flash sales (32.7%). Social media is the top source of information for fashion trends (28.0%), more preferred in urban (30.0%) than rural (26.0%) areas, followed by friends and family (36.0%) and online fashion blogs (20.0%). Fashion websites and celebrity influences each account for 8.0%, while fashion magazines are not used, reflecting a shift from traditional to digital media.

Impact of gender on monthly expenditure and fashion choice

Table 4: Impact of gender on monthly expenditure and fashion choice

Si no.	Component	Item	Male			Female		
			Rural (f and %)	**Urban** (f and %)	**Total** (f and %)	**Rural** (f and %)	**Urban** (f and %)	**Total** (f and %)
1	Monthly Expenditure	below 2000	6 (8.2)	23 (29.9)	29 (19.3)	19 (24.7)	17 (23.3)	36 (24)
		2001- 3000	53 (72.6)	36 (46.8)	89 (59.3)	46 (59.7)	32 (43.8)	78 (52)
		3001 - 4000	12 (16.4)	17 (22.1)	29 (19.3)	12 (15.6)	21 (28.8)	33 (22)
		Above 4000	2 (2.7)	1 (1.3)	3 (2)	0 (0)	3 (4.1)	3 (2)
2	Choice of fashionable clothing done	Parents	21 (28.8)	21 (27.3)	42 (28)	25 (32.5)	28 (38.4)	53 (35.3)
		Friends	13 (17.8)	11 (14.3)	24 (16)	9 (11.7)	4 (5.5)	13 (8.7)
		Self	39 (53.4)	45 (58.4)	84 (56)	43 (55.8)	41 (56.2)	84 (56)
3	Prefer that Dress which is	Suitable	3 (4.1)	10 (13)	13 (8.7)	10 (13)	10 (13.7)	20 (13.3)
		Comfortable	8 (11)	10 (13)	18 (12)	10 (13)	5 (6.8)	15 (10)
		Fashionable	42 (57.5)	40 (51.9)	82 (54.7)	45 (58.4)	41 (56.2)	86 (57.3)
		Usable for longer periods of time	20 (27.4)	17 (22.1)	37 (24.7)	12 (15.6)	17 (23.3)	29 (19.3)
4	Factor influencing online clothing choice	Price	26 (35.6)	24 (31.2)	50 (33.3)	26 (33.8)	14 (19.2)	40 (26.7)
		Brand reputation	9 (12.3)	15 (19.5)	24 (16)	7 (9.1)	14 (19.2)	21 (14)
		Style and current trends	16 (21.9)	19 (24.7)	35 (23.3)	16 (20.8)	24 (32.9)	40 (26.7)
		Comfort	8 (11)	5 (6.5)	13 (8.7)	8 (10.4)	9 (12.3)	17 (11.3)
		Material durability	5 (6.8)	4 (5.2)	9 (6)	4 (5.2)	2 (2.7)	6 (4)
		Peer influence	9 (12.3)	10 (13)	19 (12.7)	16 (20.8)	10 (13.7)	26 (17.3)
5	Decision regarding Selecting a branded product	Price	46.6 (11)	40.3 (15)	43.3 (26)	39 (9)	50.7 (13)	44.7 (22)
		Product reviews	15.1 (17)	19.5 (18)	17.3 (35)	11.7 (21)	17.8 (16)	14.7 (37)
		Brand Popularity	23.3 (11)	23.4 (13)	23.3 (24)	27.3 (17)	21.9 (7)	24.7 (24)
		Discounts & Promotions	15.1 (73)	16.9 (77)	16 (150)	22.1 (77)	9.6 (73)	16 (150)

The data (Table D) reveals distinct spending patterns and preferences between genders and across regions. Both males and females predominantly spend between INR 2000-3000 on clothing, with males slightly outspending females. Minimal expenditure is observed above INR 4000 for both genders, with rural areas showing a higher proportion of spending between INR 2000 - 3000 compared to urban areas, where higher brackets are more common. Self-selection is the leading

factor in choosing fashionable clothing for both genders, surpassing parental and peer influences. Fashion-ability is the most valued attribute in clothing for both males and females, while comfort and durability are secondary. In online shopping, price is the primary consideration for both genders, with style and trends following closely, particularly for females. Comfort and material durability are less influential, and peer influence affects females (17.3%) more than males (12.7%). While selecting branded products, price (44%) is crucial for both genders, with product reviews (16%) and brand popularity (24%) being secondary, and discounts and promotions having a lesser (16.1%) impact.

Table 5: Choice of Online platforms for purchase								
	Rural			**Urban**			**Total**		
Online Platform name	**Total Score**	**Average Score**	**Rank**	**Total Score**	**Average Score**	**Rank**	**Total Score**	**Average Score**	**Rank**
Flipkart	675	4.50	5	676	4.51	5	1351	4.50	5
Myntra	467	3.11	2	469	3.13	2	936	3.12	2
Ajio	522	3.48	4	529	3.53	4	1051	3.50	4
Sopsy	505	3.37	3	506	3.37	3	1011	3.37	3
Meesho	435	2.90	1	428	2.85	1	863	2.88	1
Amazon	888	5.92	6	878	5.85	6	1766	5.89	6
Facebook page advertisement	1011	6.74	8	1017	6.78	8	2028	6.76	8
You tube	897	5.98	7	897	5.98	7	1794	5.98	7
*Lowest average score assigned highest rank and vice versa								

Observation on choice of online platform for purchase (Table 5) shows that Meesho, with the average score of 2.90 in rural areas and 2.85 in urban areas, resulting in a combined average of 2.88, is the most favoured among the top online platforms. Myntra ranks second with average scores of 3.11 in rural and 3.13 in urban areas, averaging 3.12, showing a relatively strong preference, especially in urban settings. Sopsy is ranked third with stable average scores of 3.37 across both rural and urban areas. Ajio follows closely with averages of 3.48 in rural and 3.53 in urban areas, totalling 3.50, reflecting a solid preference with slightly higher urban scores. Flipkart, ranked fifth, shows a consistent preference with averages of 4.50 in both rural and urban areas. Amazon, in sixth place, has averages of 5.92 in rural and 5.85 in urban areas, indicating a notable preference. YouTube ranks seventh with averages of 5.98 across both areas, suggesting preference due to its role in advertising and product discovery. Finally, Facebook Page Advertisement leads with average scores of 6.74 in rural and 6.78 in urban areas, averaging 6.76, identifying as least effectiveness in influencing purchasing decisions among different online platforms.

Correlation between financial factors

Table 6.1: Correlation between Financial factors					
	Education	Occupation	Income	Mon. Expenditure	How Often
Education	1				
Occupation	-.394**	1			
Income	.471**	-.573**	1		
Mon. Expenditure	.170**	-.255**	.566**	1	
How Often	-0.077	0.024	0.014	0.084	1
**. Correlation is significant at the 0.01 level (2-tailed).					

The correlation matrix provided (Table 6.1) shows the relationships between five variables: Education, Occupation, Income, Monthly Expenditure and How Often (frequency). The significant negative correlation between Education and Occupation (-.394) (p=0.01) suggests that higher education levels are associated with lower occupational status, potentially due to a mismatch between education levels and job availability. The positive correlation between Education and Income (.471) indicates that higher education levels are linked to higher incomes, reflecting that better education typically leads to better-earning. Similarly, Education has a weak positive correlation with Monthly Expenditure (.170), implying that those with higher education might have higher monthly budgets due to better financial literacy or stable incomes. There is no significant correlation between Education and How Often (-0.077), suggesting education does not influence the frequency of the activity. The negative correlation between Occupation and Income (-.573) indicates that higher occupational statuses are associated with lower incomes, which could be due to how occupation is defined in this context. Occupation also negatively correlates with Monthly Expenditure (-.255), suggesting those in higher-status jobs have lower percentage of Monthly budgets. There is no significant correlation between Occupation and How Often (0.024), showing occupation does not affect the activity's frequency. Income has a significant positive correlation with Monthly Expenditure (.566), as higher incomes generally result in larger monthly budgets for spending and saving. However, Income does not significantly correlate with How Often (0.014), indicating the activity's frequency is independent of income levels. Lastly, Monthly Expenditure does not significantly correlate with How Often (0.084), implying that the amount of money available monthly does not affect the frequency of the activity. Significant correlations (marked with **), are statistically significant at the 0.01 level, indicating strong evidence that these correlations are not due to random chance.

Table 6.2: Correlation Impact of Gender on various choices								
Choice	Monthly Expenditure	Choice of fashionable clothing	Preferences of dress type	When you buy	Factor Influence	Most about	Method	Sale promotion
Monthly Expenditure	1							
Choice of fashionable clothing	-0.052	1						
Preferences of dress type	0.023	-0.004	1					
when_you_buy	-.121*	-0.059	-0.005	1				
Factor Influence	-0.020	-0.004	-0.012	-0.039	1			
most about	0.024	-0.046	-0.040	-0.018	0.015	1		
method	0.008	-0.014	-0.071	-0.090	0.065	0.054	1	
sale promotion	0.055	-.124*	0.011	-0.003	0.018	-0.044	0.047	1
*. Correlation is significant at the 0.05 level (2-tailed).								

From Table 6.2 illustrate that correlation matrix reveals two significant relationships. First, there is a significant negative correlation between Monthly Expenditure and 'when you buy' (-.121), indicating that individuals with higher monthly expenditures tend to shop for clothing less frequently. This suggests that these individuals may opt for higher-quality or more expensive items, which they purchase less often. Second, a significant negative correlation exists between Choice of fashionable clothing and sale promotion (-.124), implying that individuals who prioritize fashionable clothing are less influenced by sales promotions. This correlation suggests that those who value fashion and style over price are less likely to be swayed by discounts and promotions, emphasizing their preference for maintaining a particular style over seeking bargains. Significant correlations, marked with *, are statistically significant at the 0.05 level, indicating that there is strong evidence that these correlations are not due to random chance.

CONCLUSION

The analysis reveals a positive correlation between income levels and clothing expenditure, with urban populations generally spending more than their rural counterparts. Higher income groups demonstrate increased clothing budgets, especially in urban areas, indicating greater discretionary spending on apparel. Digital marketing strategies significantly influence consumer behaviour, with advertisements proving to be the most effective tool. Regional differences are highlighted by the preference for cash on delivery, particularly in rural areas. Key motivations for online shopping include better prices, time-saving, and discounts, with social media emerging as a crucial source of fashion trends. Notable differences in clothing expenditure and preferences between genders and regions are evident, with males generally outspending females. Self-selection drives fashionable clothing choices, with fashionable being the top valued attribute. Price is the main consideration in online shopping, especially for females, while peer influence affects females more than males. Online platforms like Meesho, Myntra, and Sopsy are favoured for purchases, while Facebook Page Advertisements are less effective in influencing decisions. These patterns underscore the blend of traditional and modern attire preferences and the significant role of digital platforms in shaping consumer behaviour. From the study, the findings highlight the growing importance of digital marketing in the clothing and fashion industry and its impact on purchasing decisions.

SUGGESTION AND IMPLICATIONS

Based on the findings from "Digital Marketing's Influence on Fashion Brand Preferences among Youth in Kandhamal and Khurdha, Odisha," several targeted suggestions and implications can be proposed.

Tailored Digital Marketing Campaigns: Focus on social media platforms like Instagram and Facebook as well as fashion blogs, to resonate with youth preferences.

Enhanced Online Presence: Ensure fashion brands have a strong online presence with user-friendly interfaces on popular online stores such as Flipkart, Myntra, and Amazon. Implement augmented reality (AR) technology for immersive virtual try-on experiences and gamification elements like virtual fashion shows to further engage users.

Effective Promotional Strategies: Prioritize percentage-based discounts, "Buy 1 get 2/3" deals, and exclusive offers for sustainable fashion purchases to attract price-sensitive consumers and incentivize environmentally conscious choices.

Digital Transaction Confidence: Educate youth about the benefits and security of digital transactions to increase confidence in using digital wallets and credit/debit cards.

Diverse Product Range: Offer a diverse range of quality products that align with both traditional and modern fashion trends.

Skill Development and Training Programs: Establish the Handloom Innovation Labs and engaged the youth innovators to promote the Odisha handloom product for digital marketing. This is my important recommendations.

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5

BIO-COATING OF COTTON WITH POLYLACTIC ACID, BIO-BASED RESIN-CASTOROIL AND SOYBEAN OIL

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ABSTRACT

The global awareness regarding sustainability and eco-friendly practices has led to significant advancement in the development of using bio-based products to reduce the eco concern in industries, particularly in the coating industry. Hence, the present study explores the potential of bio-plastic (Polylactic acid- PLA) with the combination of bio-resins (Castor and Soybean oil) and Water Hyacinth Plant powder to alter the chemical-based textile material. PLA- a bioplastic is biodegradable and less harmful than chemical-based plastics while Water Hyacinth is an invasive species and by utilising it resolves ecological issues and help to develop innovative materials. The present research involved dissolving PLA in organic solvents, preparing a suspension with bio-resins and Water Hyacinth powder, and applying this suspension to 76 GSM bleached cotton fabric. The coated fabrics were evaluated for changes in physical properties such as GSM, air permeability, and thickness. Results indicated that while the bio-suspension effectively coated the fabric, it also introduced challenges, including increased stiffness, decreased absorbency, and rough texture. These findings suggest that while PLA and Water Hyacinth-based coatings pave a promising way for sustainable material development, further research is necessary to optimise the material's flexibility and overall performance.

Key Words: Bio-Plastic, Bio-Resin, Sustainable Textile, Biodegradable Coating, Bio-alternative.

INTRODUCTION

In contemporary society, environmental sustainability has become a serious problem. People are becoming increasingly aware of the need to maintain human and ecological health. More research and development are being directed toward sustainability (Adiguzel Zengin et al., 2012). The principle of sustainability has also impacted the leather business, which is continuously evolving. However, genuine leather has distinct characteristics and higher quality over other materials in terms of breathability, durability, and so on; tanning operations by tanneries harm both humans and the environment. The effluent of tanneries is released in water bodies, which harms ecology (Al-Jabari et al., 2012; C. Wang et al., 2020; H. Wang, 2024). Hence, the demand to alter natural/genuine leather with artificial leather has been for few decades (Gurera & Bhushan, 2018). Nowadays, the idea of coating is prevalent and researchers are trying to develop green coating by using bio-based and biodegradable materials (Hermens et al., 2020; Witthayaprapakorn et al., 2013). Poly Polylactic acid (PLA) is extracted from natural sources and is produced after fermentation. It is considered as

the Bio-Plastic which is used in various industries for various purposes (Article & Kottayam, 2023; Witthayaprapakorn et al., 2013). Rizal et al have reported that biopolymers like PLA can be used as a green polymer to coat the material for various purposes. PLA is ideal for this purpose because it is widely obtainable, biodegradable, and has some green properties. PLA can be used to improve some mechanical properties of the material. PLA can be achieved by polymerization of Lactic acid or fermentation process (Rizal et al., 2021). On the other hand, combining bio-based plasticizers and resin can improve the material's characteristics in an environmentally conscious way (*Water Hyacinth*, 2023). Hlaing and Oo described that alkyd is successfully used by the coating industry for functional as well as decorative purposes. Oils that are used for alkyd are castor, Soybean, linseed, fish, etc. Many researchers have discovered that oil alkyd or resin combination matrixes have demonstrated improved advancements in material characteristics, leading the coating industry into the next years of age (Chen & Tai, 2018; Han et al., 2015; Hlaing & Oo, 2008; Song et al., 2023; Zarłok et al., 2014).

The proposed research work would identify natural materials (plant-based) as an alternative to conventional synthetic materials, specifically coated material. For the study, Water Hyacinth (aquatic plant) has been chosen. Water Hyacinth is a perennial, free-floating plant, mostly found in rivers, streams, ponds, lakes, and canals, and also may root in the mud of shallow water.

Over and above, this aquatic plant is a deadly species. Due to its aggressive nature and high-rate vegetative propagation, it quickly invades large water areas, which makes it the main environmental concern for developing cities like Surat and nearby areas. This species creates a bulky mat-like layer on water bodies. "It lowers dissolved oxygen, which can be harmful for fish populations and other aquatic life because it inhibits sunlight from penetrating water and disturbs their life." Furthermore, it affects the lives of animals that depend on water bodies for shelter and other necessary things. What's more, it spreads infections by leaving rotten plants in water, which can lead to a few waterborne disease outbreaks. This plant may provide an ideal environment for a few insects to breed faster, especially mosquitoes, and pose a health risk to humans by spreading malaria and dengue, etc (Mohit et al., 2023; Nyawacha et al., 2021; Shubhangi & Sagar, 2017).

OBJECTIVE

The primary objective of the study was to explore the potential of the bioplastic -Poly Lactic Acid (PLA) in combination with bio-resins (Castor oil and Soybean oil) by using Water Hyacinth powder to develop sustainable textile material.

MATERIALS AND METHODS

Material

Poly Lactic Acid graduals (Luminy®LX175, Corbion purac, Thailand) were procured from the local vendor Rivika Bio Industries Private Limited, Surat. The MANTRA (Manmade Textile Research Association, Surat) provided the solvents Tetrahydrofuran, 1, 4 Dioxane, Acetone, and Ethyl Acetate. Bleached cotton fabric with 76 GSM was provided by the MANTRA (Manmade Textile Research Association, Surat. Bio Resins – Castor and Soybean oil Resin was purchased from Amura Polymers, Ahmedabad. Water Hyacinth leaves were collected from a lake near Dharampur, Surat District.

Methods

Preparation of the Water Hyacinth Powder

The Water Hyacinth plants were collected from a lake near Dharampur. The obtained Hyacinth Plants were cleaned in preparation for further processing. The leaves and stems of plant were separated and dried in the sun for 4 to 5 days. The dried leaves were then placed in a convection oven at 90° C for 10 seconds to eliminate any excess moisture from the leaves and stems. The treated leaves and stems were then allowed to cool for 30 seconds before being crushed to achieve the standard temperature. It was then crumpled by hand and crushed in a commercial mixer grinder to obtain a fine powder. The produced powder was then sieved using a conventional sieve. The powder was then sieved again using a testing sieve to get an even finer powder for use in the coating solution. The size of the sieve used was 203.2 mm (8).

Preparation of the coating suspension

The experiment began with attempting to dissolve PLA granules in four organic solvents, Tetrahydrofuran, 1,4 Dioxane, acetone, and Ethyl Acetate. For that 12 gm (12%) of moisture-free PLA was used in each solvent in separate conical flask (Solvents were chosen based on the review). A magnetic stirrer was used for the experiment. The solvents were poured into a conical flask and kept at 40° - 60° C on a magnetic stirrer. The PLA granules were then tried to dissolve in the solvent to produce a clear solution.

After that, 200-gram suspension (12%) was prepared with selected solvent and transfer into two glass beakers, with 100 gram in each. Coating paste was prepared with 6 ml of Castor £oil resin and 6 ml of Soybean oil resin by mixing with 3 gm of Water Hyacinth powder in each beaker with the help of glass rod.

Preparation of the fabric

The bleached cotton with 76 GSM was scoured with 2 g/l detergents and 1 g/l soda ash in 1:30 MLR at 50-60° C for 30 minutes while retaining pH level at 10, then washed three times under running water, dried, and ironed (Trotman, 1984).

Coating Procedures

The coating was done manually on the printing table with the help of hand squeezes. Treatment of the fabric with prepared suspensions (PLA+ 1, 4 Dioxane + Castor oil resin + Water Hyacinth powder and PLA+ + 1, 4 Dioxane + Soybean oil resin + Water Hyacinth powder) was done on a 76 GSM bleached cotton cloth. The cotton cloth was cleansed and pressed to remove dust and wrinkles. The material was then put and tucked onto the commercial printing table at the Manmade Textile and Research Association, Surat to prevent any movement. After that, the coating suspension was poured onto the cloth, evenly spread with a hand squeeze, allowed to dry at room temperature for 20-25 minutes before being cured in a preheated oven at 60° C for 5 minutes as shown in Figures 4, 5, and 6.

Figure 1. Preparation of material

Figure 2. Coating with neat PLA Solution

Figure 3. Drying of the material

Figure 4. Preparation of Cotton for Coating

Figure 5. PLA + Castor oil resin + Water Hyacinth Matrix

Figure 6. PLA + Soybean oil resin + Water Hyacinth Matrix

Testing of the coated fabric

The physical properties of controlled and coated samples were measured. The GSM of the fabric was measured by using a manual Hydraulic GSM Cutter and Fabric Weight scale. Air Permeability tester and thickness were measured by using the Mitutoyo Digital Thickness Gauge. All the instruments were provided by the MANTRA (Manmade Textile Research Association, Surat).

RESULTS AND DISCUSSION

1.1 Preparation of the bio-suspension

Polylactic acid (PLA) is a well-known sustainable bioplastic derived from the fermentation of biomass such as potatoes, maize, and sugar. It can replace ubiquitous petrochemical-based plastics as worldwide demand for agricultural and ecologically sustainable bio-products grows. The main properties of PLA used for the study have been mentioned in Table 1.

Table 1. Physical and Mechanical Properties of PLA

Physical Properties	
Density (literature value)	1.24 g/cm^3
Melt flow index (ISO 1133-A at 210°C/2.16kg)	8 g/10 min
Melt flow index (ISO 1133-A at 190°C/2.16kg)	3 g/10 min
Stereochemical purity (Corbion method)	96 (% L-isomer)
Appearance (visual)	crystalline white pellets
Residual monomer (Corbion method)	max. 0.3 %
Water / moisture (Coulometric Karl-Fisher)	max. 400 ppm
Melting temperature Tm (DSC)	155 °C
Glass transition temp. Tg (DSC)	55-60 °C
Mechanical Properties	
Tensile modulus (ISO 527-1)	3500 MPa
Tensile strength (ISO 527-1)	45 MPa
Elongation at break (ISO 527-1)	max. 5 %
Charpy notched impact, 23°C (ISO 179-1eA)	max. 5 kJ/m^2

＊The information was collected from the product data, rev. no. 3/K006, 13th October 2016, Corbion Purac.

Figure 7. Poly Lactic Acid Granules

PLA is a bio-based polymer created from natural resources that has a lower carbon footprint than oil-based polymers. Luminy LX175-type PLA is an amorphous, transparent resin with a high viscosity and low flow that is excellent for film extrusion, thermoforming, and fibre spinning.

The PLA was studied in terms of its dissolving time, viscosity, and coating qualities. Initially, 24 gm PLA was measured and placed in a preheated oven at 60° C for 8 hours to check the moisture content and ensure that the PLA was moisture-free. The temperature remained constant at 60° for the duration of the experiment. The PLA was determined to have moisture content after being kept in the oven for 8 hours and weighed on a weighing scale. The PLA weighed 23.9 grams after 8 hours, showing that it had 0.1% moisture of its entire weight. The next step was to prepare a PLA suspension. 12% moisture-free PLA was taken and experimented with different organic solvents such as mentioned in Table 2.

Table 2 List of Solvents used to dissolve PLA

PLA (%)	Organic Solvents
12 %	Tetrahydrofuran
12 %	Acetone
12 %	Ethyl Acetate
12 %	1, 4 Dioxane

*Initially to test and determine the coating viscosity, 12% PLA was used.

Initially, a neat solution of 12% PLA was prepared. For which, 6 gm of moisture-free PLA was used, and 1, 4 Dioxane was chosen as a solvent, based on the review. The PLA granules were added to the solvent to dissolve and obtain a clear solution. (*The solution's consistency was not viscous enough to be used for coating.). The reason why researcher has chosen the 1, 4 Dioxane is during the pilot work it was found that After 3 to 4 hours of stirring, it was discovered that acetone and Ethyl Acetate are incapable of dissolving PLA. Furthermore, it was left overnight and agitated for the following two hours with no polymer disintegration was seen. and both solvents eliminated. In addition, Tetrahydrofuran and 1, 4 Dioxane could dissolve PLA granules. It took 1 hour and 15 minutes for solvents to dissolve the PLA. For the study 1, 4 Dioxane was chosen because it is commonly available and inexpensive than Tetrahydrofuran and further experiments were conducted.

Figure 8. PLA Dissolution in Solvent   **Figure 9. PLA + Castor oil resin**   **Figure 10. PLA + Soybean oil resin**

Figure 8 depicted the dissolving of PLA granules in 1, 4 Dioxane solvent. Figures 3 and 4 demonstrate PLA matrix combined with Castor oil resin and Soybean oil resin respectively.

Coating Procedure

On evaluating the viscosity and coating properties of the produced suspension, a coating with plain PLA matrix dissolved in 1, 4 Dioxane was applied to cotton material. The observation revealed that the neat PLA paste can be easily coated on cotton fabric with the given solvents. Cotton was also discovered to absorb the solution easily, and paste was noticed on the back of the fabric. Furthermore, it adds to the weight of the cloth and stiffens the cotton fabric in the same way as paper does.

As a result, it was discovered that the solution prepared with 1, 4 Dioxane showed good results as a coating paste on cotton material. Moreover, 1, 4 Dioxane solvent made the fabric stiffer, paper-like,

and decreased the absorbency. The fabric tends to tear easily, which means the strength of the fibre decreased after treatment.

Figure 11 Drying of coated samples PLA+Castor oil resin + Water Hyacinth Matrix

Figure 12 Drying of coated samples PLA+Soybean oil resin + Water Hyacinth Matrix

Figures 11 and 12 demonstrates the preparation and coating of the bleached cotton fabric with PLA matrix prepared with 12% PLA, 1, 4 Dioxane, Water Hyacinth powder, and Castor oil Resin (Figure 11) and 12% PLA, 1, 4 Dioxane, Water Hyacinth powder, and Soybean oil Resin (Figure 12). The observation disclosed that the samples treated with prepared coating suspension felt softer as compared to the neat PLA-treated sample. Cotton was also found to absorb the suspension easily, and paste was noticed on the back of the fabric.

Table 3. Basic physical properties of treated samples.

Parameter	Standard	S1	S2	S3	S4
GSM	76	103	122	141	147
Air Permeability	120 CFM	40 CFM	0.28 CFM	0.15 CFM	0.14 CFM
Thickness	0.26 mm	0.336 mm	0.359 mm	0.370 mm	0.387 mm
Softness	Yes	No	No	No	No
Surface Roughness/Texture	Soft	Rough	Rough	Rough	Rough
Touch/Feel	Soft	Feel like paper	Feel like paper	Rough	Rough

***Standard**-100% Bleached Cotton, **S1**- Samples Treated with 12% PLA + THF, **S2**- Samples Treated with 12% PLA + 1, 4 Dioxane, **S3**- Samples Treated with 12% PLA + 1, 4 Dioxane + Water Hyacinth powder + Castor joil Resin, **S4**- Samples Treated with 12% PLA + 1, 4 Dioxane + Water Hyacinth powder + Soybean oil Resin, CFM- cubic feet of air per minute.

Table 3 shows that the coated material seems to have a change in its physical properties. The visible observation demonstrated that the feel of the fabric has changed after coating and the coated material seems to be stiffer as compared to the standard sample. Moreover, the prepared matrix made the fabric paper and both decreased the absorbency of the cotton fabric. Furthermore, fabric tends to tear easily (with hands) which means the strength of the fiber decreases after treatment.

GSM (add-on % of the coating) of coated material has increased up to 26.21% in Sample 1 as compared to the standard sample, 32.14 % add-on found in Sample 2, 46.09% in Sample 3, and 48.29% in Sample 4 respectively. Furthermore, the Air permeability of the coated material has decreased by 64% in sample 1, and 71.99% in samples 2, 3, and 4 respectively. The thickness of the coated material has increased by 22.61% in sample 1, 27.57% in sample 2, 29.72% in sample 3, and 32.81% in sample 4 respectively as compared to the standard sample which is 0.26 mm.

A visual inspection found that the treated samples had no softness when compared to the standard. After treatment, the surface of the material was revealed to be rough, and the feel of the fabric provided a paper-like sensation that may tear easily, much like paper in the case of samples 1 and 2, while samples 3 and 4 felt rough.

CONCLUSION

The study concluded that fabric produced from biodegradable bio-plastic PLA, bio-resin (Castor and Soybean oil), and Water Hyacinth powder altered the physical properties of the material and coated materials that use harmful chemicals. Testing results showed that the GSM of the produced material was increased by 26.21% to 48.29%, with sample S4 (PLA + 1,4 Dioxane + Water Hyacinth + Soybean Oil) exhibiting the highest weight gain. The air permeability of the material decreased drastically from 120 CFM (standard samples) to 0.14 CFM which shows poor air permeability and reduced breathability in S4. Moreover, results concluded that the fabric became denser and thickness increased up to 32.81 %. The coating suspension increased the stiffness of the produced material, texture of S1 and S2 became paper-like that can tear easily, while S3 and S4 developed a rough texture on the surface. However, the material could achieve a biodegradable alternative to the coated, further optimization and modification is required to reduce stiffness, and increase the flexibility and durability of the material.

Further Recommendations

- Poly Lactic Acid (PLA) is a bio-plastic that can be used for coating; however, the stiffness cannot be overcome. Certain natural softeners can be utilized to make the material more flexible.
- The organic solvents used for the study affect the material's polymer system and weaken the material; a researcher can recommend exploring a few bio-based solvent that can dissolve PLA.
- The texture and feel of the material can alter by changing the particle size of the Water Hyacinth power.

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6

GOTTA PATTI EMBROIDERY: A STUDY OF THE ART AND THE ARTISANS

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ABSTRACT

All over the world people value embroidered textiles. Undoubtedly, handmade embroidered articles have a unique beauty of their own and each article is different from the other. The present study 'Gotta Patti Embroidery: A study of the Art and the Artisans 'discusses one such beautiful embroidery - *Gotta Patti*. The study was carried out in *Nayla*, a village in Rajasthan where this embroidery is being done on sarees, *lehenga, odhni, choli* and even on small products such as jewellery, bags, etc. The objective of the study was to understand the process of creating this art form as well as the materials, tools, supplies etc. used by the artisans today. An attempt was also made to study the artisans personal and family characteristics, time spent on embroidery, as also the wages received, and the problems faced by them. The *kar-khannas* were visited and the physical conditions were noted. In order to preserve this art form it was felt essential to document the motifs. Hence, a catalogue was made of designs collected from artisans as also from embroidered fabrics, books etc. Since a number of problems are associated with the traditional *khakhas,* it was decided to draft the collected designs using the AutoCAD software.A catalogue was prepared of the designs.The study found that unlike some other forms of traditional embroideries, such as *danke - ka - kaam*, this type of embroidery is still commercially viable and is therefore, being practiced by artisans and their families. They work either in *kar-khannas*, at home or at both these places. Unfortunately, the working conditions of workers practicing this beautiful embroidery are far from pleasant and require serious attention of policy-makers.

Keywords: Artisans*, Gotta patti*, Metal Embroidery*, Kar-Khannas, Khakhas*

INTRODUCTION

In almost every part of the world, people create beautiful pieces of work with the help of a simple needle and few colourful threads. The Britannica defines embroidery as "the art of decorating material, primarily textile fabric, by means of a needle and thread (and sometimes fine wire) (Britannica, 2024, August 8, para. 1)." India, too has a rich tradition of embroideries which form an important part of its social and economic life. Each state has its own unique embroidery which is

different from that of the other in terms of colour, materials and technique. According to Sharma and Rao (2019) "In India almost every state has particular type of traditional embroidery with specific names and purpose such as *Phulkari* from Punjab, *Kutch* from Gujarat, *Chamba Rumal* (handkerchief) from Himachal, *Kantha* from Bengal, *Kasuti* from Karnataka, *Chikankari* from Utter Pradesh, *Gota Patti* from Rajasthan, *Kashida* from Kashmir (pp.264)." One such unique type of embroidery, practiced in Rajasthan, is the beautiful G*otta Patti*. It falls in the category of appliqué-embroidery and also called '*Gota Kinari*' or '*Lappe ka Kaam*'. Singh (2019) considers it to be "a unique piece of work involving the fashioning of gold lace or *Gota* into intricate motifs using golden leaves and florets (p.7)." Initially this type of embroidery was metallic in nature as it was made using gold and silver threads. This was later changed to copper thread which was coated with a desired material. Today, it is done using synthetic polyester thread (Goyal & Jain, n.d.). It is also known as Plastic *Gota*.

During olden days this embroidery was used to adorn the dresses of royalty. As per the documentation done by *Gaatha,* Jodhabai - wife of Akbar used to wear G*ota Patti* embellished garments (*Gaatha,* n.d.). In the modern times they are worn by all. According to Ramratan et al. (2023), "Usually, *gota* work garments are worn on festive occasion and wedding (p.61)*."* A number of motifs - the inspiration of which is mainly nature, can be seen in the *Gotta patti* work. Some examples are *boota* and *booti, pahad, gamla, birds* such as peacock, geometrical figures etc. The base fabric ranges from cotton, silk, velvet, georgette and almost all colors including magenta, yellow, *kesari, rani*, etc. are used while making *Gotta Patti* articles. This versatility has contributed to its rising popularity both in India and abroad. According to Bapna (2023),

"In recent years, *Gota Patti* has become increasingly popular outside of India, and it is now used in a variety of fashion styles, including traditional Indian wear, fusion even western wear. This has led to a renewed interest in this traditional form of embroidery and has helped to revive the art form. The popularity of *Gota Patti* has also led to the development of new techniques and designs, making it a versatile and timeless form of embroidery that is both traditional and modern." (February 23, para. 11)

Its popularity has indeed resulted in providing income to the artisans. But it is important to understand the scenario in terms of the conditions of the artisans and what all needs to be done to further promote this art. This will ensure that the artisans continue to earn a livelihood by practising this art and it does not become a mere page in the history book of traditional Indian embroidery. A number of studies have been conducted to document this type of embroidery - Ojha (2014), Hada & Garg (2014) etc. The present study touches upon the process and focuses more on the artisan and ways of further promoting the art.

OBJECTIVES

- To gain information about the artisans and understand their working conditions.
- To document collection of motifs by designing on AutoCAD.
- To prepare a catalogue *of Gotta Patti* designs.

METHODOLOGY

The study was carried out in two major phases. During the first phase, primary data and secondary data was collected. Phase II was for the collection and documentation of designs, which included drawing of motifs using AutoCAD. The conceptual framework of the study is given below:

PHASE 1	PHASE II

Collection of data
Primary Data
   • Interview method
   • Observation
Secondary Data
   • Visit to Library
   • Visit to Museum
	Collection of Designs
	   • Documentation of designs using AutoCAD
	   • Preparation of a catalogue

Figure 1: Conceptual Framework

Phase I

During this phase, the focus was on collection of data from the secondary and primary sources. A number of visits were made to libraries and museums both in Delhi and Jaipur to gather information related to *Gotta - Patti.* In order to collect primary data, an interview schedule was constructed that had questions related to personal and family background of the artisans as well as questions regarding the practicing of the embroidery. A pilot study was conducted at Jaipur, Rajasthan. The sample consisted of ten artisans.

The data for the study was collected from 50 artisans living in *Nayla* as this village was found to be the hub of *Gotta - Patti* work. According to Hada and Garg (2014) "The *Nayla* village at Jaipur district of Rajasthan, India is famous for *Gota Patti* work on formal costume and fabrics (p.55)." Snowball sampling method was used to select the artisans.

An observation schedule was designed to collect information regarding the process of embroidery, the physical conditions prevalent at the *kar–khanas*, number of workers executing the embroidery work, their seating arrangement etc. A total of ten *kar–khanas* were visited. The process of making *Gotta Patti* on fabric was studied through observation. It has been described below along with tools and supplies needed for embroidery.

Phase II

During this phase**, t**he designs were collected mainly from *khakhas* of designs available with the artisans and also from books, internet, articles such as sarees, suits, etc. The designs were drawn using AutoCAD. A catalogue of designs was also made.

FINDINGS AND DISCUSSION

Process of embroidery

A number of tools and supplies are needed to execute the embroidery. The most important item is the *gota* which is sewn onto the fabric. Originally real gold and silver metals were used to embroider. In recent year, real gold and silver yarns have been replaced by polyester yarns. The needles used are made of stainless steel and are available in various lengths and thickness. They vary from 6 to 12 mm in thickness and are approximately 2 inches in length. For finer *Gotta Patti* work, thinner needles are used.

The base fabric used is cotton, silk, georgette, chiffon, velvet, and other synthetic fabrics. It is fixed tightly on to *khaat* or a wooden frame. Its length and width varies according to the fabric and design and can go upto 12 feet long and maximum 4 feet wide.

The design is first made on a thick translucent sheet of paper. A number of holes are made on the motif and this process is called pinning. A mixture of kerosene and chalk are rubbed over it to transfer the design on to the fabric. From the holes of punched butter paper, the mixture seeps onto the fabric and the design gets transferred. This is called *chappayi*. Bhandari (2014) has also described the process of transferring of design onto the cloth in more or less similar manner. Once the design is transferred onto the fabric, the cut leaves of *Gota* called *Patti* is pasted on the fabric as per the motif. The gum is applied using a matchstick and left for 10 – 15 minutes for drying. Traditionally, this was not the way a *Patti* would be attached to a fabric. As Choyal (2023) also wrote, "With time, *Gotta Patti* has been commercialised so much that artisans are now altering their techniques and raw materials to mass-produce pieces. Instead of appliquéing the *gota*, they now paste them onto the fabric using glue and the metal wires in the *gota* have now been replaced by plastic strips" (May 6, para.8). After drying it is secured by running stitch. The process is called *takaayi*. Further, rows of *kasaab* are attached using couching stitch to outline the *Gotapatti. Fatelah,* a flat wooden stick on which the *kasaab* is wrapped, is used for ease of working. *A* wooden hammer known as *peetan* is used for beating the *Gotapatti* from the top of the fabric. Another small wooden block known as *kuttan* is placed beneath the fabric to support it from below. Finally, the stains of tracing are removed using a solvent. The finished fabric is removed from the *khaat* and is kept in an open area to make sure that solvent gets completely evaporated.

Artisans and their working conditions

An interview schedule was used to study the artisans who are doing *Gotta patti* commercially. The findings are as given below.

Personal and Family profile of the respondents

Age

The respondents age ranged from 15 years to 46. The maximum number of respondents were in the age group of 26 to 35 years - i.e. 50%. Thus, younger generation appears to be joining this industry. But in the higher age category i.e. 46 years, there were only 3 respondents. This could be due to the fact that the need to do intricate work leads to poor vision as also sitting in an uncomfortable posture on the floor creates health problems over a period of time.

Gender

In the *kar-khannas*, 70% of the respondents were males and 30% females. This was probably due to the prevalence of the *parda* system among women. Therefore, they work mainly in their home premises.

Educational Qualifications

The analysis of the data revealed that 38% artisans had no formal education and 18% had studied only till primary school. 30% and 14% artisans had studied till higher secondary and senior secondary, respectively.

Marital Status and type of family

The majority i.e. 84% of the respondents were married. Surprisingly, only 44% were living in joint families and the remaining were in nuclear families. This points towards the change in family structure in Indian villages too with more families opting for the nuclear unit.

Information related to the craft

Table 1. Information Regarding Craft

Work Experience			Craft Training			Employment Status		
Years	No.	%	Teacher	No.	%	Status	No.	%
5-10	14	28	Master/Ustaad	24	48	Self	16	32
11-15	11	22	Parent	8	16	Working for middleman	27	54
16- 20	14	28	Grand Parent	3	6	Both	7	14
21- 25	8	16	Uncle	5	10			
26- 30	3	6	Husband	10	20			

Years of Experience

It can be seen from Table.1 that 28% of the artisans had five to ten years of work experience and another 28% had 16 - 20 years. A slightly lesser percentage (22%) had eleven to fifteen years of experience. Of the remaining, 16% had 21 to 25 years and only 6% artisans had experience of 26 years to 30 years. This again shows that although younger generation are joining this industry but with age, they have to opt out of it.

Learning the art

Once taught mainly by *ustaads* or master craftsmen, in the present study it was found that only 48% of the artisans had learnt this embroidery from them in their *kar-khaanas* and the remaining 52% learnt it from their family members.

Employment Status

The importance of middlemen emerged from the finding that 54% received work from them. 32% were self-employed and received work directly from the shopkeepers and interestingly 14% reported working for *kar-khaana* during the day and at night they would work at home to earn extra income.

Time spent on working

The study revealed that the demand for *Gotta Patti* work increased during the festive season and during such times the artisans have to work for 12 - 14 hours per day. At other times they work on an average, 10 - 12 hours per day. Sometimes, closer to the delivery date also the number of hours put in were high. Similarly, during the rainy season the number of hours reduced due to power cuts.

The time spent on an item depends upon the type of product embroidered. A contemporary *lehanga* might take 20 – 30 days and a saree take approximately 15 days. A smaller item such as a *dupatta* gets completed in five days. The time required to make a *kameez* of *salwar-kameez* and a *choli*/ blouse is roughly three to four days.

Wages

The study revealed that the wages were paid either by per piece rate system or on an hourly basis. When they are paid as per piece then they can get as little as Rs. 200 or as high as Rs. 2000 per piece depending upon the type of design and intricate work required. When paid as per hour then

they get Rs. 30 per hour, which comes to Rs. 300 – Rs. 360 for a working day of 10 hours to 12 hours.

The *kar-khanas* or the work place

A total of ten *kar-khanas* were visited. These were *pucca* buildings but with *kachcha* floor. There were two rooms in each *kar-khaana,* with two to three *addas* in each room. In a room of almost 15 feet x 18 feet there were only two ceiling fans. There were two windows of 2 feet x 3 feet and one ventilator of 1-foot x 1foot in each room.

The source of light was tube light and windows. Each room had only two tube lights fixed on two walls. There were no task lights provided for the intricate work of *Gotta patti* work. Also, it was observed that there was no facility of inverters or generators, in case of power cut.

A total number of 10 – 12 artisans work in one room. The number of artisans on each *adda* varies according to the design. Mostly artisans sit on the floor mat, but in some cases, they were using cushions too.

Problems faced by the Artisans

The beautiful embroidery of *gotta patti* is practiced by artisans who face many problems. The study reported the following problems faced by them -

- Poor Vision – It was found that due to the intricacy of the work, artisans toil over the *adda,* and work for long hours in poor lighting, which increases the strain on eyes leading to poor vision.
- Joint pain – Due to continuous hours of working and bad sitting postures, artisans complained about pain in neck, back and knees.
- Storage – Artisans reported problem of storage of *khaakha*, which took a lot of storage space in their small set-ups. During rainy season, the *khaakhas* get spoiled and it becomes difficult to retain them after some time.
- Commercialization of *Gotta patti* Work – As a result of commercialisation, no doubt opportunities have increased but it has also led to fierce competition and markets are filled with similar but cheaper products.With almost negligible visual difference, customers are unable to make out the difference between handmade embroidery and machine embroidery.
- Low Education Level – The literacy level of individuals involved in *Gotta patti* craft is low. As a result of low literacy level, they are more prone to exploitation in terms of working hours and wages.
- Lack of Financial Support – Most of the artisans involved in the *Gotta patti* craft face shortage of finances and funding. During the past decade government has introduced schemes for the artisans but these are not fully accessible to the artisans.
- Lack of knowledge – Due to low literacy level, the artisans do not seem to have the knowledge and awareness regarding the recent advancements and techniques in their field. They are under paid for the work which is being sold in the market at a much higher price. Also, they are unaware of labour rights, minimum wages and laws regarding overtime.

Documentation of Designs using AutoCAD

The artisans make the designs on butter paper called *khakha* and this is done manually. Although this does not tear, but due to the mixture of chalk and kerosene oil, the pencil marks of the design start disappearing eventually. Over a period of time, it becomes difficult to identify the designs made on the *khakha*. Many times, the artisans are not able to locate the earlier used *khakha*

and recreate the same design. These *khakhas* are also difficult to store. Hand-made *khakhas,* also have the limitations that they cannot be immediately edited and motifs cannot be resized as per the requirement of the product.

Keeping in mind the above problems faced by the artisans, the researcher collected various motifs and patterns from the artisans and other sources. These motifs were also acquired from old articles of *Gota- Patti*, contemporary products and books. In order to preserve the *khaakhas*, efforts were made to recreate the motifs using AutoCAD. AutoCAD is a computer-aided drafting software program used to create 2D and 3D designs. Apart from being used for making engineering designs, AutoCAD is also used in fashion industry to create motifs, patterns etc. It has number of advantages which are as given below:

Possible to Edit – It is possible to change the design as per the likes of the customer. It is also possible to resize motifs and regroup in order to create a new design using same motifs. This is difficult in the case of handmade *khaakha in which* design made once and punched cannot be changed.

Time Saving – The printouts of the motifs can be taken out as and when required. Since khaakhas have to be made manually they require a lot of time and effort.

Easy to Store – The designs made can be stored and saved for as long as possible conveniently. Even after many years the designs can be relocated and used.

Keeping in mind the advantages, the researcher gained training in AutoCAD. Subsequently, a
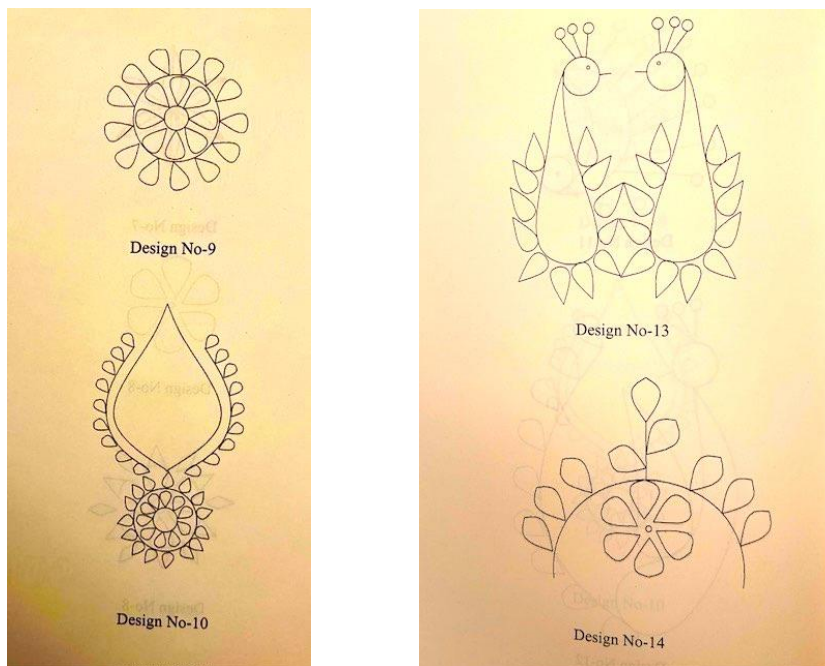
number of motifs were drawn using AutoCAD.

Figure 2: Designs made using AutoCAD software

Catalogue of designs

The pictures taken of the designs were put together in the form of a catalogue.

Figure 3: Catalogue of Designs

CONCLUSION

The beautiful embroidery of Gota - Patti has come a long way. The machines have provided cheaper alternatives but the charm of the handmade embroidery still persists. The materials have changed but the motifs, method of execution remain more or less the same. But the condition of workers is far from satisfactory. Their workplaces are not well - ventilated, seating is not designed as per ergonomics and lighting is poor. Their work conditions need to improve and they have to be made aware of their rights. The general public has to appreciate the hard work that goes behind the creation of even simple articles so that they are willing to pay a little extra to hand embroidered items. Similar studies can be done to gain and document information regarding other types of embroideries too. This will not only create market for products but will help the artisans receive their well-deserved respect.

Unfortunately, due to lack of time, data could be collected only from limited number of artisans living in Nayla. Other areas could not be covered. Only ten kar - khanas could be visited and limited number of designs could be documented. These constitute the limitations of the study.

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AN ADVANCEMENT OF FUSION DESIGN BY INTEGRATING WARLI MOTIFS AND MADHUBANI ART

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ABSTRACT

The paper entitled is undertaken with a view to creating innovative products by integrating two highly esteemed traditional Indian art forms Warli and Madhubani designs. In order to do this, the study collected a total of 30 motifs (15 from each design) from secondary sources and combined a sample of 6 motifs (3 from each) from both traditions and applied them to the products aimed at enhancing interior décor. Thus the study obtained 5 fusion designs and also sought to evaluate the aesthetic appeal and acceptance of these designs when used as everyday items, exploring their potential in modern settings. A panel of 30 judges was assembled to visually assess the collected designs based on specific attributes using a 5-point rating scale. The thorough evaluation identified designs that effectively combined the unique features of Warli and Madhubani art while appealing to contemporary tastes. The highest-scoring designs were then carefully applied to selected products through freehand techniques, preserving the authenticity of the traditional art forms. These finalized products underwent a second evaluation by the same judges and members of the general public, who provided feedback on their aesthetic and functional qualities. The results revealed a strong appreciation for the fusion designs from both judges and the public. The products were particularly well-received for use in home decoration and other practical applications, highlighting the significant potential of combining Warli and Madhubani art for innovative product development. This approach not only showcases the beauty and adaptability of these traditional art forms but also plays a vital role in promoting and preserving Indian cultural heritage. By introducing these art styles to a broader audience, the study fosters greater awareness and appreciation, encouraging further exploration and creation of similar products in the future.

Key words: - Development, Design, Fusion, Madhubani art, Warli motifs

INTRODUCTION

The fusion of traditional art forms represents a dynamic and innovative approach in the realm of contemporary design, where ancient cultural expressions meet modern aesthetics. This blending of distinct artistic traditions not only offers fresh creative perspectives but also plays a crucial role in preserving and revitalizing cultural heritage. In this context, the current study focuses on the development of fusion designs by integrating Warli motifs and Madhubani art—two highly esteemed and culturally significant forms of Indian folk art.

Warli art, which originates from the tribal communities residing in the North Sahyadri Range of Maharashtra, is renowned for its simplistic yet profoundly symbolic geometric patterns. These patterns, often depicting elements of the natural world, agricultural practices, and daily life, are created using basic shapes such as circles, triangles, and squares. The minimalism of Warli art, with its monochromatic palettes and abstract representations, embodies a deep connection with nature and a straightforward narrative style that has been passed down through generations.

On the other hand, Madhubani art, which hails from the Mithila region of Bihar, is characterized by its intricate and vibrant depictions of mythology, nature, and social events. Traditionally practiced by the women of the Mithila region, Madhubani paintings are distinguished by their complex patterns, bold use of color, and rich symbolism. The themes often center around religious stories, deities, and the harmonious relationship between humans and the natural world. The art form is known for its dense compositions, where no space is left unadorned, creating visually captivating and detailed narratives. By bringing together the minimalistic elegance of Warli motifs with the detailed richness of Madhubani art, this study seeks to create unique fusion designs that celebrate the distinct identities of these traditional art forms while also exploring their potential in contemporary applications. This fusion is not merely an aesthetic experiment but an exploration of how two different cultural expressions can coexist and complement each other, leading to new and innovative design possibilities. The integration of Warli and Madhubani elements offers a creative platform for innovation across various fields, including interior design, fashion, and visual arts. In interior design, for example, the fusion of these two styles could result in striking wall art, textiles, or home decor items that blend the simplicity of Warli's geometric forms with the vibrancy of Madhubani's detailed patterns. In fashion, designers could create garments that juxtapose the earthy tones and minimalistic designs of Warli with the bold colors and intricate motifs of Madhubani, resulting in apparel that is both culturally rich and visually appealing. Moreover, this fusion also holds potential in digital and graphic design, where the combination of Warli's symbolic language with Madhubani's narrative depth could lead to compelling visual content for branding, marketing, and media. The study, therefore, not only contributes to the preservation of these traditional art forms but also ensures their relevance and appeal to contemporary audiences, making them accessible and appreciated in new contexts. Through this exploration, the study seeks to support the ongoing efforts to preserve and revitalize Indian folk art. By adapting these traditional forms to modern design applications, the study helps bridge the gap between the past and the present, ensuring that these rich cultural expressions continue to thrive in a rapidly changing world. Ultimately, the fusion of Warli motifs and Madhubani art offers a unique opportunity to celebrate India's diverse artistic heritage while fostering a deeper appreciation for the timeless beauty and cultural significance of these traditional art forms.

JUSTIFICATION OF THE STUDY

The justification for this study is based on the need to preserve and promote traditional Indian art forms amid globalizing influences that risk overshadowing cultural heritage. Warli and Madhubani art, both integral to India's artistic history, face the threat of marginalization due to modern trends. This study aims to revitalize these traditions by integrating Warli motifs with Madhubani art, creating innovative fusion designs that maintain their cultural essence while appealing to contemporary audiences.

This approach not only helps bridge traditional and modern art forms but also supports the economic sustainability of artisans by opening new market opportunities. By showcasing these fused designs, the study fosters greater appreciation for India's diverse cultural heritage and ensures the continued relevance of these traditional arts. In essence, the study seeks to balance cultural preservation with innovation, ensuring the enduring relevance and vitality of Warli motifs and Madhubani art.

OBJECTIVES

- To collect and analyze traditional motifs
- To develop fusion designs and evaluate the aesthetic appeal.
- To develop products using the developed fusion design.
- To evaluate the developed product and to assess their overall acceptability.

REVIEW OF LITERATURE

Sharma, E., et. al (2014) in their study explored the fusion of two traditional Indian folk art forms, Madhubani and Warli, through Computer-Aided Design (CAD) for innovative textile applications. By blending these art styles, the research aims to introduce unique motifs to the modern design and fashion industry. The project focuses on creating digital fusion designs for apparel using advanced printing techniques like digital, roller, and screen printing, offering efficient methods for design reproduction. It also emphasizes preserving these art forms by developing a design repository to cater to the growing consumer demand for ethnic and culturally inspired motifs in textiles.

Sodhi, S., et. al. (2016) in their study focused on adapting Warli painting motifs for Aari embroidery to create innovative textile designs while preserving the traditional essence of both art forms. Using secondary sources, fifteen motifs were selected by experts and transformed into thirty designs using CAD. Three designs were further adapted for Aari work and evaluated by experts and consumers for appeal, cost, and suitability. The results showed high acceptance and appreciation of the designs, which were deemed suitable for a wide range of products. This research highlights the potential of CAD in enhancing traditional motifs for modern textile applications.

Rani, P., et. al. (2019) in their study explored the adaptation of traditional Madhubani motifs for innovative design development. A total of 120 motifs were collected from secondary sources, manually sketched, and digitally refined using CorelDRAW X5 and Adobe Photoshop. The motifs were categorized into floral & foliage, geometrical, animal & bird, and religious themes. Four motifs from each category were selected, leading to the creation of thirty unique designs, with five top designs chosen for diverse applications. These designs can be applied to textiles using techniques like digital and hand embroidery, printing, painting, or a combination of methods, showcasing the versatility of Madhubani art in modern applications.

Joshitha, S.,et. al. (2023) in her study explored the adaptation of Warli motifs for textile design, focusing on items like masks, kurtis, palazzos, and dupattas. A total of thirty motifs were designed for center and border patterns, with a panel of thirty respondents selecting the most suitable designs through visual assessment. Four final products were crafted using embroidery

techniques, earning high praise for their aesthetic appeal, affordability, and artistic charm. The designs, though intricate, were easy to adapt, with palazzo designs receiving the highest appreciation. This work underscores the timeless charm of Warli art and its ability to cater to the fashion industry's demand for distinctive and creative designs.

Studies highlighting the fusion of warli motifs and madhubani arts are few and most of the research have created the fusion of these motifs with the aid of software on the computer (CAD, Photoshop, illustrator) while the fusion of these traditional motifs are basically created with the free hand method. Thus the earlier lacks the natural presentation while the latter does not. Therefore the present study makes an attempt to create innovative products by integrating two highly esteemed traditional Indian art forms warli and madhubani designs through free hand method.

METHODOLOGY

Motifs used:

A total number of thirty Motifs constituting a half from each Warli and Madhubani arts were carefully gathered from a variety of sources, including traditional literature, artworks, and digital platforms. These sources provided a rich repository of designs, ensuring an authentic representation of the art forms. The collected motifs were then analyzed and a sample of six motifs selected through visual evaluation by the judges constituting a half from each Warli and Madhubani arts were adapted for use in design, highlighting their cultural significance while integrating them into modern fashion. This approach not only preserved the traditional essence of these art forms but also showcased their versatility in contemporary textile applications.

Visual evaluation of warli motifs and madhubani arts:

The visual evaluation of warli motifs and madhubani arts were evaluated by a panel of thirty judges including teachers, staff members, boutique owners, shopkeepers, housewives, and students to determine their acceptability for the selection of the top six motifs (three from each warli and madhubani). The evaluation was done in an online mode through google form. The evaluation of the designs was done on the parameters; excellent, very good, good, fair, poor. The percentage of five different parameters was calculated online by the google form for each motif. The motifs which had maximum percentage in "Excellent" category were selected.

Development of fusion designs using free hand method:

The creation of fusion designs that combine Madhubani art and Warli motifs involved integrating the unique elements of both styles into innovative and cohesive designs. The process started with an in-depth analysis of the distinct features, cultural significance, and traditional applications of Warli motifs and Madhubani art. Complementary motifs from each art form were carefully selected to create a balanced blend, aiming to maintain the simplicity of Warli while adding the intricate and vibrant aspects of Madhubani. The designs were refined through sketching and adjustments to ensure visual appeal and coherence. These fusion designs were then applied to various products, such as textiles and home décor, highlighting their potential in modern design.

Evaluation of the developed designs:

The developed designs were evaluated by a panel of thirty judges, including staff members, boutique owners, shopkeepers, housewives, and students, to determine their acceptability. The evaluation criteria included balance of design, color combinations, fusion patterns, functionality, overall appearance for specific products, and the degree of connection to warli and Madhubani art styles. A five-point rating scale was utilized for the assessment, with scores of 1, 2, 3, 4, and 5 corresponding to poor, fair, good, very good, and excellent, respectively.

Development of products:

All the selected designs were applied on specific object like coffee mug, fabrics, canvas etc. using hand painting techniques.

Acceptability of the developed products:

The developed products were subsequently subjected to visual evaluation by the same panel of thirty judges to assess their acceptability. The evaluation was based on parameters such as the balance of design, color combinations, fusion patterns, functionality, and overall appearance for specific products.

Five distinct scores were assigned: 1 for Poor, 2 for fair, 3 for good, 4 for very good and 5 for Excellent. The Weighted Mean Score (WMS) was calculated based on the number of respondents for each characteristic of the functional features.

The acceptance of the developed products was assessed using the Weighted Mean Score (W.M.S). The W.M.S was calculated based on the rating provided by the judges, using the following formula:

$$W.M.S = \frac{\text{No. of Respondents(E)}\times5+ \text{No. of Respondents(VG)}\times4+ \text{No. of Respondents(G)}\times3+\text{No. of Respondents(F)}\times2+\text{No. of Respondents (P)}\times1}{\text{Total No. of Respondents}}$$

W.M.S was analyzed for the acceptance level in the following ranges (**Edwards, A. L, 1957**)

- Excellent: 4.20-5
- Very Good:3.40-4.19
- Good: 2.60-3.39
- Fair: 1.80-2.59
- Poor: 1-1.79

RESULTS AND DISCUSSION

Developed fusion design:

The fusion design of warli motifs and madhubani art were developed. Total five fusion design was developed and is shown in Figure 1.
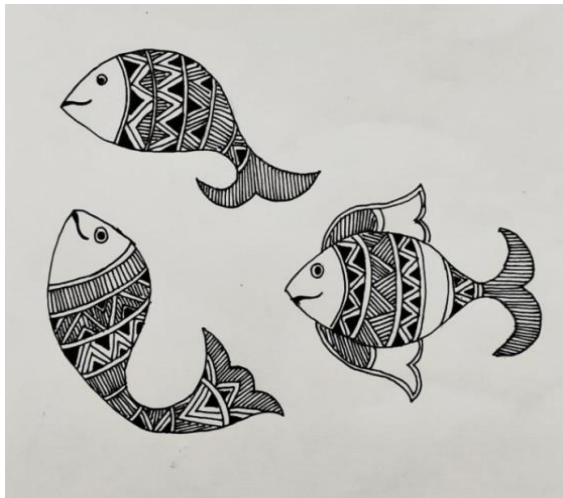
FD-01

FD- 02

FD- 03

FD- 04

FD- 05

Figure: 1 Fusion Design of Warli Motifs and Madhubani Art (FD. 01- FD. 05)

Visual evaluation of developed fusion design:

All the developed fusion design of warli motifs and madhubani art were subjected to visual evaluation by the judges for the designs were visually assessed based on various attributes, the selection of ten most preferred motifs. The result of visual evaluation is shown in Table 1.

Table: 1 Mean Scores obtained on visual evaluation of developed fusion designs

Attributes	FD-1	FD-2	FD-3	FD-4	FD-5
Balance of Design	2.62	2.78	4.90	3.30	2.88
Color Combination	2.50	2.90	4.94	3.84	2.91
Fusion Pattern of Design	2.60	2.66	4.89	3.60	3.20
Functionality of Design	2.30	2.80	4.80	3.91	2.80
Overall Appearance	2.70	2.60	4.84	3.94	3.70
Total scores	12.72	13.74	24.37	18.59	15.49
Mean scores	12.72/5= 2.54	13.74/5=2.74	24.9/5=4.87	18.59/5=3.71	15.49/5=3.09
Rank	**IV**	**III**	**I**	**II**	**III**

To interpret the visual evaluation scores of the developed fusion designs, let's analyze each attribute and the total mean scores. Fusion Design no. 3 received the highest total mean score (4.87) and excelled in the attributes of balance, fusion pattern, functionality, and overall appearance. Fusion Design no. 4 came in second with a total mean score of (3.71), performing well in fusion pattern and overall appearance but less effectively in functionality. Design nos. 2 and 5 both scored (2.74, 3.09), with strengths in color combination and fusion pattern but less functionality compared to Fusion Design no. 3. Fusion Design no. 1 had the lowest mean score (2.54), with lower ratings across several attributes, including balance, color combination, and functionality. Overall, Fusion Design no. 3 is the most favorable design based on the evaluation criteria.

Product development:

Following the design evaluation, selected fusion designs were applied to develop actual products, ensuring that the integrity of both art forms was maintained in the final output.

Raw material used:

For product development, different raw materials were selected purposively according to the requirement of each article. Raw material were used, fevicol, Acrylic colors, empty bottle, cups, jute fabric. Apart from this we used some more necessary materials to make the article, such as tracing paper, yellow carbon paper, fine tip pencil, cartridge sheet, and different sizes of brushes (round & flat). The cost of the developed products was calculated on this basis of different raw materials and necessary materials used according to the requirements of each articles.

Process involved in the developed product:

- Design were draw on Cartridge Sheet then trace on article with the help of tracing or yellow carbon paper.

- The designing and painting was done by freehand.
- The major motifs used were bird, peacock, trees, lady, animals etc. So a fusion of the two arts would give great variety in choice and articles thus developed.

<table>
<tr><td>(i)</td><td>(ii)</td></tr>
<tr><td>(iii)</td><td>(iv)</td></tr>
</table>

Figure: 2 Product development using Fusion Design of Warli Motifs and Madhubani Art (i,ii,iii,iv)

Final developed products:

A total of top five fusion designs of warli motifs and madhubani art was developed, including a pen stand (Product A), a coffee mug (Product B), a face mask (Product C), a knee-length kurti with a front slit (Product D), and a canvas painting (Product E). The fusion designs were developed by incorporating either the complete design or individual motif elements. The pictures of the developed products are shown in figure 3.

Product A (Pen Stand)

Product B (Coffee Mug)

Product C (Face Mask)

Product E (Knee Length Kurti with Front Slit)

Product E (Canvas Painting)

Figure: 3 Developed Products (Product A,B,C,D,E)

Acceptability of the developed products:

The developed product was subjected to evaluation by same panel of thirty judges (the judges who evaluated the developed designs) to access the acceptability of the developed products. The evaluation focused on various attributes, including the arrangement of motifs or designs, color combinations, the appropriateness of the designs for specific products, and the degree of connection between the developed designs and the traditional Madhubani art and Warli styles. A five-point ranking scale was used for this assessment, where the products were rated as 1, 2, 3, 4, or 5, corresponding to poor, fair, good, very good, and excellent, respectively and the findings are presented in Table 2.

Table: 2 Acceptability of the developed products

Developed Products	Motifs Suitability for particular Products	Arrangement of design or motifs	Colour combination	Fusion of Warli motifs and Madhubani art	Total Score	Mean Score	Ranking
Product A	4.10	4.12	4.20	4.34	16.76	4.19	**ii**
Product B	4.79	4.10	3.10	3.64	15.63	3.90	**iii**
Product C	2.90	3.90	4.10	4.35	15.25	3.81	**iv**
Product D	4.88	4.89	4.92	4.79	19.48	4.87	**i**
Product E	2.45	2.30	2.50	3.10	10.35	2.58	**v**

The table presents a formal evaluation of five developed products based on visual assessment criteria to determine their acceptability. The products are assessed on four parameters: motif suitability for the particular product, arrangement of design or motifs, color combination, and the fusion of Madhubani and Warli motifs. Each parameter is scored on a scale of 1 to 5, and a total score is calculated to rank the products. The findings are as follows:

Product D achieved the highest ranking with a mean score of 4.87, obtaining highest weighted mean score for motif suitability, arrangement of design, color combination, and the fusion of Madhubani and Warli motifs. Its top performance across the majority of categories positions it as the most acceptable product. Product A and Product B gained second and third ranking with a mean score of 4.19 and 3.90 respectively. Product C ranked fourth with a mean score of 3.81. Product E ranked last, with a mean score of 2.58. Its relatively lower score in the arrangement of design negatively impacts its ranking, despite moderate scores in the other categories. Product D is the most visually acceptable, demonstrating balanced and consistent strengths across all criteria. Products A and B are similarly competitive, though A excels in the fusion of artistic motifs. Product E with the lowest mean score, demonstrates the least visual appeal, primarily due to weaknesses in design arrangement.

In summary, Product D Knee Length Kurti with front slit emerged as the most successful design in terms of acceptability, while Article E was the least favored among the five evaluated designs.

CONCLUSION

In India, each state is known for its own traditional fabrics and distinctive designs. Among these, Madhubani painting from the Mithila region of Bihar and Warli painting from Maharashtra are particularly cherished for their cultural significance. However, the techniques involved in producing these designs are often labor-intensive and time-consuming. This study represents an initial effort to create fusion designs that combine elements of these two folk arts. Through this approach, a variety of objects can be decorated, repaired, or even repurposed, transforming otherwise unused items into beautiful and attractive pieces. Furthermore, these fusion designs could open new opportunities for designers having no computer knowledge to meet the evolving demands of consumers, particularly those seeking ethnic motifs and patterns in textile products. The adoption of these designs will not only preserve and advance India's traditional art forms but also promote the growth of the related industries.

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CONSUMER ACCEPTANCE OF SANJHI ART IN FASHION

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ABSTRACT

This research paper delves into the intricate world of fashion and traditional art, specifically focusing on the integration of *Sanjhi* art into contemporary fashion articles. *Sanjhi* art, a centuries-old paper-cutting craft originating from India, offers a rich tapestry of cultural heritage and artistic expression. The study aims to verify the acceptance of *Sanjhi* art within the fashion realm, exploring various sides including consumer preferences, historical roots, creation processes, and influencing factors. Conducted exclusively among female participants, this research presents a gender-specific perspective on the intersection of traditional art and modern fashion. Through a quantitative method, the study seeks to unravel the nuanced shades of consumer behaviour and preferences regarding *Sanjhi* art-inspired fashion articles. By engaging with female participants, the research aims to capture diverse viewpoints and experiences, shedding light on the intricate relationship between gender, culture, and fashion consumption. The historical exploration of *Sanjhi* art serves as an initial pillar of the research, offering insights into its cultural significance and aesthetic appeal. Drawing from historical narratives and cultural contexts, the study contextualizes the evolution of *Sanjhi* art and its relevance in contemporary fashion. Through a comprehensive analysis of historical sources and artistic traditions, the research seeks to develop our understanding of *Sanjhi* art. The study aims to showcase the versatility and adaptability of *Sanjhi* art in the realm of lifestyle design. In conclusion, this research paper contributes to a deeper understanding of the acceptance and integration of *Sanjhi* art in contemporary fashion, offering valuable insights for researchers, designers, marketers, and industry practitioners. By exploring the complex scopes of *Sanjhi* art in fashion, the study brightens new avenues for creative expression, cultural exchange, and commercial innovation within the global fashion landscape.

Keywords- Cutting, Decorative, Laser, *Sanjhi*, Traditional.

INTRODUCTION

Fashion and art are two strong mediums that influence modern aesthetics while also reflecting cultural heritage. Within this framework, the traditional form of *Sanjhi*, which has its roots in the culturally vibrant Indian city of Mathura, has experienced fascinating growth. *Sanjhi* art, traditionally used for religious and cultural reasons, has seen a revival and is now being incorporated into modern lifestyle. This study aims to examine how well-received *Sanjhi* art and fashion are, examining the complex interactions between traditional craftsmanship and contemporary market tastes.

Sanjhi art has a rich history based on religious traditions and is distinguished by its delicate paper-cutting, complex patterns, and delicate designs. Originating from folk culture, this art form gained prominence during the 15th and 16th centuries through Vaishnava temples, boosted by Brahmin priests crafting rangoli's in honour of Lord Krishna. Its popularity increased further in the

16th and 17th centuries, as *Sanjhi* motifs adorned temple floors and walls. Contemporary themes were seamlessly incorporated during the Mughal era, enriching the art's depth and relevance. *Sanjhi's* modern incarnation has been merged into the fashion industry, providing a distinctive fusion of modernism and heritage. With a desire for originality and a connection to one's cultural roots, traditional crafts and traditional forms of art have seen a rise in popularity recently on a global scale. *Sanjhi* art has drawn interest from artists and customers due to its fine detailing and cultural relevance.

Fig. 1. *Sanjhi* Art

The goal of this research is to unravel the complex web of customer preferences and acceptance around *Sanjhi* art and how it fits into the fashion industry.

OBJECTIVES

- To study the history of traditional *Sanjhi* Art.
- To identify the articles which can be created using *Sanjhi* Art.
- To create and analyse the acceptance of designed articles.
- To explore the factors influencing consumers preferences towards *Sanjhi* art in fashion.

HYPOTHESIS

Application of *Sanjhi* art to lifestyle articles will not impact consumer acceptance.

METHODOLOGY

The Acceptance of *Sanjhi* Art in Fashion: A study on consumer preferences.	In depth analysis consumer preferences for *Sanjhi* Art, the study uses quantitative research method .	The survey will include questions related to consumer prefeences of, purchasing behaviour, and perceptions of *Sanjhi* Art.	Data Analysis	Survey data will be statistically analysed using relevant software.

Fig. 2. Research Process

Product Development

This Objective 2 of this research paper aims to identify five accessories using *Sanjhi* Art motifs. Traditional *Sanjhi* Art motifs were used for product development, namely: bookmarks, jewellery box, mobile cover, nameplate, and coaster. Through a survey-based approach, data was collected and analysed to identify the preferences.

Bookmark

The bookmark in (Fig. 3) combines traditional *Sanjhi* Art with contemporary design, featuring hand-cut leaves on leather. Edges were embroidered with blanket stitch for elegance. Crafted with careful attention to detail using a pen cutter. This offers both functionality and aesthetic appeal for book lovers. It could serve as a unique gift embodying *Sanjhi* Art's cultural heritage for modern tastes.

Fig. 3. *Sanjhi* Art inspired bookmark.

Jewellery box

The Jewellery Box in Fig. 4 shows a laser-cut peacock design on MDF board, seamlessly blends traditional *Sanjhi* Art with modern materials. This combination of traditional craft and contemporary aesthetics results in a, elevating the box's aesthetic appeal with a touch of grandeur. Moreover, it serves as a testament to *Sanjhi* Art's adaptability in product design, catering to contemporary tastes while preserving the art form and inherent craftsmanship.

Fig. 4. *Sanjhi* **Art inspired Jewellery box**

Nameplate

The Nameplate represents the essence of traditional *Sanjhi* Art through its personalised design, featuring a laser-cut floral border delicately etched onto MDF board. Fig. 5 not only showcases *Sanjhi* Art's versatility in decorative applications but also transforms ordinary objects into bespoke works of art, adding a unique touch to any environment. Furthermore, the Nameplate provides homeowners with a customizable option to infuse their living spaces with cultural heritage, serving as a lasting tribute to the craftsmanship inherent in *Sanjhi* Art.

Fig. 5. *Sanjhi* **Art inspired Nameplate**

Mobile cover

The Mobile Cover (Fig. 6.) serves as a captivating canvas for traditional *Sanjhi* Art motifs intricately cut into paper designs. This accessory offers a stylish complement to mobile devices, seamlessly blending cultural heritage with modern application. It represents *Sanjhi* Art's adaptability in meeting diverse consumer preferences. Despite its lightweight construction, the cover provides durable protection for mobile devices.

Fig. 6. *Sanjhi* **Art inspired Mobile cover**

Coaster

The Coaster (Fig. 7.) seamlessly integrates traditional *Sanjhi* Art motifs into its design, showcasing a laser-cut horse motif on an MDF board. This piece offers a practical solution for tabletop protection, combining style with functionality. It serves as a prime example of *Sanjhi* Art's versatility, effortlessly meeting both decorative and functional needs.

Fig. 7. *Sanjhi* **Art inspired Jewellery box**

FINDINGS AND DISCUSSION

The research sample comprised 58 women across four different age groups: 18-30 years, 31-40 years, 41-50 years, and 51-60 years. Each age group was represented uniformly to ensure a balanced demographic spread. This allowed for comprehensive analysis of consumer preferences across various life stages, providing valuable insights into the acceptance and interest in *Sanjhi* art within different age demographics.

Familiarity of paper Crafts and Traditional folk-art forms

Analysing the preferences of individuals across various occupations sheds light on the popularity of Paper crafts like stencil art, scrapbooking, and origami. Among students, stencil art holds high appeal, with 30% showing interest, while scrapbooking captures the attention of 20% (Fig. 8.). Professionals express a strong inclination towards scrapbooking 30% and origami 27%, indicating a desire for hands-on creative pursuits. Interestingly, retirees and homemakers display minimal engagement in stencil art and scrapbooking but show varied interest in origami, with participation rates ranging from 0% to 20%. Individuals in other categories exhibit diverse

preferences, with scrapbooking being particularly popular. Meanwhile, unemployed individuals reveal moderate interest across all hobbies, with varying participation rates. Familiarity with paper crafts and Traditional Folk Art in %.
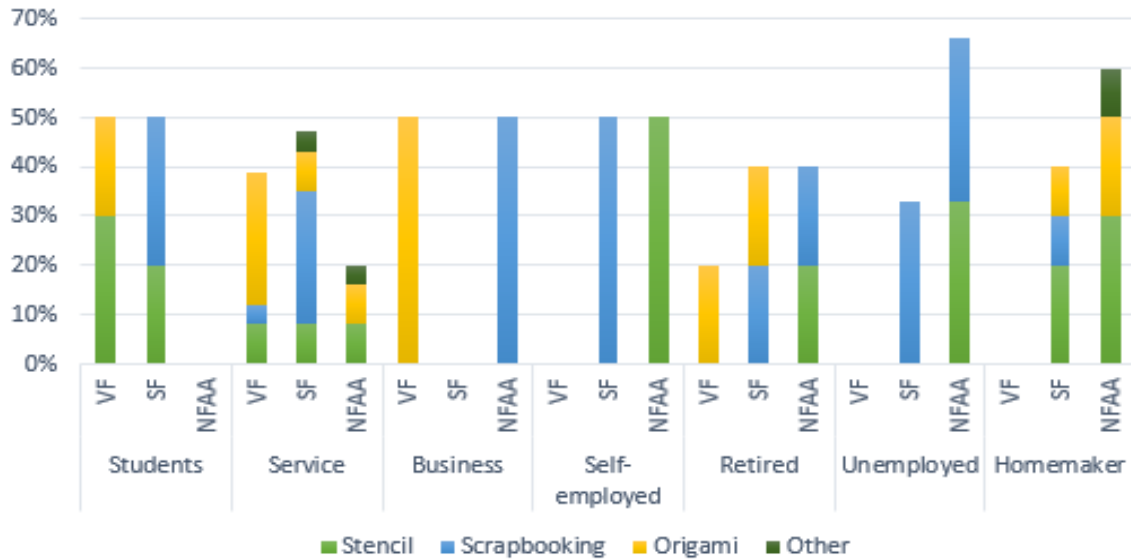
VF-Very familiar, SF- Somewhat familiar NFAA- Not familiar at all
Fig. 8. Familiarity with paper crafts and Traditional Folk Art.

ELEMENTS OF SANJHI ART

Sanjhi art, known for intricate paper cutting and vibrant motifs, was examined in terms of colour combinations, motifs, and paper cutting preferences (Fig.9). Traditional motifs were overwhelmingly preferred by 64% participants, indicating a strong cultural appreciation. Intricate paper cutting also received attention from 24% respondents, emphasizing admiration for technical skill. Colour combinations which were less favoured, with only 12% participants expressing a preference, suggesting they may not be the primary focus in *Sanjhi* art. Overall, the study highlights the enduring appeal of cultural heritage and the importance of craftsmanship in shaping aesthetic preferences.
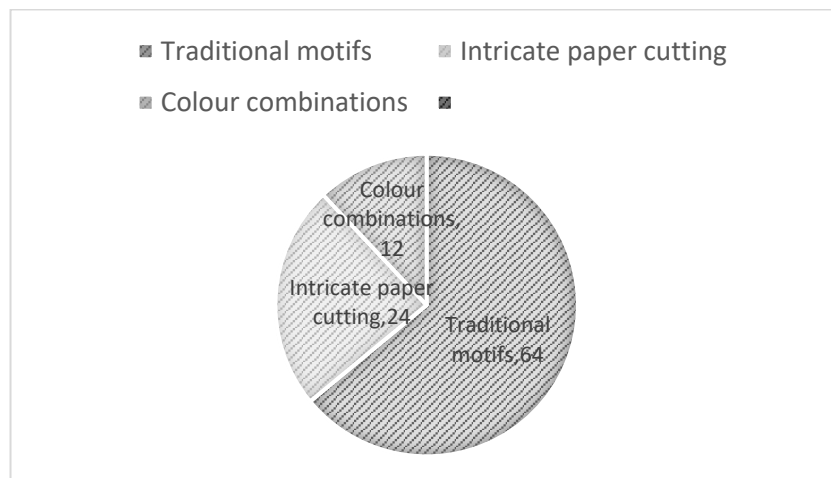
Fig. 9. Distribution of Aspects in *Sanjhi* Art

Bookmark

The data (Fig. 10.) presents a breakdown of survey responses regarding the willingness to spend across different age groups and cost of product. Notably, respondents aged 18-30 show a higher tendency to consider purchases bookmark in the lower cost brackets of Rs.100-150/- and Rs.150-200/-, with 20% and 31% respectively indicating a definite likelihood to buy. As age increases, there is a shift towards higher cost brackets, particularly among the 31-40 years age group where 33% express definite intent to spend in the Rs.200-250/- range. Flexibility among the 41-50 years age group, with 50% indicating acceptability in the Rs.200-250/- bracket. The 51-60 years age group shows a mixed response, with a notable 16% definite intent to spend in the Rs.300-above bracket.
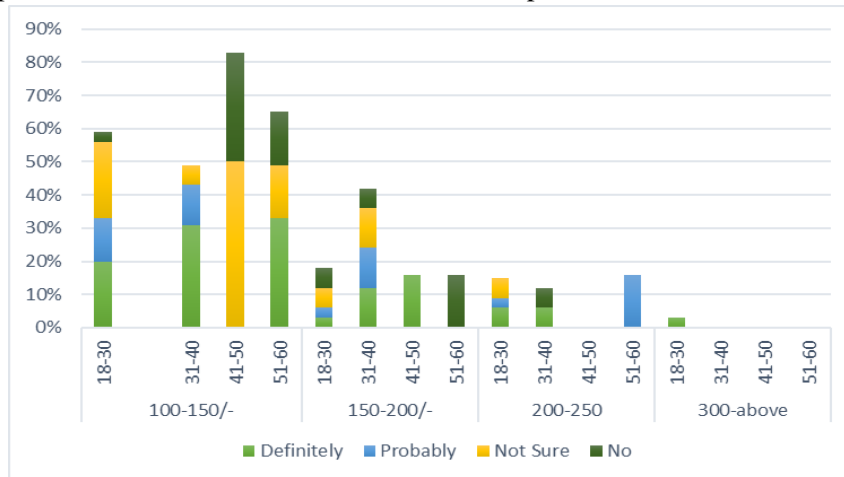
Fig. 10. Distribution of Consumer Purchasing Intent Across Age Groups and Cost Ranges in %.

Jewellery box

The data collection showcases a subtle pattern of consumer preferences across various age brackets and cost ranges. As seen in Fig. 11., the 18-30 age group, there is a consistent interest in the mid-range cost brackets of 500-600/- and 600-700/-, with 20% and 25%, respectively, uttering definite purchase intent of jewellery box. This trend continues among the 31-40 age group, where 25% show definite intent in the 600-700/- bracket. The 51-60 age group also demonstrates a strong inclination towards the higher cost brackets, particularly evident in the 700-800/- range, with 33% expressing definite intent to buy. However, uncertainties prevail across various age groups, notably among the 41-50 age group, with 16% unsure about purchases in the 600-700/- bracket.
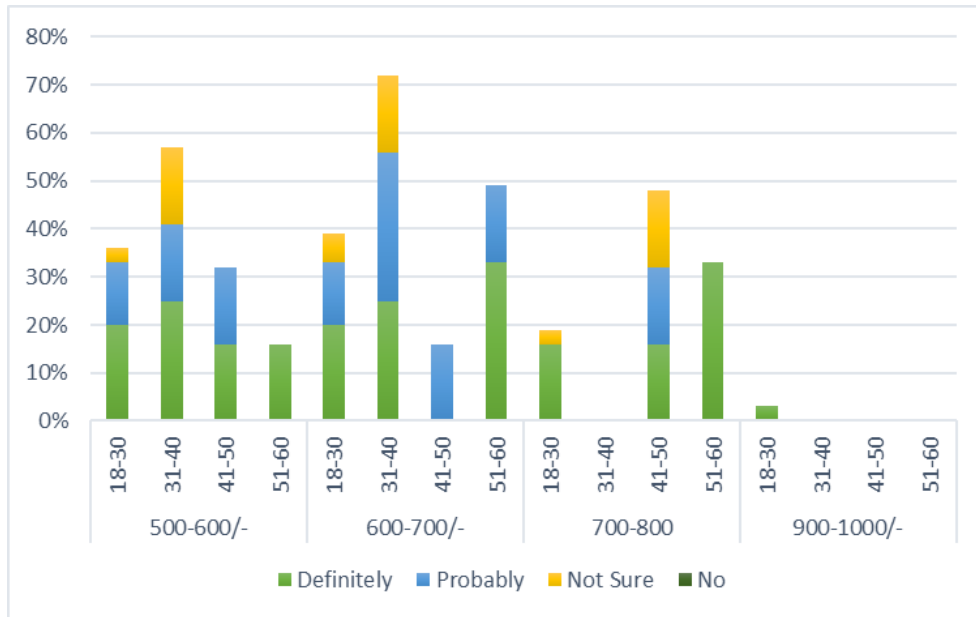
Fig. 11. Distribution of Consumer Purchasing Intent Across Age Groups and Cost Ranges in %.

Nameplate

The dataset (Fig.12.) showcases a nuanced pattern of consumer preferences across various age brackets and cost ranges. In the 18-30 age group, there is a constant interest in the mid-range cost brackets of 500-600/- and 600-700/-, with 20% and 25%, respectively, expressing definite purchase intent. This trend continues among the 31-40 age group, where 25% show definite intent in the 600-700/- bracket. Notably, the 51-60 age group also demonstrates a strong inclination towards the higher cost brackets, particularly evident in the 700-800/- range, with 33% expressing definite intent to buy. However, adaptability overcome across various age groups, notably among the 41-50 age group, with 16% unsure about purchases in the 600-700/- bracket.
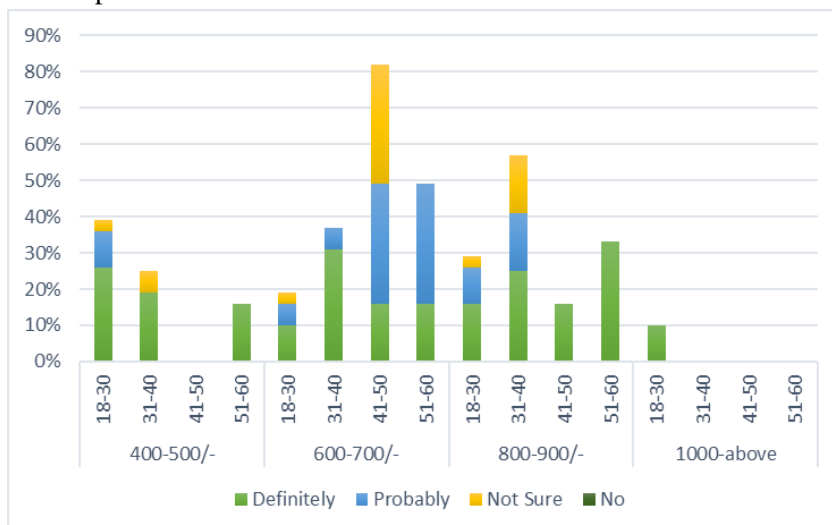
Fig. 12. Distribution of Consumer Purchasing Intent Across Age Groups and Cost Ranges in %.

Mobile Cover

The data analysis reveals interesting insights into consumer behaviour regarding different cost brackets across various age groups. Among individuals aged 18-30, there is a notable interest in the 150-200/- and 200-250/- price ranges, with 10% and 13%, respectively, stating definite intent to purchase (Fig.13.). Conversely, the 31-40 age group shows a heightened inclination towards higher-cost options, particularly evident in the 200-250/- bracket, where 25% demonstrate definite purchasing intent. However, uncertainties persist across all age groups, exemplified by the 41-50 age unit, where 16% remain unsure about purchases in the 300-400/- bracket. Interestingly, the 51-60 age group exhibits diverse preferences, with a significant proportion expressing definite intent for purchases exceeding 500/-, especially in the 300-400/- bracket. Mobile covers were less considered for personal use or as a gift due to various reasons like they might perceive it as less meaningful compared to other items, they may prioritize functionality over aesthetics when it comes to mobile accessories, furthermore, people might already have a mobile cover that they are satisfied with. .
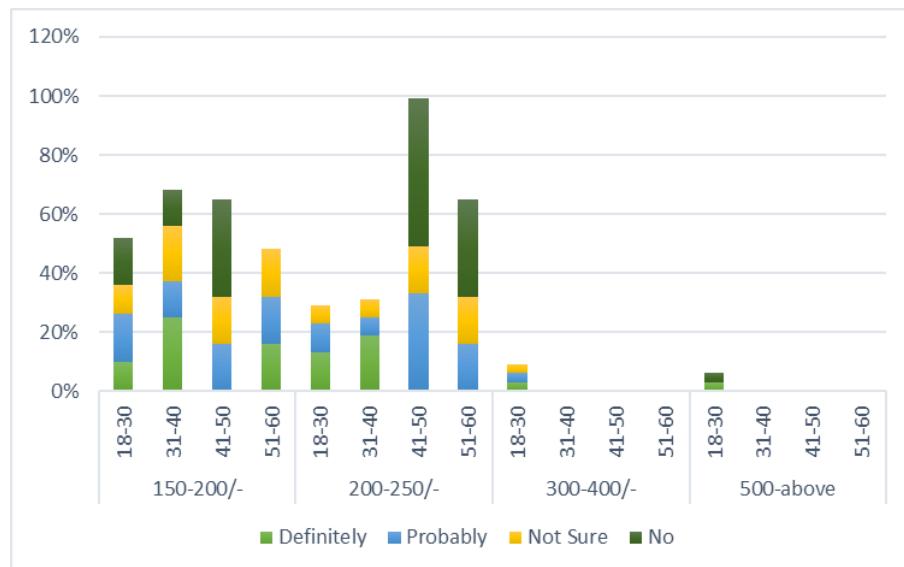
Fig. 13. Distribution of Consumer Purchasing Intent Across Age Groups and Cost Ranges in %.

Coaster

The survey data specifies diverse consumer preferences across different age groups and cost brackets, revealing intriguing insights into purchasing behaviour. Notably, respondents aged 18-30 years exhibit a strong leaning towards mid-range and higher-priced items, with 40% representing a definite intent to purchase products in the Rs.200-250/- and Rs.300-400/- price ranges (Fig.14.). Equally, the 31-40 years age group demonstrates a preference for higher-cost items, notably evident in the Rs.150-200/- bracket, where 37% express definite purchasing intent. Remarkably, there is a high level of assurance across most demographics, indicating a clear direction in consumer decision-making. However, it is essential to note that while certain age groups exhibit distinct preferences, such as the 51-60 years age group's inclination towards higher-priced items.
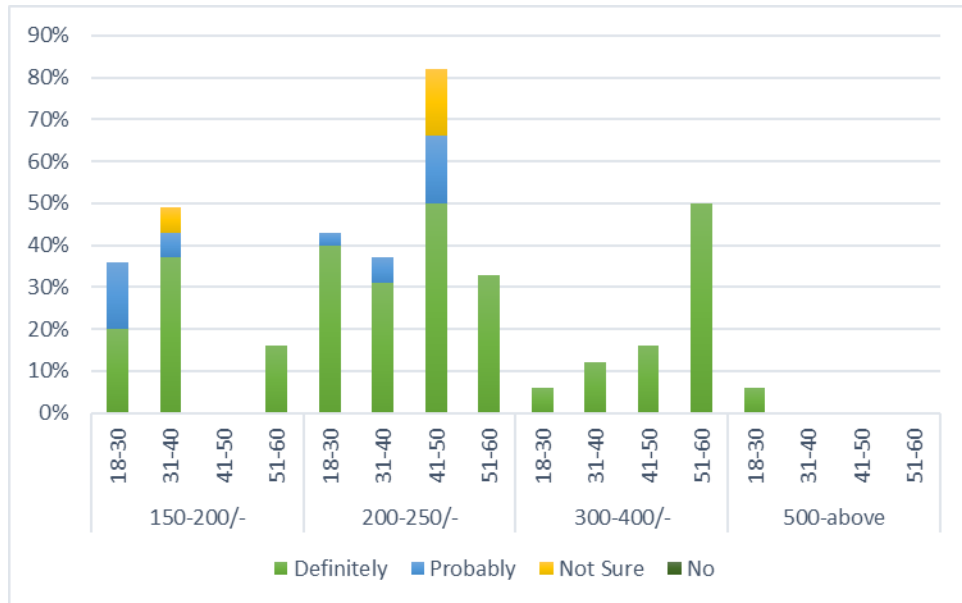
Fig. 14. **Distribution of Consumer Purchasing Intent Across Age Groups and Cost Ranges in %.**

OVERALL ACCEPTANCE OF SANJHI ART INSPIRED ARTICLE

Understanding consumer perceptions and preferences towards customizable home accessories is crucial for businesses in today's market. Findings reveal varying degrees of interest and preference across the categories (Fig.15.). While coasters emerged as the most favoured accessory with an overwhelming majority expressing a very positive impression 69% and nameplates 54% and other have still high markets. Businesses can leverage these insights to tailor product offerings effectively, enhancing customer satisfaction and driving sales growth in the dynamic home decor industry.
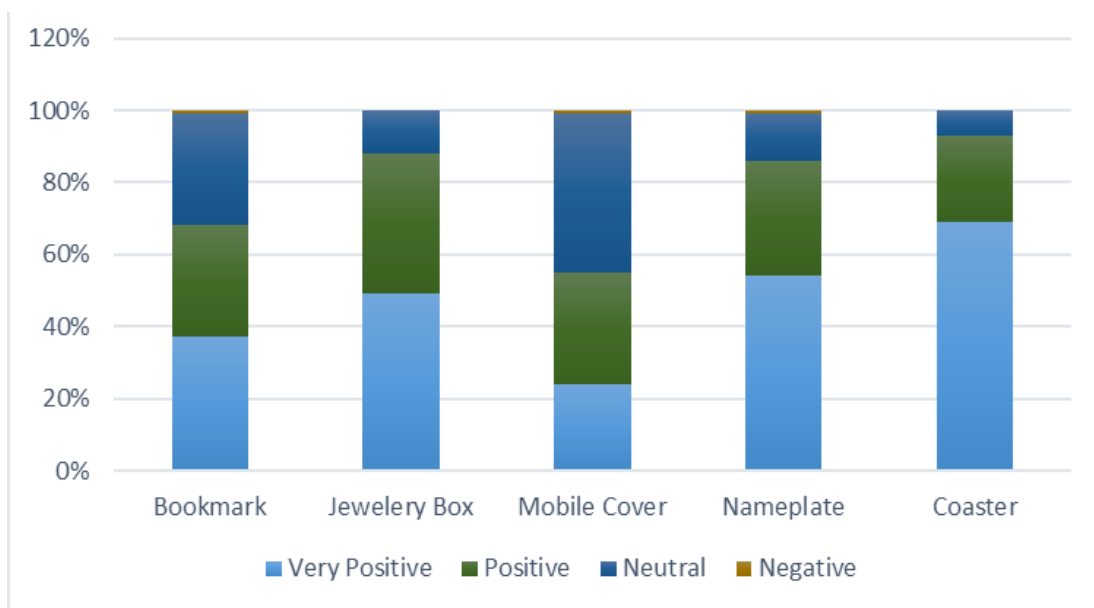
Fig. 15. Analysis of Consumer Perception Towards *Sanjhi* Art Inspired Articles

CONCLUSION

The study aimed to explore the history of *Sanjhi* art, understanding its cultural significance and aesthetic appeal. The Research identified potential accessories and articles incorporating *Sanjhi* art, aligning with consumer preferences. Fashion articles using *Sanjhi* art were created, showcasing unique designs and artistic craftsmanship. Throughout the research, it became evident that there is a significant interest and acceptance of *Sanjhi* art in fashion lifestyle. Consumers showed a positive inclination towards fashion articles incorporating *Sanjhi* art. The research findings support the hypothesis that integrating *Sanjhi* art into fashion articles is likely to be well-received by consumers. Furthermore, the analysis of consumer acceptance revealed that adding *Sanjhi* art to fashion articles did not negatively impact consumer preferences. The revival of traditional art is important since it helps to preserve cultural heritage, maintaining connections to the past and passing on valuable artistic traditions to future generations. Similarly, the revitalization of *Sanjhi* art is important as it represents a unique and cultural significant art form with deep roots in Indian heritage. Preserving traditional art forms will provide a platform for creative expression, innovation, and cultural exchange. Future research on the acceptance of fashion articles incorporating *Sanjhi* art can be expanded in various dimensions:

- Conducting similar studies in different geographical regions to understand regional variations in consumer preferences and acceptance towards *Sanjhi* art in fashion.
- Analysing acceptance among different socioeconomic strata to understand how income levels influence consumer perceptions and purchasing behaviour.
- Focusing on specific ethnic communities or cultural groups that have a historical connection to *Sanjhi* art to explore their preferences and potential for cultural revival.
- Engaging fashion designers, interior designers, architects, and other industry professionals in research to gain insights into their perspectives on incorporating traditional art forms like *Sanjhi* into contemporary fashion.
- Collaborating with artisans, fashion brands, and cultural organizations to conduct interdisciplinary research and develop innovative approaches for promoting *Sanjhi* art in fashion.

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ECO-FRIENDLY, NON-TOXIC & SUSTAINABLE FLAME RETARDANT FINISH USING MARINE COLLAGEN PEPTIDE FOR COTTON TEXTILE

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ABSTRACT

In the Indian subcontinent, cotton is the most widely used fiber due to its availability and comfort. However, as a non-thermoplastic fiber, cotton lacks both a glass transition temperature and melting point. It undergoes pyrolysis and combustion at around 350°C, with a low Limiting Oxygen Index (LOI) of 18.4%, making it highly flammable. This presents a significant fire hazard for consumers and the environment. Despite extensive research conducted in the last century, most developments have focused on commercially available fire retardants, classified into compounds based on inorganic salts, halogen, and retardants based on the compound phosphorus. Although environmentally friendly intumescent fire retardants were also developed, their effectiveness remains questionable. Several plant and animal-based substances have shown potential as fire retardants when applied as surface coatings on cotton fabric, prompting the search for an effective natural alternative. This research explores the potential of Marine Collagen Peptide, a promising protein-based bio-macromolecule, combined with titanium dioxide as a coating on cotton fabric using the pad batch method (4 dips and 4 nips). Solutions of three concentrations—5%, 20%, and 25%—were applied with padding expressions of 80%, 90%, and 100% to pre-treated cotton fabric samples. Vertical flammability tests and Limiting Oxygen Index (LOI) measurements were performed to assess the fire-retardant characteristics of both treated and untreated fabrics, and surface morphology was studied using scanning electron microscopy. Statistical analysis of test results identified the optimal conditions for achieving the best fire-retardant performance.

Keywords: Collagen, Eco-friendly, Flame retardant cotton, Sustainability

INTRODUCTION

Every part of people's daily lives involves cotton materials (Gao et al., 2019), although they are highly combustible and soon burn completely in the air (Lecoeur et al., 2001). Cotton fabric- related fire hazards constantly present a major risk to people's lives and property. Enhancing the flame-retardant qualities of cotton textiles is therefore extremely important from a practical standpoint (Chen et al., 2015). Furthermore, as science, technology, and society have advanced, it has become imperative that flame retardant technologies become more environmentally friendly. Natural flame retardants made of bio-based materials satisfy the criteria of a green strategy, which not only lessens the impact of the energy crisis but also does not pollute

the environment (Costes et al., 2017). Additionally, a number of the halogenated flame retardants found in conventional flame retardants are harmful to humans and animals, carcinogenic, bio accumulative, and so on (Alongi et al., 2015; Watanabe & Sakai, 2003). In light of this, bio-based compounds that are environmentally benign and renewable offer possible substitutes for conventional flame retardants in terms of environmental safety and energy conservation (Zhang et al., 2019).

The development of non-flammable or heat-resistant fibres, as well as the use of specific flame-retardant formulations that reduce the risk of fire, are the two key approaches for significantly improving the fire-retardant properties of textile materials. Traditionally used inorganic flame retardants containing phosphorus, nitrogen, halogen, and boron do not bond with the material's fibres; at best, their physical adsorption occurs in the material's pores. Over time, the flame-retardant composition's desorption, elution, spraying, and other processes reduce its fire-resistant properties. (Nabijon et al., 2017).

Therefore, functionality and longevity of textile products are significantly enhanced by the use of fire retardants. Fire-resistant textiles are more durable and can withstand harsh conditions, including exposure to flames, heat, and chemicals. This durability extends the lifespan of products, reducing the frequency of replacements and contributing to sustainability efforts. Furthermore, textiles with fire retardant properties are less prone to damage from minor accidents or incidents involving open flames, making them a preferred choice in various industries such as workwear, military, and outdoor gear. Therefore, the textile industry's need for fire retardants is undeniable. These compounds are essential for ensuring safety, compliance with regulations, and the overall functionality and longevity of textile products. As the world becomes more conscious of fire safety and environmental concerns, the demand for innovative and sustainable fire-retardant solutions in the textile industry is likely to grow. By prioritizing fire retardants in textile production,manufacturers can meet the expectations of safety-conscious consumers while contributing to a safer, more resilient future. The present investigation is an attempt for determining collagen bio macromolecule as a potent natural fire retarding agent used with casein for finishing treatment on cotton fabric.

OBJECTIVES

1. To examine the impact of collagen as a natural fire-retardant agent on the performance characteristics of cotton fabric.
2. To develop a standardized formulation for the finishing treatment of cotton fabric.
3. To optimize the process parameters and identify the most effective formulation of natural fire-retardant agent.

METHODOLOGY

Collection of fabric: 100% cotton fabric was purchased from a local store situated in Kolkata, West Bengal with the constructional parameters as presented below in Table 1.

Table- 1: Construction particulars of test fabric

Fabric	Weave	Threads/Inch		Weight(g/m^2)	Thickness (mm)
		Ends	*Pick*		
Cotton	Plain	47	43	140	0.28

Collection of chemicals: Marine collagen peptide 90-95 % was selected as the main fire retarding agent for the study and was purchased from Ases Chemical Works, Rajasthan, India. Other chemicals used for the study was α- amylase, pectinase, cellulose, titanium dioxide, sodium chloride, hydrogen peroxide, sodium hydroxide, sodium metasilicate and Triton X 100 (non-ionic wetting agent).

Preparation of fabric: The cotton fabric was enzymatically desized using 2 ml/l of α-amylase (diastase) and 5 gpl sodium chloride at 50°C, with a pH of 6 for 30 minutes, following a material-to-liquor ratio (MLR) of 1:30. Additionally, 2 gpl Triton X 100 (a wetting agent that is non-ionic in nature) was added to the desizing bath. After the reaction concluded, the solution was drained, and the treated fabric was thoroughly washed with water at 95°C for 30 minutes. Finally, the fabrics were washed with tap water and allowed to air dry. (Hao et al., 2013).

Following desizing, the cotton fabric underwent a combined scouring and bleaching process in a single bath, using enzymatic treatment. This process ensures the cotton fabric is clean, bright white, and prepared for subsequent textile production, yielding high-quality, vibrant, and durable fabrics (Ahmed et al., 2019). The desized fabric was treated with 0.5% o.w.f pectinase and 0.5% o.w.f cellulase, combined with 3% o.w.f hydrogen peroxide, 1 gpl sodium hydroxide, and 1.5gpl sodium metasilicate at 60°C, pH 7 for 30 minutes using MLR 1:20. The temperature was then elevated to 95°C for 45 minutes. The fabric was then washed in cold and hot water and allowed to air dry for 24 hours.

Preparation and application of the fire-retardant solution: Three weight percentages of marine collagen -15%, 20% & 25% were obtained and added to distilled water. Using a magnetic stirrer set at 300 rpm, collagen was continuously stirred until it completely dissolved. After the collagen had totally dissolved, the process was afterwards stopped. After the formation of the unfolded/denatured protein suspension, the pH was adjusted to 10 using NaOH, TiO2 was added, and the suspension was heated to 90°C in a thermostatic bath while being stirred magnetically at 300 rpm for two minutes. Finally, the suspension was allowed to cool to room temperature.

In a climate chamber set at 30°C and 30% relative humidity, the collagen solution was applied to the cotton materials using the dip coating method for five minutes each of four cycles. The excess collagen solution was then pressed out using a rotary drum. The padding expressions were set to 80%, 90%, and 100%, and the padding was repeated four times with each padding expression. Following a 100°C drying process in a lab-scale hot air oven, the coated samples underwent a 5 minutes curing period at 130°C.

Design of Experiment (DOE): The Taguchi techniques are extensively used in engineering analysis to maximize performance characteristics by combining several design metrics. An engineering technique called robust parameter design is used to design products and processes with an emphasis on reducing variance and/or noise sensitivity. Design of Experiments (DOE) aims to make a product's performance characteristic(s) less sensitive to changes in essential design parameters for the product and/or process (Krishnaiah & Shahabudeen, 2012). Design of Experiment for this study includes two factors with three levels for each run shown in Table 2, the appropriate Taguchi orthogonal array is the L9 array. In this arrangement, each row corresponds to an experimental run, and the levels of the factors are assigned according to the L9 orthogonal array as shown below in Table 3.

Table- 2: Factors and levels selected for study

Factor 1: Collagen Concentration	Factor 2: Padding Expression
Level 1: Low concentration (15%)	Level 1: Light padding (80%)
Level 2: Medium concentration (20%)	Level 2: Medium padding (90%)
Level 3: High concentration (25%)	Level 3: Heavy padding (100%)

Table- 3: Experimental runs arranged usingTaguchi'sL9 Orthogonal array

Experiment	Collagen Concentration	Padding Expression
1	15%	80%
2	15%	90%
3	15%	100%
4	20%	80%
5	20%	90%
6	20%	100%
7	25%	80%
8	25%	90%
9	25%	100%

Testing and Evaluation: All untreated and treated textile samples were conditioned for at least 48 hours at a relative humidity of 65% ($\pm$ 2%) and a temperature of 27°C ($\pm$ 2°C), in accordance with the IS: 6359-1917 standard (Bureau of Indian Standards, 1982), before conducting the testing and evaluation procedures described below.

- **Surface Morphology Analysis (SEM):** Scanning Electron Microscopy (SEM) is a highly effective imaging technique widely used across scientific disciplines to produce high-resolution, three-dimensional images of surface and sub-surface structures. It allows for in-depth analysis of a specimen's morphology, composition, and topography. In this study, SEM analysis was conducted at the Bombay Textile Research Association (BTRA) in Mumbai to examine the changes in the surface appearance of the samples after the application of the fire-retardant agent.

- **Vertical Flammability:** ASTM D6413 is the standard test method for evaluating the flame resistance of textiles through a vertical test. It is specifically used to assess the flame resistance of fabrics designed to protect against electric arc and flash fire hazards. The test determines whether the fabric will continue to burn after the ignition source has been removed. During the test, an 8-inch fabric specimen is suspended in an enclosed chamber and secured on three sides. The bottom cut edge of the fabric is exposed to a controlled methane flame for 10 seconds. After flame exposure, the after-flame duration, afterglow, and char length are measured.
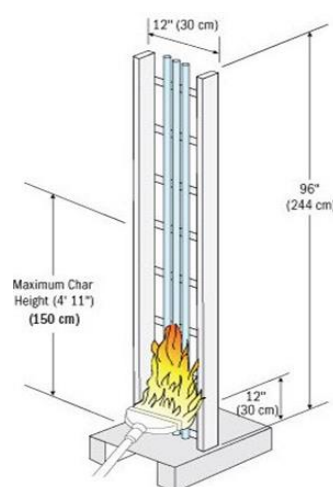
The term "after flame" refers to the number of seconds that a visible flame remains on the cloth after the ignition source is withdrawn.

After glow is the time in seconds that a visible glow persists on the fabric after the flame is extinguished.

Char Length refers to the length of damaged or ruined fabric in inches caused by a flame. The occurrence of melting or dripping, if any, was also recorded.

Observation: During the test, various aspects of the specimen's behaviour are observed, including:
  i.   After Flame Time
  ii. After Glow Time
  iii. Hole Formation Time

Statistical Analysis

Analysis of Variance (ANOVA): A two-way factor analysis of variance without replication was used in this study. It is a statistical technique that evaluates the impact of two independent factors (variables) on a single dependent variable by measuring each combination of factor levels only once. In this design, there are no repeated measurements or multiple observations within each combination of factor levels. Instead, data is collected for each unique combination of the two factors.

Taguchi Signal-to-Noise Ratio (SNR): The Taguchi Signal-to-Noise Ratio (SNR) is a statistical measure utilized in quality engineering, which focuses on improving product quality by minimizing variability due to uncontrollable factors (noise). The Taguchi Design of Experiments (DOE) methodology, particularly in the context of quality improvement and optimization. The fundamental idea behind SNR is to assess the impact of various factors and their levels on the variability of a response variable while considering the desired outcome. The formula for SNR varies depending on the desired performance characteristics, which fall into three main categories:

A. Smaller-the-Better: This is used when the goal is to minimize the output (e.g., defects, error rates). where; y_i represents the observed values, and n is the number of observations.

$$SNR = -10 \times \log_{10} \left(\frac{1}{n} \sum_{i=1}^{n} y_i^2 \right)$$

B. Larger-the-Better: This is utilized when the purpose is to maximize the output (for example, strength or efficiency).

C. Nominal-the-Best: This is used when the goal is to achieve a specific target value (e.g., dimensions in manufacturing).where; μ is the mean of the observed values, and σ^2 is the variance.

$$SNR = -10 \times \log_{10} \left(\frac{1}{n} \sum_{i=1}^{n} \frac{1}{y_i^2} \right)$$

In the course of this study "Smaller-the-Better" & "Larger-the-Better" SNR techniques were used to obtain the best possible combination of the standardized recipe with the use of Minitab Software.

$$SNR = 10 \times \log_{10} \left(\frac{\mu^2}{\sigma^2} \right)$$

FINDINGS AND DISCUSSION

Flame Retardance of the Treated Fabric: The ASTM D6413 test was conducted on the cotton samples untreated and treated using three different collagen concentrations (15%, 20% & 25%) at three different padding expressions (80%, 90% & 100%) to evaluate three different parameters i.e. "After Flame Time (AFT)," "After Glow Time (AGT)," and "Hole Formation Time (HFT)" and the data recorded in seconds is presented below in the Table 4.

Table-4: Flame retardancy of the samples– Vertical Flammability Test

	Collagen Concentration	After Flame Time (secs)	After Glow Time (secs)	Hole Formation (secs)
Untreated (*Control*)	**-**	**18.0**	**28.0**	**3.0**
80% Padding expression	**15%**	29.0	59.6	-
	20%	28.6	39.6	-
	25%	32.6	51.0	-
90% Padding expression	**15%**	20.0	33.3	-
	20%	29.0	40.0	13.6
	25%	30.0	40.0	5.0
100% Padding expression	**15%**	34.6	38.0	13.0
	20%	23.0	33.0	3.5
	25%	32.3	38.6	2.0

When the padding expression was maintained at a constant 80%, the After-Flame Time (AFT) was highest for the sample with 25% collagen at 32.6 seconds, followed by 29.0 seconds for the 15% collagen sample, and the lowest improvement was seen at 28.6 seconds for the 20% collagen sample. The After-Glow Time (AGT) was greatest for the 15% collagen sample at 59.6 seconds, followed by 51.0 seconds for the 25% collagen sample, and the least improvement was observed at 39.6 seconds for the 20% collagen sample. For Hole Formation Time (HFT), all three collagen concentrations showed no effect, indicating no holes formed during fabric burning. The statistical analysis indicated that cotton fabric treated with three different concentrations of collagen at 80% padding expression did show significant difference ($p < 0.05$) in the flame retardancy of the treated fabrics.

The padding expression was consistently set at 90% which exhibited enhanced flame-retardant performance after treatment. It was found that the AFT of the sample with 25% collagen was the highest at 30.0 seconds, followed by 29.0 seconds for the sample with 20% collagen, and the least improvement was observed at 20.0 seconds for the 15% collagen sample. For AGT, both the 25% and 20% collagen samples recorded the highest values at 40.0 seconds, with the least improvement observed at 33.3 seconds for the 15% sample. Regarding HFT, the sample treated with 15% collagen exhibited no hole formation, which is the desired outcome. However, the samples treated with 25% and 20% collagen showed hole formation at 5.0 seconds and 13.6 seconds, respectively. Statistical analysis confirmed that cotton fabric treated with the three collagen concentrations and a 90% padding expression exhibited a significant difference ($p < 0.05$) in flame retardancy.

The Table 4 also shows favorable fire-retardant results and demonstrated enhanced performance after treatment when the padding expression was set to 100%. The 15% collagen-treated sample recorded the highest AFT at 34.6 seconds, followed by 32.3 seconds for the 25% sample, while

the 20% sample showed the smallest improvement at 23.0 seconds. For AGT, the 25% collagen- treated sample recorded the highest value at 38.6 seconds, followed closely by 38.0 seconds for the 15% sample, with the 20% sample recording the lowest improvement at 33.0 seconds. In terms of HFT, the 15% collagen-treated sample recorded the highest time at 13.0 seconds, followed by 3.5 seconds for the 20% sample, with the 25% sample showing the shortest time at 2.0 seconds. Statistical analysis confirmed that cotton fabric treated with these three collagen concentrations at 100% padding expression exhibited a significant difference ($p < 0.05$) in flame retardancy.

Optimization using Taguchi Signal-To-Noise (S/N) Ratios: Taguchi Signal-to-Noise Ratios, commonly referred to as S/N ratios was used for optimizing the recipe for flame retardant finish. These ratios are designed to quantify the variation in a system's output caused by different sources of variability or noise. The test values obtained from vertical flammability test along with their S/N ratios is shown in Table 5.

Table-5: Experimental results along with S/N ratio

Collagen Concentration	Padding Expression	After Flame Time (secs)	After Glow Time (secs)	Hole Formation (secs)	S/N Ratio
15%	80%	29.0	59.6	0.0	29.24796
15%	90%	20.0	33.3	0.0	26.02060
15%	100%	34.6	38.0	13.0	30.78152
20%	80%	28.0	39.6	0.0	28.94316
20%	90%	29.0	40.0	13.6	29.24796
20%	100%	23.0	33.0	3.5	27.23456
25%	80%	32.6	51.0	0.0	30.26435
25%	90%	30.0	40.0	5.0	29.54243
25%	100%	32.3	38.6	2.0	30.18405

The average of the S/N ratio for each level of the factors of collagen concentration and padding pressure are given in Table 6 for AFT, AGT & HFT. The delta value was calculated by subtracting the largest value from the lowest from among the values in each column.

Table-6: Response Table for Signal to Noise Ratio for three different parameters

	Level	Collagen Concentration	Padding Pressure
After Flame Time	1	28.68	29.49
(AFT)	2	28.48	28.27
(Larger is Better)	3	30.00	29.40
	Delta	1.52	1.21
	Rank	1	2
After Glow Time	1	32.52	33.87
(AGT)	2	31.46	31.51
(Larger is Better)	3	32.64	31.23
	Delta	1.19	2.64
	Rank	2	1
Hole Formation Time	1	-22.28	*
(HFT)	2	-16.78	-18.33

(Smaller is Better)	**3**	-10.00	-13.06
	Delta	12.28	5.26
	Rank	**1**	**2**

The Taguchi method determines the optimal level combination for AFT by selecting the levels where the signal-to-noise (S/N) ratio is highest. The optimal combination was found to be 25% collagen concentration at 80% padding expression, representing the highest collagen concentration and lowest padding expression level. Furthermore, the main effects plot provides an indication of the relative significance of the parameters on the system's response, with the slope of each parameter's plot determining its influence. A steeper slope indicates a greater impact. From Figure 1, it is clear that both collagen concentration and padding pressure are highly significant factors.

Similarly, for AGT, the optimal level combination was identified by selecting the levels with the highest signal-to-noise (S/N) ratio. The optimal combination was found to be 25% collagen concentration and 80% padding expression, representing the highest collagen concentration and the lowest padding expression level. Additionally, the main effects plot provides insight into the relative significance of each parameter on the system's response, with the slope of each plot indicating its influence. A steeper slope reflects a greater impact. From Figure 2, it is clear that both collagen concentration and padding pressure are highly significant factors.

For HFT, the chosen levels followed the "smaller is better" principle, meaning the optimal level combination was where the signal-to-noise (S/N) ratio was the lowest. The ideal combination was found to be 25% collagen concentration at 80% padding expression. The absence of a projection line indicates a value of 0, signifying the highest collagen concentration and lowest padding expression level. Additionally, the main effects plot offers an estimate of the relative significance of the parameters on the system's response, with the slope indicating influence. A steeper slope suggests a greater impact. From Figure 3, it is evident that both collagen concentration and padding pressure are highly significant factors.
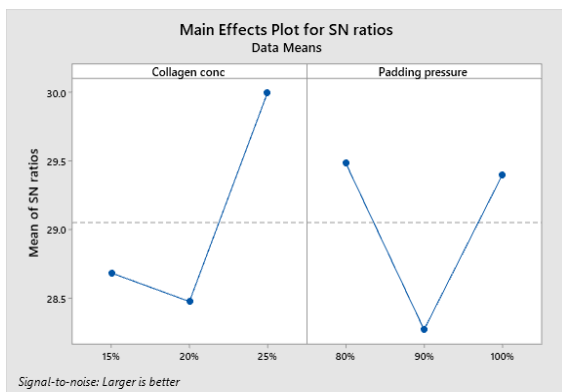
Fig.-1: Main Effects Plot for S/N ratios of AFT of the treated samples
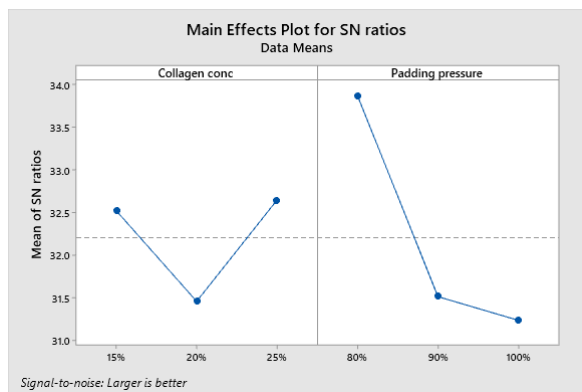
Fig.-2: Main Effects Plot for S/N ratios of AGT of the treated samples
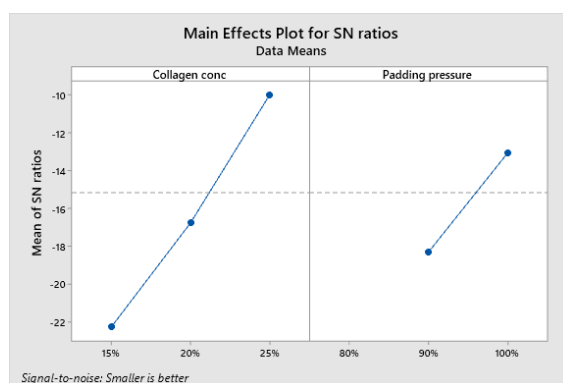
Fig.-3: Main Effects Plot for S/N ratios of HFT of the treated sample

Surface Morphology of the Coated Samples: As seen in the SEM images in Figure 4, the control cotton fibers exhibit a typical convoluted, wrinkle-like structure due to their longitudinal fibril composition. In Figures 4 (A-D), displayed at different micron scales, a thin granular film is visible on the surface of the modified fibers, covering them and causing the fuzz to adhere firmly to the fiber surface. This granular coating is particularly noticeable in Figure 4 (A).
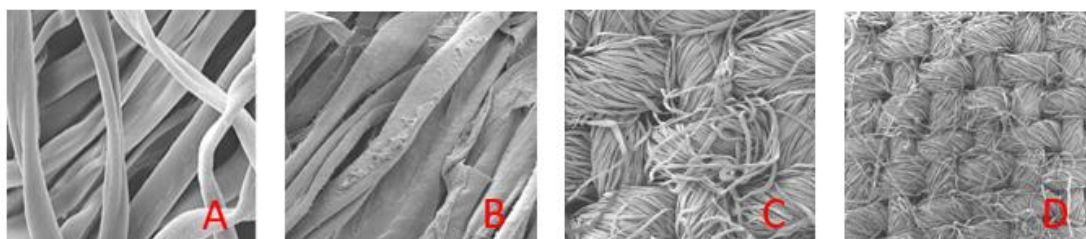
Fig.-4 (A-D): SEM images of the optimized treated & untreated samples. A: Control sample (10µ);B: Treated sample (10µ); C: Treated sample (100µ) & D: Treated sample (500µ)

Additionally, the surface of the modified cotton fabric appears somewhat rough. Compared to the control cotton fabric, the fibers in the modified fabric are more tightly bound and do not easily separate or fall off. Figures 4 (C-D) show a normal appearance, indicating that the surface is smooth, with no significant visual difference from the control sample.

CONCLUSION

In this study, marine collagen was utilized as a flame-retardant agent in combination with titanium dioxide (TiO2), which was successfully deposited on the surface of a cotton substrate. The flame retardancy effect was evaluated through vertical flame tests and an analysis of the surface morphology of the treated samples compared to the untreated control sample. Experimental results, supported by statistical analysis, indicated a significant improvement in the flame retardancy of the treated samples. The optimal conditions were identified as a 25% collagen concentration and 80% padding expression. These findings support marine collagen as a natural, non-toxic, eco-friendly, and biodegradable substance with the potential to serve as a flame retardant, warranting further research in the future.

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ASSESSING TECHNOLOGY ADOPTION AND USAGE PATTERN AMONG WOMEN ENTREPRENEURS OF GUWAHATI CITY, ASSAM

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ABSTRACT

Digital entrepreneurship has served as a driving tool in the country's economy in the present era. With the rise of technology-driven entrepreneurship, rise of women entrepreneurship has also been expressively evident. Technology being the catalyst to economic and social inclusion for the women, the study explored the ICT adoption, its usage pattern among 33 small and micro women entrepreneurs and their challenges in ICT usage for entrepreneurial pursuits in Guwahati city, Assam. Purposive and snowball sampling techniques were used to select the sample of the study. The sample had a mix of old and young, married and single entrepreneurs, selected using purposive and convenient sampling technique. Usage level of ICT tools among women entrepreneurs slightly differed in terms of little less than fifty percent (45.45 %) reporting higher usage and little more than fifty percent (54.54%) reporting lower usage. Higher usage of smartphones was seen along with predominant usage of social media applications, WhatsApp, Facebook and limited use of Instagram for business activities. In terms of problems regarding ICT usage, almost seventy percent (69.69%) of the women felt they lack understanding ICT and various technologies to some extent. Almost forty percent (39%) of the respondents had physical and mental tiredness and indifference in operating ICT tools to a great extent. Therefore, this research broadens its impact by facilitating women's entrepreneurial endeavors through enhancements in marketing, communication, networking, product and service innovation, sales and revenue growth, and raising awareness about privacy and security issues.

Keywords: Women entrepreneurs, digital literacy, technology adoption, empowerment, gender and technology

INTRODUCTION

As a renowned driver of development, entrepreneurship has been essential in generating capital and propelling India's economy forward. The number of female entrepreneurs contributing to economic growth is rising as well. Women entrepreneurs are defined as those that engage in business ventures and business creation that empower women economically, establish financial security, and

carve out a niche for themselves in the community. Women entrepreneurs are discouraged by a few business obstacles, such as insufficient capital and a lack of expertise about information and communication technology (ICT), even when there are tremendous possibilities. (Rahman, 2022)

In light of the increasingly demanding and rapid digitization of businesses, which calls for the fast, efficient, and reliable exchange of information, business owners must be creatively productive, possess strong problem-solving abilities, and be adept in their ability to integrate data into various business processes in order to accelerate the delivery of customised and on-demand goods and services along the supply chain. (Gunasara, et al., 2021)

Therefore, in order for women entrepreneurs to succeed even more, they must enter frontier markets by focusing their operating modules on advances in technology skills, which are essential for company success. As a result, in order to reduce transaction costs and broaden their market reach, women entrepreneurs must be equipped with the necessary abilities to capitalise on developments in data processing and communications. (Gunasara, et al., 2021)

Why women entrepreneurship?

The rise of women entrepreneurs is a crucial step in advancing the overall development of human resources. Without including women, who make up about half of the global population, no development programme could be considered a complete success. It is widely acknowledged that women manage the great bulk of household expenses. When a woman succeeds in business, she transforms her family and society and encourages other women to follow in her footsteps and become independent. Their prosperity benefits the nation's growth, families, society, and local and regional economy. Just 10% of all business owners in the nation are women. Women tend to have a stronger understanding of the consumer's perspective. Furthermore, women are frequently reported to be more adept at establishing lasting relationships, which is essential for any business relationship to survive for a long period of time. According to a United Nations research, women's empowerment and economic development are closely intertwined. The economies of nations where women have made progress have typically been stable. In contrast, the economy has stagnated in nations where women have faced restrictions. (Hujuri, 2017)

Entrepreneurship in Assam

Assam has been at the forefront of entrepreneurship growth in the northeast. It is rich in a wealth of natural and human resources. The growth of the region will increase substantially if it is used appropriately and adequately. The government has begun to pay special attention to the area over the years, and the entrepreneurs have been taking advantage of this. Nonetheless, there are still several obstacles facing Assam's startup community. Rather than taking chances and enter the new business sector, which they view as an unrespectable career and are afraid of being embarrassed by society, people would prefer to hold positions in administration and be respected in society. To encourage youth and provide the necessary skills and time investment to improve business culture, there is a great need for an awareness campaign, government backing, and success stories of the expanding entrepreneurial activities. (Goswami, 2023)

ICT as an Enabler for Women Entrepreneurship

Technology-based tools and resources used for information creation, sharing, transmission, storing, and exchange are collectively referred to as information and communication technologies,

or ICTs. Development circles such as the World Bank, the United Nation Development Program-UNDP, and United Nations Development Fund for Women-UNIFEM believe that when implemented and utilised appropriately, ICT represents an extraordinary enabling tool. However, the majority of developing country women experience social and economic disadvantages that make it difficult for them to use technology. The utilisation is hindered by the high rate of illiteracy. (Sanyal and Das, n.d.) ICT use has opened up new business prospects for women entrepreneurs, especially in developing countries. For example, women were formerly unable to use financial services, but now they can with the aid of mobile banking and digital payment methods. Women are now more capable of handling their money, making business investments, and establishing their credit histories.

Additionally, ICT has helped women-owned enterprises expand in a number of industries, such as education, healthcare, and agriculture. For instance, smartphone applications have been created to assist female farmers in connecting with consumers, enhancing their farming methods, and gaining access to market information. In a similar vein, women can now obtain healthcare and educational services in isolated and underprivileged locations through telemedicine and e-learning platforms. Women entrepreneurs continue to encounter particular obstacles and hurdles despite the countless benefits of ICT. Lack of digital literacy, restricted access to digital skills, and inadequate use of technology and the internet are a few of these.

LITERATURE REVIEW

Churk, H., Ndesangia, B., & Mshote, E. (2023) conducted a study in Tanzania on the challenges faced by women entrepreneurs in using ICT for business. The study revealed that mobile money services posed significant difficulties due to high transaction fees, fraud risks, and vulnerability, coupled with a lack of digital skills. These challenges limit the full adoption of digital financial services, making business operations more complex for women entrepreneurs.

Etebu, C. E., & Otiri, A. O. (2023) explored the digital adoption patterns among women entrepreneurs in Nigeria and found extensive usage of WhatsApp, Facebook, Instagram, and mobile banking apps. However, the study also highlighted key barriers, including the high cost of ICT gadgets, difficulty in accessing affordable subscriptions, and disrupted electricity supply, with high majority (89.7%) of respondents facing electricity-related issues. Additionally, limited education, inadequate training, and a lack of awareness of ICT advantages further hindered the effective use of digital tools.

Jagtap, S. (2022) investigated the role of social media in business promotion among women entrepreneurs in Pune. The study revealed that while Facebook and WhatsApp were commonly used for marketing, entrepreneurs rarely utilized Instagram and Facebook Marketplace due to discomfort and a lack of expertise. Moreover, the majority of respondents relied on their family members or personal efforts to market and promote their products, indicating a limited dependence on digital marketing strategies.

Mohanty, P. (2021) conducted a study on digital appropriation among women entrepreneurs in Odisha, revealing their proficiency in various digital skills, including text- and voice-based searches, app usage, and digital transactions in multiple languages. Native language content was found to facilitate access to relevant information. While electronic payment systems ensured quick transactions, concerns regarding financial fraud persisted. Additionally, limited digital adoption

among suppliers, customers, and employees posed challenges to maximizing the benefits of digital tools.

Kapinga, A. F. (2020) examined the barriers to business growth among women entrepreneurs in Tanzania. The findings indicated that these entrepreneurs faced challenges such as limited access to market information, insufficient financing, gender inequality, patriarchal ideology, and a lack of business skills. The study suggested that mobile technology, particularly mobile marketing applications, could empower women entrepreneurs by providing access to market data, helping them identify potential buyers, and enabling informed decision-making regarding product sales.

Muhaini, A., & Ahmad, S. (2018) investigated ICT adoption among women entrepreneurs in Malaysia and found that security concerns played a major role in their reluctance to use digital tools. The fear of cybersecurity threats and data breaches limited their engagement with ICT, affecting their willingness to adopt digital solutions for business operations.

RESEARCH TREND

Analysing the literatures, trend of using various social media applications, especially WhatsApp, Facebook and Instagram was common among women entrepreneurs from different regions. These apps served as cost-effective and convenient platforms for promotion of their products and services, and engage with customers. However, usage of platforms such as Instagram and Facebook Marketplace were used to a lesser extent, which was due to a lack of expertise and comfort in using their sophisticated features for business activities. Integration of mobile payment apps and digital banking into the businesses was observed from the studies. This facilitated the process of effortless and quick financial transactions, however fears related to privacy and security was still a concern among the women entrepreneurs. Availability of digital content in native language was an advantage for the women entrepreneurs especially from Odisha, for comprehension and smooth adoption of technological tools in business.

RESEARCH GAP

The reviewed studies primarily focused on adoption of technology for business among women entrepreneurs, and their engagement in various social media platforms. However studies related to adoption of various ICT tools for different purposes among women entrepreneurs was limited. Moreover studies related to technological skills for business activities were relatively scarce. As such the present study seeks to study the various technical skills the women entrepreneurs possess, and further studies the problems related to adoption of ICT tools for entrepreneurial ventures.

OBJECTIVES

1. To study the demographic profile of women entrepreneurs.
2. To study the usage of smartphone among women entrepreneurs, in terms of
   - Various purposes
   - Social Media usage
   - Competencies in ICT features
3. To study the problems related to ICT adoption among women entrepreneurs.

METHODOLOGY

In the modern digital age, the influence of Information and Communication Technology (ICT) on the business sector has notably increased, promoting efficiency, connectivity, and innovation. This study primarily aimed to access how female entrepreneurs utilize ICT in their business operations and to identify any challenges they face in doing so.

To achieve this objective, a quantitative research approach was employed to gather empirical data and conduct precise statistical analysis. The research sample consisted of 33 small and micro-scale female entrepreneurs situated in Guwahati city, Assam. Participants were selected using purposive and snowball sampling techniques, ensuring a diverse representation of women entrepreneurs engaged in various business activities within the region. Purposive sampling technique was used to include women who were actively using ICT tools for their business operations, and snowball technique helped reach out to other women entrepreneurs via reference. This way the researcher could collect data from women entrepreneurs working in various business areas. Data collection was carried out through a structured questionnaire distributed both offline and online, utilizing platforms such as Google Forms. The collected data was analysed using statistical methods, particularly focusing on frequency-percentage and mean calculations.

Ethical considerations

Ethical considerations were strictly followed throughout the study. Informed consent was obtained from every respondent, ensuring voluntary participation. Confidentiality was also maintained to protect the privacy of the respondents.

RESULTS AND DISCUSSION

Table1: Demographic data

	Percentage (%)
Age	
25-35 years	51.61
36-52	48.38
Educational qualification	
Bachelor's degree	42.4
Secondary school	30
Master's degree	27.3
Marital status	
Married	79.3
Unmarried	17.2
Separated	3.4
Family type	
Nuclear	78.8
Joint	15.2
Extended	6.1
Monthly income	
Less than Rs 50,000	33.3

Rs 50,000-80,000	33.3
Rs 80,000-1,00,000	21.2
More than 1,00,000	12.1

Table 1 shows the profile of the selected women entrepreneurs of Guwahati city, Assam. Little more than fifty percent (51.61%) of the respondents belonged to 25-35 age group. Most of the respondents had bachelor's degree (42.4%) followed by almost similar percentage of respondents having Secondary school and Master's degree. High majority of the respondents were married (79.3%).

Fig 1: Percentage distribution of respondents according to their areas of entrepreneurship

(n=33)
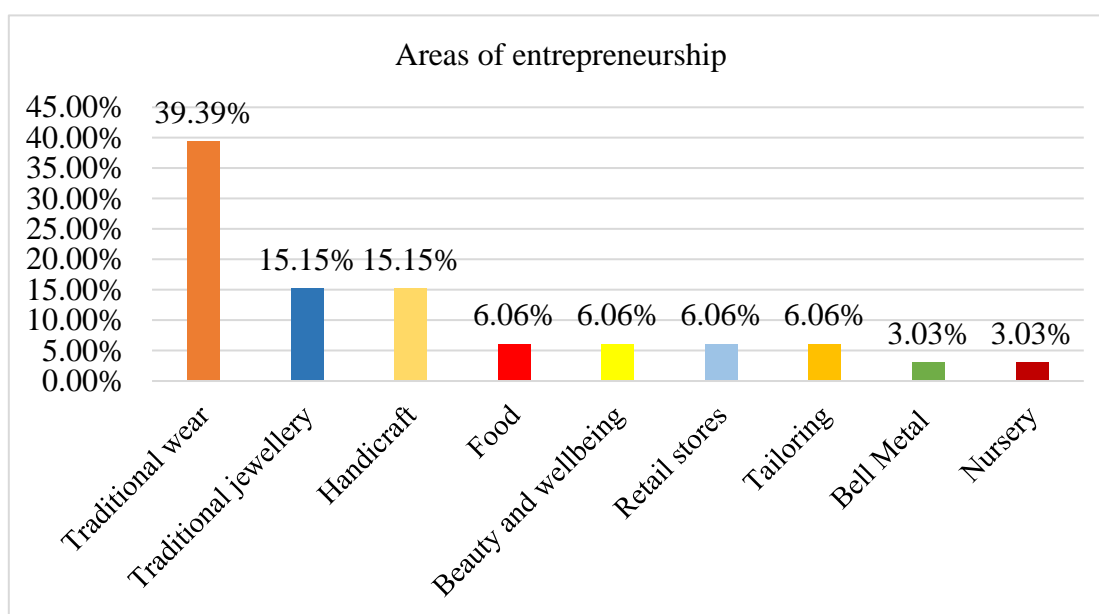
Figure 1 shows the various areas where women entrepreneurs were involved. The areas included traditional wear, traditional jewellery, handicraft, food, beauty and wellbeing, retail stores, tailoring, bell metal, nursery, with respondents working with the industry of traditional wear at a higher percentage (39.39%) compared to others.

ICT tools usage

Figure 2 reveals the usage of various ICT related tools for their business purposes. All of the women entrepreneurs used smartphone showing a positive indication of adopting and involving ICT effectively into their entrepreneurial ventures. In addition, 18.18% of women entrepreneurs use laptops for their businesses, while 12.12% use desktop computers suggesting that they still play an important role in the business operations of some women entrepreneurs. Apart from smartphone, percentage of owning of laptops, desktops and tablets was relatively low, determining an indirect relation of ownership of such ICT tools and monthly income of the family. A study in Nigeria showed similar response about women entrepreneurs finding ICT gadgets and other tech facilities expensive enough for their business. This shows how usage of various ICT tools determines the level of adaptability in leveraging technology to meet their business needs.

Fig. 2: Percentage distribution of respondents according to their usage of ICT tools (Multiple choice) (n=33)

ICT tools
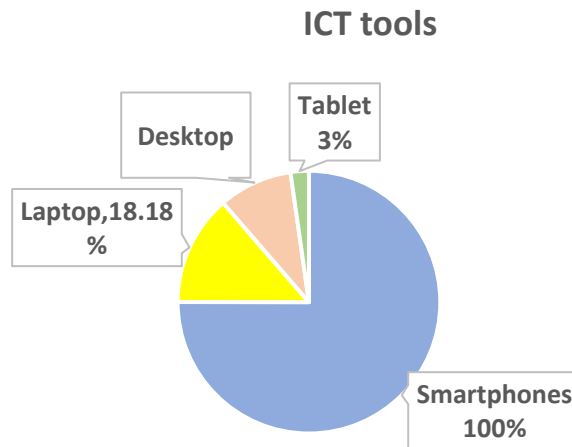
Figure 3 illustrates the diverse purposes for which women entrepreneurs use smartphones. The majority (78.78%) utilize smartphones primarily for voice calls, indicating a heavy reliance on them for business-related conversations. Approximately seventy percent (66.66%) use smartphones for messaging, followed by sixty percent who employ them for e-banking, suggesting a favourable acceptance of e-banking services among women entrepreneurs for business transactions. However, only thirty percent utilize smartphones for business promotion, potentially due to a lower emphasis on digital marketing, insufficient skills in this area, or prioritization of other business tasks. A study in Odisha revealed the women entrepreneurs having proficiency in apps usage, text and voice based search, multiple language digital transactions, shows a contrast of digital skills, with the women entrepreneurs of present study having skills limited to voice calling, messaging, and e-banking.

Fig. 3 Percentage distribution of respondents according to their use of smartphone (Multiple response) (n=33)

Use of Smartphone
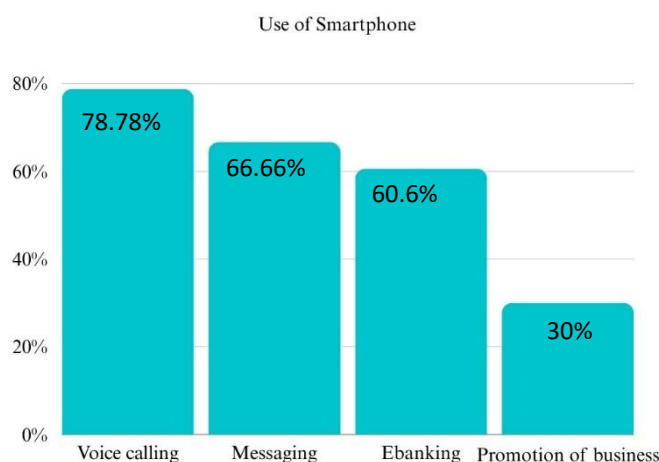
Social Media Usage

Regarding usage of social media for business, majority of women entrepreneurs used WhatsApp (81.81%) and Facebook (57.57%) to a great extent, signifying that women might feel more comfortable and reliable with features of the applications for communication, networking, engaging with customers, suppliers and peers, and other business operations, as such applications require simple and less technical knowledge compared to other digital platforms. Regarding Instagram, only about forty percent (39%) of the respondents used it to a great extent. They might not be very adept in using Instagram and might find it technically tougher and time consuming to use compared to WhatsApp and Facebook, especially the older adult age group. Similar results was seen in a study in Nigeria, where extensive usage of social media platforms such as WhatsApp, Facebook and Instagram for business activities. A study in Pune showed similar results, with women entrepreneurs' social media usage was limited to WhatsApp and Facebook. They rarely uses Instagram and Facebook Marketplace because of their lack in expertise, and instead depends on their families or the market for product promotion.

Competencies in ICT features

Few percent (33% and 30%) of the respondents were able to compare information from various sources and find authentic sources to a great extent. The probable reason might be that the respondents are not professional enough to access resources regarding networking, finance, and market information. Moreover they might not be well adept with the knowledge in terms of technical skills, digital marketing and legal formalities.

Similar percentage of respondents were able to keep their data private to a great extent followed by 39% of the respondents had responsible online behaviour. This shows that very few number of respondents are aware and conscious about safeguarding information regarding their business and personal data. Percentage of having responsible online behaviour was less because majority of the respondents might not be digitally literate enough regarding the various security risks and threats regarding data privacy. Furthermore, the respondents might be feel pressured to grow their business leading to neglecting and compromising their data.

Less than fifty percent (42%) of women entrepreneurs used cloud storage to a lesser extent, indicating that a significant number of respondents might not be using cloud storage or may be using it at a minimum level for storing and accessing business related documents. Little more than fifty percent (51.51%) of the respondents were using Reels/Shorts for business promotion to a less extent. The probable reason for less usage of reels/shorts maybe due the limited technical skills required for capturing customer attention and engagement.

A similar study in Odisha, related to skills in smartphone usage showed that the women entrepreneurs were proficient in text and voice-based search, followed by various app usage and digital transactions in multiple languages. However a contrasting results in study conducted in Tanzania revealed how women entrepreneurs lacked digital skills, resulting in less usage of digital transactions.

Problems in ICT usage

Almost seventy percent (69.69%) of the respondents felt they lack understanding ICT and various technology to some extent. This indicates that a significant number of the respondents

although being digitally literate faced problems in comprehending the various features of ICT applications and tools. Their level of problems may vary in terms of individual interests and technological skills. Limited resources in terms of education, finance and time might be few reasons for the women entrepreneurs of not being technologically literate.

Almost sixty percent (57%) of the respondents felt they lacked understanding regarding computer and mobile operations, and benefits of social media in business to some extent. This shows a significant gap in perceiving technology for business purposes among the women entrepreneurs. The possible reason might be the lack of exposure towards technology and their beneficial features. They might also have little or no training and access to resources regarding understanding about technology.

Almost forty percent (39%) of the respondents had physical and mental tiredness and indifference in operating ICT tools to a great extent. The probable reason for the challenge may be the lack of sufficient technological skills to operate ICT tools which may lead to fatigue and frustration. With balancing work with personal life demands while working on comprehending such tools and finding solution to such problems may result in burnout over time.

Almost forty percent (39%) of respondents lacked familiarity with the trends in digital media skills such as making shorts and Instagram reels, and attractive videos for their products and services. Making visually compelling and appealing videos for product engagement requires much creativity, skills on editing, visual design principles and techniques that is time consuming to learn and work on. They might have other priorities related to business tasks or family responsibilities that may take up their time, and find difficulty in getting engaged with comprehending and working with for a longer period of time. Moreover with the lack of understanding digital skills, women might also feel like they do not belong to the tech world and become least interested in the digital marketing and continue with the conventional way of promoting their business.

The results of the present study resembled with the few of the results of the reviewed studies, where almost all of the studies revealed about the challenges related to privacy and security concerns, with majority of the women entrepreneurs having fear of financial security, fraud risks and vulnerability. Moreover, similar studies also revealed the lack of digital skills and awareness related to ICT that would facilitate the business operations.

CONCLUSION

The findings presented emphasize the active participation of women entrepreneurs across a wide array of industries, showcasing their substantial presence within the entrepreneurial domain. This suggests a vibrant and diverse landscape where women are actively engaging in business ventures. The widespread adoption of smartphones and other ICT tools among women entrepreneurs is indicative of a positive trend towards embracing technology as an integral part of their business operations. This signifies a significant step towards empowerment, as technology can streamline processes, increase efficiency, and expand market reach.

Despite this progress, women entrepreneurs encounter notable hurdles, particularly in effectively utilizing digital platforms for business promotion. While they demonstrate proficiency in basic digital tasks such as communication and e-banking, challenges arise when leveraging platforms like Instagram for marketing purposes. Factors such as technical complexities and time constraints, especially among older entrepreneurs, hinder their ability to fully exploit the potential of digital

marketing. Furthermore, evident gaps in digital literacy and technological understanding underscore the importance of targeted educational efforts. By implementing tailored support programs and resources, women entrepreneurs can enhance their digital skills and reducing the gap in digital literacy, thereby unlocking new avenues for business growth and economic empowerment.

Addressing issues such as fatigue, apathy towards technology, and time constraints is pivotal in ensuring sustained support for women entrepreneurs. By providing them with the necessary tools, knowledge, and encouragement, we can cultivate an environment conducive to their success. Ultimately, this contributes to fostering inclusive growth and advancing gender equality in the realm of entrepreneurship, empowering women to thrive in the digital age.

FUTURE IMPLICATIONS

The results of the present study highlight the ICT adoption and usage pattern among women entrepreneurs, followed by their engagement in social media platforms, and their competencies in digital skills for business operations, and the challenges related to it. Reviewing various literatures, and considering the results, the researcher suggests studies aimed at digital literacy among women entrepreneurs that would delve into proficiency in digital skills from basic to advanced level, awareness related to advantages of ICT in business, and essentially focus on awareness related to security concerns in e-banking. Government and other related organisations can develop policies and programmes aimed at fostering digital literacy among women entrepreneurs. Development of technological infrastructures for smooth business operations are further suggested. Educational institutions and training institutions can organize training programmes and workshops on ICT skills, digital marketing, cybersecurity, and on technological advancements that would bridge the gap of digital skill and literacy.

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11

OCCUPATIONAL STRESS AND PERCEIVED HEALTH PROBLEMS OF SELECTED NURSES

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ABSTRACT

Nursing involves caring for individuals of all ages, families, groups and communities in various settings, Nurses commonly encounter heightened work-related stress. The study aimed to assess the occupational stress and perceived health problems of nurses and their correlation with demographic variables. About 650 female nurses from private hospitals in Coimbatore district, Tamil Nadu, were selected using purposive sampling method. The majority of nurses (73.6%) were aged between 21 to 30 years and Most of them had general nursing and midwifery qualification (52.3). Occupational stress such as lack of technical assistance (25.9%), fear of making mistakes (24%) were consistently reported by nurses. The study revealed a high prevalence of health issues among nurses, including musculoskeletal problems (48.7%), gastritis and stomach ulcers (43.3%), and respiratory allergies (21.4%). These conditions were significantly associated with occupational stress ($p < 0.001$). Higher monthly income levels were positively correlated with health satisfaction (r = 0.257**). Several health problems had positive correlation with occupational stress (r value: 0.295 to 0.464). Despite challenges, the majority of nurses reported satisfaction with their health (75%), highlighting the need for interventions to improve working conditions.

Keywords: Health issues, Workplace conflicts, Occupational stress, Musculoskeletal problems

INTRODUCTION

Nursing comprises both the standalone and collaborative care of people of all ages, families, groups and communities. It encompasses promoting health, preventing health, preventing disease and providing care (WHO.,2020). "Nursing is an important and fast-growing profession within the health care field. Nursing is a well-respected medical profession that includes several duties and specialties. It is an integral part of health care system".

Nurses are often the unsung heroes of emergency response, in addition to working at the forefront of disease prevention and medical emergencies, the primary health care delivery includes promotion, prevention, treatment and rehabilitation. "Work-related stress or occupational stress, as defined by the National Institute for Occupational Safety and Health Administration (NIOSH, 1999), refers to the physical and emotional harmful responses that occur when the demands of a job exceed the employee's capabilities, resources, or needs". Nurses commonly encounter heightened work-related stress due to inadequately equipped and overcrowded wards, strained interpersonal

relationships with colleagues and physicians, heavy workloads, and pressures from patients and their families. Balancing these demands with family responsibilities further compounds their stress levels (Chichi, 2023).

Health perception is a term widely used to assess an individual's own health status, encompassing personal feelings, thoughts, prejudices and expectations about their health. It helps to determine whether an individual considers themselves healthy or not (Palazogli et al., 2018). It is imperative that nurses' working conditions be improved, that flextime policies be implemented, that nurses be better selected, recruited, motivated, and retained, that appropriate wage laws be established, and that nurses have a clear career path. One way to combat workplace and societal harassment is to establish staff standards and educate the public about the value of nurses and their significant influence on health outcomes (Annu Kwoshik.,2022).

OBJECTIVE OF THE STUDY

The main objective of the study is to assess the occupational stress and perceived health problems of nurses and to associate and correlate the occupational stress and perceived health problems with demographic variables.

HYPOTHESIS

H0: There is no significant association between occupational stress, perceived health problems and demographic variables.

Ha: There is significant association between occupational stress, perceived health problems and demographic variables.

METHODOLOGY

Study Design:

The study used a purposive sampling technique to select its participants. Purposive sampling is a non-probability sampling method where researchers select participants based on specific criteria relevant to the research study.

Study Area:

The study was conducted exclusively in private hospitals located in Coimbatore district, Tamil Nadu, ensuring a focused and localized approach to understanding the occupational hazards faced by female nurses in this specific region.

Study Sample

The study focused on registered female nurses working in private hospitals in Coimbatore district, Tamil Nadu. These nurses were selected based on the criteria of having completed at least one year of experience in the hospitals and being currently employed there. About 220 samples were selected using purposive sampling technique.

Study Tool:

To assess the occupational stress and perceived health problems faced by female nurses, a comprehensive questionnaire was developed. This questionnaire was divided into two main sections: Socio-Demographical details and professional information. The Socio-Demographical details section included questions about age, marital status, presence of sick people at home and security for grown up children. The professional information section included questions about educational qualification, work experience, area of current work, working hours per week and monthly income.

The questionnaire contained 17 questions related to occupational stress and 14 questions related to perceived health problems. Respondents were asked to rate their responses on a 5-point Likert scale (1-Never, 2-Seldom, 3-Sometimes, 4-Often, 5-Always) and answer Yes or No dichotomous questions. For assessing health satisfaction, a Likert scale ranging from very dissatisfied to very satisfied was used.

Data Collection and Analysis:

Prior to the main survey, a pilot study was conducted on a sample of 50 respondents to test the clarity and relevance of the questionnaire. This pilot sample was not included in the total sample of 200 nurses. Informed consent was obtained from all participants before data collection began. Data collection took place over a period of five months, from June 2021 to October 2021.

The collected data were entered into a database and analyzed using SPSS (Statistical Package for the Social Sciences, Version 21). Descriptive data analysis techniques such as Mean of score (MS), Frequencies (N), and Percentages (%) were used to summarize the data. Additionally, Chi-square and correlation analyses were performed to explore the relationships between different variables and identify any significant associations. A total of 220 completed the survey questionnaire, providing valuable insights into the occupational hazards faced by female nurses in private hospitals in Coimbatore district, Tamil Nadu.

FINDINGS AND DISCUSSION

Table 1: Sociodemographic Details of Selected Nurses

Demographic Variable	Categories	Number of Respondents (n=220)	Percentage (%)
Age (years)	21-30	162	73.6
	31-40	31	14.1
	41-50	22	10.0
	51-60	5	2.3
Marital status	Unmarried	135	61.4
	Married	85	38.6
Current marital status	With Husband	78	35.5
	Stay away from him	7	3.2
	Divorcee	1	0.4
	Widowed	3	1.4
	Not Applicable	131	59.5

Type of family	Not Applicable	6	2.7
	Nuclear	156	70.9
	Joint	58	26.4
Presence of ailing member in the family	No	127	57.7
	Yes	93	42.3
Number of children	No	31	14.1
	Not applicable	123	55.9
	One	36	16.4
	Two and above	30	13.6
Security for grownup children	No	46	20.9
	Not Applicable	169	76.8
	Yes	5	2.3

The table 1 presents the sociodemographic profile of the selected nurses (n=220) indicates predominantly young workface with 74 percent selected nurses aged 21 to 30 years of age, of which 60 percent were unmarried. Most respondents (70.9%) belong to nuclear families and about 42.3 percent report to have ailing members in the family indicating additional caregiving responsibilities. About 36 percent of the selected nurses had only one child. Security provisions are rare, with only 2.3 percent reporting such measures.

Table 2: Professional Information of Selected Nurses

Demographic Variables	Categories	Number of Respondents (N=220)	Percentage (%)
Professional qualification	GNM	115	52.3
	B.Sc.	100	45.5
	M.Sc.	4	1.8
	Ph.D.	1	0.5
Area of current work	Ward	129	58.6
	ICU	48	21.8
	CATHLAB	3	1.4
	OT	11	5.0
	Emergency	21	9.5
	OP	8	3.6
Experience	1-3 years	155	70.5
	4-10 years	50	22.7
	11 years and above	15	6.8
Working hour per week	48 hours	54	24.5
	More than 48 hours	113	51.4
	Less than 48 hours	53	24.1
Monthly income (₹)	10,000 to 25,000	138	62.7
	25,001 to 50,000	59	26
	50,001 and above	25	11.4

The professional information of the selected nurses (n=220), most nurses (52.3%) hold general nursing and midwifery degree (GNM) qualification with limited nurses had advanced

degrees. The majority work in wards (58.6%) and had one to three years of experience (70.5%). More than half of the selected nurses (51.4%) work for more than 48 hours per week and about 62.7 percent earn ₹ 10,000 to 25,000 monthly.

Table:3 Exposure to Occupational Stress by Selected Nurses

Occupational Stress	Never		Seldom		Sometimes		Often		Always	
	n	%	n	%	n	%	n	%	n	%
Lack of internal empowerment	106	48.2	21	9.5	67	30.5	14	6.4	12	5.5
Lack of self confidence	123	55.9	19	8.6	48	21.8	14	6.4	16	7.3
Suffer from burnout	152	69.1	7	7.7	32	14.5	16	7.3	3	1.4
Insensitive towards others	134	60.9	23	10.5	46	20.9	8	3.6	9	4.1
Undervalued	135	61.4	18	8.2	52	23.6	4	1.8	11	5.0
Lack interest in profession	154	70	14	6.4	37	16.8	8	3.6	7	3.2
Conflict with doctors	119	54.1	17	7.7	53	24.1	13	5.9	18	8.2
Conflict with superior	120	54.5	20	9.1	40	18.2	17	7.7	23	10.5
Conflict with Peers	108	49.1	20	9.1	59	26.8	19	8.6	14	6.4
Lack of opportunity to open talk	82	37.3	14	6.4	82	37.3	17	7.7	25	11.4
Fear on patient death	109	49.5	14	6.4	58	264	16	7.3	23	10.5
Fear of making mistake	50	22.7	17	7.7	79	35.9	21	9.5	53	24.1
More workload in workplace	40	18.2	21	9.5	93	42.3	24	10.9	42	19.1
Uncertainty	55	25.0	21	9.5	84	38.2	26	11.8	34	15.5
Lack of material resources	75	34.1	22	10.0	57	25.9	22	10.0	44	20.0
Lack of technical assistance	60	27.3	18	8.2	62	28.2	23	10.5	57	25.9
Overall Occupational Stress	6	2.8	75	34	107	48.6	29	13.2	3	1.4

Table 3 highlights significant occupational stress exposure among nurses, indicating area's requiring attention. The frequently exposed occupational stress includes resource inadequacies, with 25.9 percent always facing lack of technical assistance followed by fear of making mistakes (24%) experiencing constantly posing a risk to job confidence and clinical efficiency. High workload is also notable, with 19 percent reported always and 42.3 percent reported sometimes. Present study also highlights the prevalence of emotional stressors such as feelings of being undervalued were common, with 23.6 percent reported sometimes. Conflicts related stress with peers (26.8%) and superiors (18.2%) reported sometimes. Results are in consistent with Chaudhri et al (2018) who identifies conflicts with supervisors, unreasonable demands from patients and families, workload and dealing with death and dying as common stressors among healthcare workers which is similar to the observed results. These underscores the need for importance of resource allocation, supportive leadership and interventions targeting stress management for nurses.

The overall occupational stress levels provide the cumulative exposure to occupational stress which indicate varied exposure patterns. The majority of the selected nurses (48.6%) reported moderate stress ('sometimes' score: 33 – 48) while 34 percent reported occasional stress (seldom). Notably, 13.2 percent faced frequent stress (often) and 1.4 percent reported constant stress (always). Only, 2.8 percent reported no stress. Similar to the cross-sectional study conducted by Joshi et al., (2020), where about all nurses reported moderate to severe stress. Both studies highlight the pervasive nature of job stress among nursing staff.

Table:4 Perceived Health Problems of Selected Nurses

Health Problems	Never		Seldom		Sometimes		Often		Always	
	n	%	n	%	n	%	n	%	n	%
Musculoskeletal problems	105	47.7	8	3.6	65	29.5	24	10.9	18	8.2
Gastritis and stomach ulcers	101	45.9	15	6.8	66	30.0	22	10.0	16	7.3
Respiratory allergies	159	72.3	6	2.7	42	19.1	5	2.3	8	3.6
Skin allergies	156	70.9	13	5.9	32	14.5	10	4.5	9	4.1
Anaemia	139	63.2	12	5.5	47	18.6	15	6.8	13	5.9
UTI*	142	64.5	15	6.8	40	18.2	10	4.5	13	5.9
Renal stones	213	96.8	-	-	5	2.3	2	.9	-	-
Hypertension	192	87.3	2	9	10	4.5	4	1.8	12	5.5

UTI*- UrinaryTract Infection

Health Problems	Yes		No	
	n	%	n	%
Varicose vein	61	27.7	159	72.3
Infectious hepatitis	4	1.8	216	98.2
Diabetes mellitus	13	5.9	207	94.1
Tuberculosis	149	66.4	73	33.2
Cancer	-	-	220	100.0
Cardiac illness	-	-	220	100.0

Table:5 Level of Health Satisfaction of Selected Nurses

Health Satisfaction	Very Dissatisfied		Dissatisfied		Neither Satisfied nor Dissatisfied		Satisfied		Very Satisfied	
	n	%	n	%	n	%	n	%	n	%
	1	5	15	6.8	39	17.7	130	59.1	35	15.9

Perceived health problems among the selected nurses (n=220) were given in the table 4, the certain health problems are notably persistent among nurses, with musculoskeletal problems (8.2%), gastritis and stomach ulcers (7.3%), anemia and urinary tract infections (5.9) hypertension (5.5%) indicating the potential severe long term health consequences. Almost 70 percent of the selected nurses never experienced respiratory and skin allergies, though few (4%) frequently experienced.

The occurrence of varicose veins, tuberculosis in 27 percent and 66 percent respectively highlights the need for targeted health interventions. About 60 percent of the selected nurses 'satisfied' with their health where few nurses reported that they are dissatisfied with health.

Table:6 Association and Correlation of Demographic Variables with Occupational Stress and Health Satisfaction

Demographic Variables	Occupational Stress		Health Satisfaction	
	Chi-square	Correlation	Chi-square	Correlation
Age	9.643[NS]	-0.077 [NS]	10.914 [NS]	0.136 [NS]
Professional qualification	13.663[NS]	-0.103 [NS]	7.507 [NS]	-0.048 [NS]
Area of current work	17.675[NS]	-0.110 [NS]	29.709 [NS]	0.034 [NS]
Experience	7.965 [NS]	-0.025 [NS]	8.038 [NS]	0.104 [NS]
Working hours per week	9.190 [NS]	0.010 [NS]	6.014 [NS]	0.41 [NS]
Monthly income	13.673 [NS]	-0.111 [NS]	40.216**	0.257**
Health satisfaction	47.729**	-0.386**	1	

(<0.05 – significant, >0.05 – insignificant), ** indicates significant at the 0.001 level (2 tailed). * Indicates significant at the 0.05 level (2-tailed)

The table 6 presents the association and correlation of demographic variables with occupational stress and health satisfaction. The chi-square and correlational analysis show no significant association between age, professional qualification, area of current work, experience and other demographic variables ($p>0.05$). Whereas, a study found significant relationships between job stress and workability with age, work experience and higher education while our study, did not show significant correlations with occupational stress highlighting potential differences in context or population (Imenpanah et al., 2023). Furthermore, health satisfaction was associated with occupational stress ($\chi^2 = 47.729$, $p < 0.01$) and had negative correlation with p value less than 0.001. However, monthly income significantly associated with health satisfaction ($\chi^2 = 40.216$, $p < 0.01$), showed positive correlation suggesting higher income associated with better health satisfaction.

Table:7 Association and Correlation of Perceived Health Problems with Occupational Stress

Perceived Health Problems	Occupational Stress	
	Chi-square value	Correlation value
Musculoskeletal diseases	63.437**	0.449**
Gastritis and stomach ulcer	77.443**	0.464**

Respiratory allergies	55.594**	0.371**
Skin allergies	64.261**	0.357**
Varicose veins	10.037*	0.160*
Anaemic	74.863**	0.406**
Infectious hepatitis	2.569[NS]	0.097[NS]
Urinary tract infection	69.143**	0.308**
Renal stones	7.836[NS]	0.168*
Diabetes mellitus	25.250**	0.191*
Tuberculosis	6.009[NS]	0.012[NS]
Hypertension	78.036**	0.295**

(<0.05 – significant, >0.05 – insignificant),** indicates correlation is significant at the 0.001 level (2 tailed), * indicates correlation is significant at the 0.05 level (2-tailed)

The relationship between perceived health problems and occupational stress. Significant positive correlation ($p<0.001$) was observed for musculoskeletal diseases, gastritis, respiratory allergies, skin allergies, urinary tract infection and hypertension (r value raging from 0.295 to 0.464) indicating moderate relationship between health issues and occupational stress. Weaker positive correlation was found with diabetes and varicose veins. In contrast, infectious hepatitis, renal stones and tuberculosis had no relationship with occupational stress. This suggests certain health problems such as musculoskeletal and gastrointestinal conditions are strongly linked with occupational stress. However, managing these conditions remains crucial for ensuring the health and productivity of healthcare workers, highlighting the need for further research to explore additional factors contributing to occupational stress and the impact of these health conditions on overall well-being.

CONCLUSION

The study emphasizes the critical occupational hazards faced by female nurses in private hospitals in Coimbatore district, Tamil Nadu. The findings underscore the significant association between monthly income, occupational stress and health satisfaction, emphasizing the importance of fair remuneration and supportive work environments. Additionally, perceived health problems such as musculoskeletal disorders, respiratory issues and psychological stress were prevalent among the respondents, indicating the urgent need for preventive measures and interventions to safeguard the health and well-being of female nurses in the region. The findings underscore the urgent need for interventions to mitigate these hazards and improve the working conditions of nurses. It is imperative for healthcare institutions and policymakers to address these issues promptly to ensure the well-being and productivity of nursing staff.

RECOMMENDATION FOR FUTURE RESEARCH

Future research could further explore the nuanced factors contributing to occupational hazards in this population, facilitating more effective strategies to promote occupational health and safety in the healthcare sector.

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<div align="center">**12**</div>

STUDY ON ASSESSING THE HEALTH STATUS AND CONSTRAINTS FACED BY THE TRIBAL WOMEN IN HELEM TEA ESTATE, BISWANATH DISTRICT OF ASSAM

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<div align="center">**ABSTRACT**</div>

Tribal health is a critical concern due to the inadequate traditional healthcare systems among India's tribal communities. This study at Helem Tea Estate in Assam's Biswanath District examined the health conditions of tribal women, focusing on health issues, dietary habits, and healthcare preferences. Data from 80 participants were collected via structured interviews. Findings revealed a high prevalence of health complications, with a strong preference for traditional treatments over modern hospital care. Most participants adhered to a vegetarian diet. SPSS was used for data analysis, with one-way ANOVA comparing health challenges across age groups ($F(3,76)=.605$, $p=.614$), showing no significant differences. The study highlights the need for culturally sensitive healthcare interventions. It provides insights to develop targeted strategies to improve health outcomes by addressing preferences for traditional treatments and dietary habits. This research underscores the importance of culturally appropriate healthcare practices for tribal populations.

Key word: Health status, health affliction, food habit, Tribal, Women, constraints

<div align="center">**INTRODUCTION**</div>

Health is a fundamental aspect of human development, as highlighted by the Human Development Index (Gogoi, 2021). The World Health Organization (WHO) defines health as a state of complete physical, social, and mental well-being, not merely the absence of disease. Basu (1933) expands this view, emphasizing health's interconnectedness with cultural, economic, and social dimensions. However, tribal communities, with lower literacy and economic attainment, face significant health challenges influenced by traditional beliefs and limited access to services.

Tribal populations experience higher mortality and infant mortality rates, facing a triple burden of communicable and non-communicable diseases, addiction, and malnutrition. Women and children are especially vulnerable to issues such as early marriage, malnutrition, and limited education, with women of reproductive age facing risks like anemia and hypertension (Chandana, 2020). Factors such as inadequate healthcare infrastructure, communication barriers, and workforce shortages further exacerbate these disparities (Chandana, 2020; Liddel, 2022).

In developing countries like India, tribal women face additional challenges in accessing healthcare, education, and infrastructure. This study examines the health status and challenges of tribal women in the Helem Tea Estate, Biswanath district of Assam, to provide insights for targeted policy interventions. Addressing these disparities is crucial for fostering inclusive and equitable development, ensuring tribal women have better access to essential services.

SIGNIFICANT OF THE STUDY

The study conducted in Godam Line Village of Darjeeling District, West Bengal, provides a comprehensive examination of the health status and nutritional challenges facing tribal women in the region. The findings reveal a troubling prevalence of illness and diseases among the respondents, with diarrhea, cough and cold, and dysentery emerging as the most common ailments, affecting half of the surveyed women. Notably, chronic conditions such as hypertension, vision problems, and arthritis were also prevalent in this tribal community. One of the critical observations of the study pertains to the dearth of adequate healthcare facilities in the region, resulting in a substantial number of cases going untreated. The lack of accessible healthcare infrastructure poses a significant hurdle for tribal women seeking medical attention, exacerbating the impact of prevalent diseases. During pregnancy, the reliance on fruits and health drinks underscores the community's coping mechanisms in the absence of comprehensive healthcare services (Sarka, 2016). Nutritional concerns are paramount, as the study indicates inadequate food consumption among tribal women, leading to poor health conditions and heightened susceptibility to diseases such as diarrhea, filarial infections, malaria, tuberculosis, and anemia. The scarcity of Proper Health Centers (PHCs) in accessible areas compounds these challenges, underscoring the need for improved healthcare infrastructure and services to cater to the specific health needs of the tribal population. Furthermore, the lack of awareness about HIV/AIDS, particularly among tribal women, points to a critical gap in health education programs. This knowledge deficit extends to reproductive health, contributing to problems like reproductive tract infections. Early marriages exacerbate these challenges, leading to medical emergencies and unbalanced health conditions among tribal women (De, 2017). The multifaceted health issues outlined in this study underscore the urgency of targeted interventions, increased healthcare accessibility, and enhanced health education initiatives to uplift the health and well-being of tribal women in this region.

OBJECTIVES

1. To know the socio-economic profile of the respondents
2. To identify the health condition of the respondents
3. To study the type of diet followed by the respondents
4. To analyses the constraints of the respondents on health condition

HYPOTHESIS

1. H_0-There is no significant difference in the population mean for problems faced by tribal women and age group.
2. H_a-There is at least one mean age group difference with the problems faced by tribal women and age group.

MATERIAL AND METHODS

The research focused on Tribal women residing in the Helem Tea Estate in the Biswanath District of Assam, utilizing a simple random sampling technique to gather data from 80 participants through a well-prepared interview schedule. The study's primary objective was to assess the health conditions, dietary habits, and constraints faced by these tribal women. Both primary and secondary data sources were employed, with face-to-face interviews providing primary data and supplementary information gathered from books, journals, and websites.

The collected data underwent analysis using descriptive statistical methods, including Mean and Standard Deviation, as well as Percentage analysis to understand the practices followed by the respondents in treating their illnesses. Additionally, One-way ANOVA was applied to assess the population mean differences among tribal women's age groups concerning the challenges they encountered. This comprehensive approach, blending qualitative and quantitative data, enhances the depth and breadth of insights into the health and lifestyle patterns of the tribal women in the Helem Tea Estate, contributing valuable knowledge to inform targeted interventions and improvements in healthcare practices within this community.

RESULT AND DISSCUSSION

The study has undergone various analyses for full filing the objectives and the study need. The following table brings out the socio-economic profile of the selected sample respondents.

Table 1. Socio economic profile of the respondents (N=80)			
Aspect	**Category**	**Frequency**	**Percentage**
Age	18-25	15	18.75
	25-30	19	23.75
	30-40	21	26.25
	40 and above	25	31.25
Religion	Hindu	55	68.75
	Christian	25	31.25
Caste	ST	80	100
Family type	Join	20	25
	Nuclear	60	75
Marital Status	Married	80	100
Educational qualification	Illiterate	35	43.75
	Primary School	15	18.75
	Middle School	20	25
	High School	10	12.5
Occupation	Agriculture	25	31.25
	Business	2	2.5
	Employee in tea garden	53	66.25
Income of the respondents (Rs) per month	(Rs 5000-10,000	65	81.25
	High above 10,000	15	18.75

The socio-economic profile outlined in Table 1 offers valuable insights into the demographic characteristics of the respondents (N=80) in the study on tribal women from the Helem Tea Estate in the Biswanath District of Assam. The age distribution reveals a varied sample, with a notable proportion (31.25%) aged 40 and above, indicating a mix of generational perspectives. The majority of respondents identified as Hindu (68.75%), reflecting the dominant religious composition in the region, while 31.25% identified as Christian, highlighting a religious diversity within the tribal community. The caste distribution emphasizes the homogeneous nature of the sample, with all respondents belonging to the Scheduled Tribe (ST) category. This underscores the targeted focus on a specific tribal group, ensuring the study's relevance to the intended population. Family types exhibit diversity, with 75% residing in nuclear families and 25% in joint families. This variation may influence the dynamics of health practices and decision-making within households. Marital status, with all respondents being married, underscores the importance of capturing insights specific to married tribal women, considering the unique health challenges they may face.

Educational qualifications highlight a range of literacy levels, with a significant proportion (43.75%) being illiterate. This underscores the importance of considering varying educational backgrounds when assessing health-related knowledge and practices. Occupationally, a substantial number (66.25%) work as employees in tea gardens, indicating a prevalent employment pattern in the region. The income distribution reflects economic diversity, with the majority (81.25%) earning between Rs 5000-10,000 per month, while a noteworthy percentage (18.75%) earns above Rs 10,000 per month. This economic variability may influence access to resources and healthcare-seeking behavior among tribal women.

The socio-economic profile provides a nuanced understanding of the contextual factors that may influence health and lifestyle patterns among tribal women in the Helem Tea Estate. Recognizing these demographic characteristics is crucial for tailoring interventions and policies that address the specific needs of this community, aiming to enhance overall health and well-being and the findings undergo with the study made by Sarkar, (2016).

The table-2 provides the findings related to the health afflictions faced by the selected tribal women.

Table 2. Health afflictions faced by the tribal women * (N=80)			
Particular	Frequently %	Rarely %	Sometimes %
Body ache	90	5	5
Skin diseases	87.5	2.5	10
Gynecological disorder	87.5	7.5	5
Gastritis	80	5	15
Anemia, Influenza (fever, cough etc)	75	17.5	75
Diarrhea	10	15	75

Table 2 presented the health afflictions faced by tribal women (N=80) in the study, categorized by frequency. The findings provided a detailed overview of prevalent health issues within this specific demographic. Body ache emerged as a predominant health concern, with 90% of respondents reporting its frequent occurrence, while only 5% experienced it rarely, and 5%

indicated occasional instances. Skin diseases also featured prominently, affecting 87.5% of tribal women frequently, while 2.5% reported rare occurrences, and 10% noted occasional incidents.

Gynecological disorders appeared to be a widespread health affliction, with 87.5% of respondents facing them frequently, 7.5% experiencing them rarely, and 5% encountering them occasionally. Gastritis was another notable concern, affecting 80% of tribal women frequently, 5% rarely, and 15% occasionally. The combined category of anemia, influenza (fever, cough, etc.) underscored a significant health challenge, with 75% reporting frequent occurrences, 17.5% experiencing them rarely, and 7.5% encountering them occasionally. Diarrhea, while reported by 75% of respondents occasionally, was less frequent, with only 10% experiencing it frequently and 15% rarely.

These findings illuminated the prevalent health issues faced by tribal women in the Helem Tea Estate, providing essential insights for targeted healthcare interventions and strategies aimed at improving the overall well-being of this specific community and it was coinciding of Chandana (2020) with the study of. The high frequencies of certain health afflictions emphasized the urgency of addressing these issues comprehensively within the context of the tribal population.

The investigator further tried to understand the descriptive statistics of the selected respondents age group in the basis of mean, standard deviation and median.

Table 3. Descriptive statistics of Age group –Mean, Standard Deviation and Median (N=80)				
AGE	Mean	N	Std. Deviation	Median
18-25	2.0625	16	1.18145	2.0000
25-30	2.2759	29	1.03152	2.0000
30-40	2.0000	10	0.94281	2.0000
40 ABOVE	2.5600	25	1.22746	3.0000

The descriptive statistics presented in Table 3 offer a nuanced exploration of the age distribution among tribal women in the Helem Tea Estate, providing key insights into central tendencies and variabilities within each age group. In the 18-25 age category, the mean age of 2.0625 indicates a moderate average age, with a standard deviation of 1.18145 reflecting a degree of variability in ages within this group. The median age of 2.0000 signifies a balanced distribution, suggesting that half of the respondents in this group are below this age. This age group represents a relatively younger segment of the population. Moving to the 25-30 age group, the mean age increases to 2.2759, accompanied by a slightly lower standard deviation of 1.03152. This suggests a somewhat higher average age with less variability compared to the 18-25 group. The consistent median age of 2.0000 indicates a central tendency, highlighting a balanced distribution similar to the younger age bracket.

The 30-40 age group, with a mean age of 2.0000 and a standard deviation of 0.94281, represents a cohort with a lower average age and less variability. The median age remains at 2.0000, indicating a balanced distribution similar to the younger age groups. This category comprises individuals in the middle range of the age spectrum. In contrast, the 40 and above age group stands out with a mean age of 2.5600 and a higher standard deviation of 1.22746, signifying a wider range of ages and greater variability. The median age increases to 3.0000, suggesting a

central tendency toward slightly higher ages compared to the other groups. This age category represents a more mature segment of the population.

In discussion, these descriptive statistics provide valuable insights into the age dynamics among tribal women in the Helem Tea Estate. Understanding age-related characteristics is essential for tailoring interventions and healthcare strategies, considering the diverse health needs and challenges that may vary across different life stages and the study matched with the study of Lindell (2022). This nuanced understanding contributes to the contextualization of health-related findings within the broader demographic landscape of the study population.

The practices followed by the respondents for the treatment of their illness was examined by the investigator.

Table 4. Practices followed for the treatment of the respondent's illness (N=80) *		
Practices	**Frequency**	**Percentage %**
Went to hospital	27	33.75
Take medicine from the pharmacy by their own	80	**100**
Go to nearby PHC	75	93.75
Herbal treatment	80	**100**
Home remedy	77	96.25
		*multiple response

Table 4 outlined the practices followed by the respondents (N=80) for the treatment of their illnesses, providing insights into past healthcare-seeking behaviors within the tribal community in the Helem Tea Estate. The data revealed that all respondents (100%) reported taking medicines from the pharmacy on their own, indicating a high level of self-reliance in managing their health. Herbal treatment also emerged as a prevalent practice, with all respondents (100%) opting for this traditional form of healthcare. This finding highlighted the significance of indigenous knowledge and cultural practices in the health management of the tribal women in the Helem Tea Estate.

Moreover, seeking professional medical assistance was also observed, with 33.75% of respondents stating that they went to the hospital, and 93.75% visited nearby Primary Health

Centers (PHCs). This dual approach suggested a combination of traditional and modern healthcare practices, indicating a diversified health-seeking behavior within the community. Home remedies were widely embraced, as reported by 96.25% of respondents. This inclination towards home-based treatments signified the reliance on locally available remedies and cultural practices for addressing health issues. The multiple-response format of the table allowed for the identification of overlapping practices, highlighting the complexity of healthcare choices among tribal women. The coexistence of traditional herbal treatments, self-medication, and utilization of formal healthcare facilities painted a comprehensive picture of the varied healthcare landscape in the Helem Tea Estate in the past. Understanding these practices was crucial for designing healthcare interventions that respected and integrated the community's existing health-seeking behaviors while incorporating essential modern medical services.
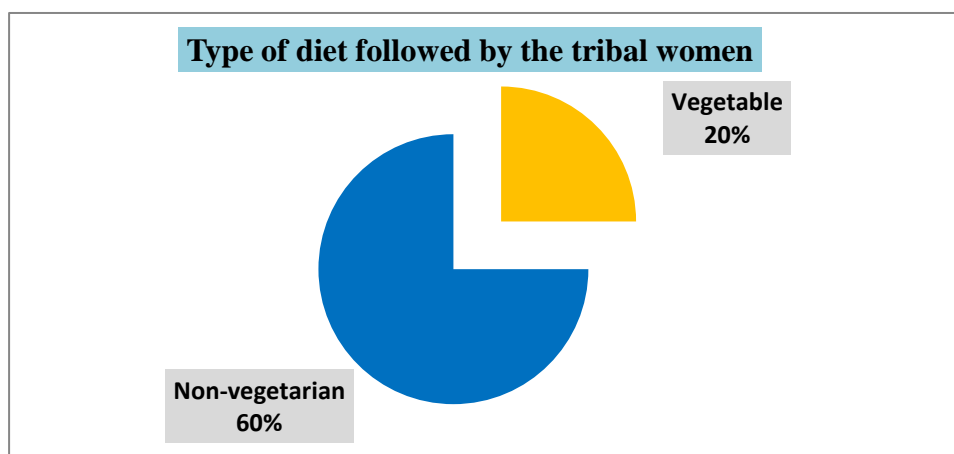
Fig 1. Food habit of the respondents

Figure I imply that 60 percent of the respondent preferred non-vegetarian food while 20 percent of the respondents preferred vegetables. Since the tribal people's food pattern preferred to start with non-vegetarianism there is a reason that these tribal's people lives in harsh condition and do the majority of their everyday task physically, under harsh weather condition, and to do that they need to consume meaty dishes to provide them with essential nutrition which, typically vegetarian cannot provide.

Hypothesis testing:

1. H_0-There is no significant difference in the population mean for problems faced by tribal women and age group.
2. H_a-There is a significant difference in the population mean for problem faced by Tribal Women

Table 5. Variables	
Independent Variable	Dependent variable
Age Group	Problems faced by tribal women

Table 5 outlines the variables used in the study, distinguishing between the independent variable and the dependent variable.

The independent variable in this research is the "Age Group" of the respondents, categorized into four groups: 18-25, 25-30, 30-40, and 40 above. This variable serves as a crucial factor for understanding any potential variations in the problems faced by tribal women.

The dependent variable is identified as the "Problems faced by tribal women." This variable encompasses a range of issues, the details of which are enumerated in Table 6. The study aims to investigate the relationship between the age groups of tribal women and the specific challenges or problems they encounter.

This differentiation between independent and dependent variables sets the foundation for a more in-depth analysis, allowing researchers to explore how age may correlate with the various problems faced by tribal women in the Helem Tea Estate. By clearly defining these variables, the study aims

to contribute valuable insights into the nuanced dynamics between age and health challenges within the tribal community.

Table 6. Problems faced by tribal women (N=80)		
Aspects	Frequency	Percentage (%)
Low economic condition	25	**31.25**
Burden of household activities	23	28.75
Low level of Knowledge	16	20
Lack of health facilities	16	20

Table 6 presented a comprehensive overview of the problems faced by tribal women (N=80) in the study, illustrating the frequency and percentage distribution of each aspect. A considerable proportion of tribal women, constituting 31.25%, reported challenges associated with a low economic condition. This historical data underscores economic vulnerability as a substantial concern within the community during the study period. The burden of household activities emerged as a prevalent issue, affecting 28.75% of tribal women. This finding highlights the historical significance of household responsibilities in shaping the experiences of women in the community. A notable portion, comprising 20% of respondents, faced challenges associated with a low level of knowledge. This historical aspect emphasizes the importance of educational interventions to enhance awareness and knowledge within the community. Similarly, another significant concern was the lack of health facilities, affecting 20% of tribal women. This historical data underscores the critical need for improvements in healthcare infrastructure to address health-related challenges faced by the community. These historical findings provide a snapshot of the multifaceted problems experienced by tribal women in the Helem Tea Estate, offering insights into the relative prevalence of each issue during the study period. Such data guides the understanding of past challenges and informs future interventions and policy decisions to address the specific needs of this population.

The problems faced by the tribal women with respect to their age group was examined in the current study.

Table 7. Problem faced by tribal women with respect to age group (N=80) One-way ANOVA					
Variable	Age	DF	Mean	F	Sig
Problem faced by tribal women	18-25		2.062		
	25-30	79	2.275	.605	.614
	30-40		2.00		
	40 and above		2.56		

The findings from the one-way ANOVA, as presented in Table 7, offer insights into the relationship between age groups and the problems faced by tribal women in the historical context of the study (N=80). The analysis encompassed four distinct age brackets: 18-25, 25-30, 30-40, and 40 and above. The calculated F-value of 0.605, coupled with a non-significant p-value of 0.614, indicates that, during the historical period under study, there was no statistically significant difference in the mean scores of reported problems among tribal women across various age groups. This implies that the challenges faced by tribal women in the Helem Tea Estate did not exhibit

substantial variations based on age. The lack of significance suggests that any observed differences in mean scores across age groups were likely due to random chance rather than a meaningful association with age and the same was reported in the study of Choudhury (2021). This finding challenges the assumption that age played a prominent role in influencing the reported problems faced by tribal women. It indicates that factors other than age, such as socio-economic conditions, cultural aspects, or individual circumstances, might have had a more prominent impact on the challenges experienced by women in the community during that historical period.

These historical insights contribute to a more nuanced understanding of the complex interplay of factors influencing the well-being of tribal women. It underscores the importance of considering multiple dimensions, beyond age alone, when crafting interventions and policies aimed at addressing the challenges faced by this population. Further research and exploration of these multifaceted influences would be valuable for developing targeted and effective strategies to improve the overall health and socio-economic conditions of tribal women in similar contexts.

CONCLUSION

In conclusion, the analysis of historical data presented in Table 7, utilizing a one-way ANOVA to explore the relationship between age groups and the problems faced by tribal women in the Helem Tea Estate (N=80), yields valuable insights. The non-significant findings, with an F-value of 0.605 and a p-value of 0.614, suggest that age did not play a statistically significant role in influencing the reported problems faced by tribal women during the study period. This indicates that, at that particular historical juncture, challenges experienced by tribal women were not significantly differentiated across various age groups. The absence of a clear correlation between age and reported problems underscores the complexity of factors influencing the well-being of tribal women, emphasizing the need for a multifaceted approach in understanding and addressing their challenges. While age may not have emerged as a significant determinant, other socio-economic, cultural, and contextual factors likely played a more pronounced role in shaping the experiences of tribal women in the Helem Tea Estate. This insight has implications for tailored interventions and policy formulations, emphasizing the importance of considering a broader set of determinants when addressing the health and socio-economic concerns of tribal women. Future research could delve deeper into these multifaceted influences to uncover the specific dynamics at play and inform more targeted strategies for improving the overall well-being of tribal women in similar contexts. The historical perspective provided by this study contributes to a more nuanced understanding of the intricate interplay of factors shaping the challenges faced by tribal women, paving the way for more effective and contextually relevant interventions in the future.

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13

INFLUENCE OF SOCIO-ECONOMIC CHARACTERISTICS ON CAREER PREFERENCE OF ADOLESCENTS GIRLS IN GOVERNMENT INTER-COLLEGES: A COMPARATIVE STUDY OF ARTS AND SCIENCE STREAM

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ABSTRACT

This research paper explores the occupational preferences of college-going girls and the factors influencing these choices, extending beyond traditional roles to include careers in caregiving, volunteering, and artistic endeavors. Building on previous studies, it identifies societal influences, educational experiences, individual traits, and parental guidance as key determinants in shaping career decisions among young women. Data were collected through structured interviews with 200 students from Government Girls Inter Colleges (GGIC) in Varanasi, selected via simple random sampling. The data were analyzed using mean, standard deviation, t-test, and Pearson's correlation techniques. Participants selected their desired occupations from a list of 15 options and identified factors influencing their vocational preferences. The findings reveal significant patterns in occupational choices, with scientific professions, teaching, nursing, and creative work emerging as popular options. Influential factors included job suitability, personal interest, societal influence, and prestige. This study enhances our understanding of gender dynamics in the workforce by highlighting the occupational aspirations of college girls and the factors driving their career decisions. The insights gained can inform efforts to promote gender equity in career choices and foster inclusivity in the workforce.

Keywords: Adolescent, Career Preference, Gender, Influences, Occupational Choices Socioeconomics.

INTRODUCTION

Occupation encompasses the spectrum of activities an individual engages in, whether for remuneration or personal fulfillment that occupies a significant portion of their time. It comprises a range of tasks and responsibilities that define one's professional or personal endeavors, including employment, hobbies, duties, and responsibilities, whether compensated or not. This broader perspective acknowledges that occupations extend beyond traditional job roles and may encompass diverse pursuits such as care giving, homemaking, volunteering, and artistic pursuits, reflecting the multifaceted nature of human activity and contribution to society.

Occupational preferences have been reported to change with the grade among girls (Kuzgun, 2004). Corey, (2015) studying fairly large samples of high school girls have reported that occupations like stenography, nursing, teaching journalism, medicine and Airhostess are more preferred by them. Smith and Johnson (2023) have found that jobs enjoying glamour, aesthetic value, effort and prestige are more desired by girls. Their research highlighted the societal influences, educational experiences, and individual traits that contribute to differences in career choices, especially among college-aged women.

Factors like suitability and liking for the job are also reported to affect occupational choice among girls. More recently, Sharma and Dhakar (2022) have found social service, fame, self-expression, adventure and prestige as factors affecting occupational preferences among Indian school girls. Brown and Jones (2020) investigated the impact of parental guidance and expectations on the career aspirations of young women in college. The present investigation proposed to study the occupational preferences among college girls and the factors that affected these choices.

OBJECTIVES OF THE STUDY

The study has been undertaken with the following objectives to:

- To explore how socio-economic characteristics influence career preferences of girls at Government Inter-colleges.
- To examine the occupational preferences of arts and science girls and the factors affecting their career choices
- To analyze the relationship between career preferences and socio-economic characteristics of adolescent girls.

METHODOLOGY

The study was conducted in GGIC schools of Varanasi district, Uttar Pradesh. Students from the 11th and 12th class were included in the research after explaining them the purpose of the study. They were included after taking the informed consent from them. Purposive sampling method was adopted to select the study participants. Varanasi district has five GGIC schools, all were chosen for the study, namely GGIC Banaras, GGIC Cholapur, GGIC Ramnagar, GGIC Tikari and GGIC Maldahiya. A sample size of 200 was calculated through Yemen's formula ,40 students from classes 11th and 12th i.e. 20 from art stream and 20 from science stream, was selected for the participation in this study. A check list of 15 occupations was prepared. The occupations included were scientist, banking and finance, teaching, creative work, social work, interior decoration, law practice, ITI/ Technician, clerical job, management, journalism, nursing, singing/dancing, own business and Indian armed force. The data was collected in classroom situation. The subjects were asked to check, by putting a tick (√) against an occupation which they really desired to take up as a career after completing their education. In the similar manner, they were requested to check the factors which affecting their career choices. They were requested to be frank in giving their occupational preferences and factors affecting these choices. After tabulating the responses, basic statistical methods such as percentages, frequency were used to analyze the data and fractional ranking used to rank the occupation preference and factors affecting their career choices.

FINDING AND DISCUSSION

Table (1): Occupational Preferences and Affecting Factors their career choices as given by the Girls:

OCCUPATION	(%)	RANK	FACTORS	(%)	RANK
Scientist	61	I	Independence	38	I
Banking & Finance	30	II	Liking with Passion	27	II
Teaching	24	III	Social service	16	III
Creative work	16	IV	Work life balance	22	IV
Social work	15	V	Prestige	20	V
Interior decoration	10	VI	Money	19	VI
Law practice	10	VI	Access to Opportunities	16	VII
ITI/technician	09	VIII	Family occupation	10	VIII
Clerical Job	08	IX	Social expectation	09	IX
Management	07	X	Travel	08	X
Journalism	03	XI	Marriage and Family Pressure	06	XI
Nursing	03	XI	Technological Advancements	03	XII
Singing/Dancing	02	XIII	Security	02	XIII
Own Business	02	XIII	Glamour	02	XIV
Indian Armed Forces	00	XV	Suitability	02	XIV

The pattern of occupational preferences among the arts and science group

The five most desired occupations, in terms of frequency of checks for the group were: Scientist (61%), Banking and finance (30%), Teaching (24%), Creative work (16%) and Social work (15%). It is to note that non-traditional positions like those of an interior decoration, law practice, ITI/ technician, Clerical job, Management, Journalist, Nursing, Singing/Dancing, Own business and Indian armed forces were much not preferred by girl's students.

The factors affecting the choice of the art and science group

The five most frequently stated motivational factors were: independence (38%), Liking (27%), social service (16%), work life balance (22%), prestige (20%), and money (19%), access to opportunity (16%). Some other factors such as family occupation (10%), travel (8%), social expectation (9%) The factors like marriage and family pressure, technological advancement, security, approval, suitability, free time and glamour were stated as least affecting their occupational preference. The occupational choice becomes easier if individuals realize their interests (Aggarwal and Bala, 2017).

Table-2: Occupational Preferences and Affecting Factors by Arts and Science Girls

OCCUPATION	Frequencies (%)		FACTORS	Frequencies (%)	
	Arts (N 100)	Science (N 100)		Arts (N 100)	Science (N 100)
Scientist	00	84	Independence	80	89
Banking & Finance	48	8	Liking with Passion	76	95
Teaching	40	20	Social service	32	87
Creative work	30	00	Work life balance	84	48
Social work	08	12	Prestige	42	60
Interior decoration	08	08	Money	62	45
Law practice	08	04	Access to Opportunities	23	34
ITI/technician	02	12	Travel	10	25
Clerical Job	06	04	Family occupation	12	28
Management	04	04	Social expectation	35	04
Journalism	00	04	Marriage and Family Pressure	20	12
Nursing	00	04	Technological Advancements	12	05
Singing/Dancing	02	00	Security	18	07
Own Business	02	00	Glamour	08	05
Indian Armed Forces	00	00	Suitability	08	04

Table 2 revealed that Arts group gave the highest preference for banking and finance (48%); followed by teaching (40%), creative writing (30%), social work (8%), interior decoration (8%) and law practice (8%). While in Science group, the first preference was given to Scientist (84%), Teaching (20%), Social work (12%), ITI/ Technician (12%), and Interior decoration (8%) and Banking & finance (8%). Sharma (2014) observed no significant difference in career indecision among students in science, arts, and commerce disciplines. However, Khasawneh, Hailat, and Jawarneh (2007) noted notable differences in career decision status across economics and arts streams. Monteiro (2015) conducted qualitative research indicating variations in responses to career decisional status based on gender and educational streams. Additionally, Sharma (2014) found significant differences among adolescents in science, arts, and commerce streams regarding career decision making. Whereas the five most frequently stated motivational factors for the arts group were: work life balance (84%),independence (80%), liking with passion (76%), money (62%), prestige (42%), Social service (32%), and social expectation (35%) play a major role in carrier

preference among respondents some other factors such as access to opportunities, marriage and family pressure, security and technological advancement having little role in carrier preference among respondents, for the science group the five most frequently stated factors were: liking with passion (95%),independence (89%),social service (87%), prestige (60%), work life balance (48%), money (45%) and access to opportunity (34%). Other factors such as family occupation, travel, marriage and family pressure also have little role in occupational preference. It is to be noted that factors like suitability, social approval, glamour, security and authority were approval, glamour, security and authority were stated as least affecting occupational preference by both the groups. Garcia and Lee (2019) revealed the correlation between personality traits and career choices among female college students. Their analysis revealed how factors such as suitability, conscientiousness, security and openness to experience influence occupational preferences and decision-making processes. Fearfull and Kamenou (2006) reported that while making 'choices' regarding their career women are believed to keep their family and children in mind. Similarly, Ferguson and Sharples (1994) cited that when it comes to selecting a career, women often choose those fields which help her juggle her career and family responsibilities in a more considerable manner.

Table-3: Relationship between the Career Preference and Socio-economic characteristics of girls

S.No.	Socio-Economic Characteristic	Career Preference	
		'r' value	't'
1.	Family background	0.02*	0.198
2.	Types of family	0.01*	0.099
3.	Size of family	0.00*	0.000
4.	Birth Order	0.09	0.895
5.	Educational qualification of father	0.61	7.625**
6.	Educational qualification of mother	0.24	2.449*
7.	Occupation of father	0.03*	0.297
8.	Occupation of mother	0.58	7.073**
9.	Family income	0.09	0.895
10.	Mass- media exposure	0.54	6.353**
11.	Influence of family on career preference	0.02*	0.198
12.	Influence of friends on career preference	0.41	4.072**
13.	Influence of teachers on career preference	0.32	3.172*

* Significant at the 0.05 level.   **Significant at the 0.01 level.

Table-3 offers valuable insights into how various socio-demographic characteristics relate to individuals' career preferences. Examining correlation coefficients 'r' values and 't' values, we gain a comprehensive understanding of the influence these factors on carrier preferences. The family background, types of family, and family size exhibit negligible correlations with career preferences indicating minimal impact from these aspects. Birth order shows a weak positive correlation, suggesting a slight influence, although statistically insignificant.

Parental educational qualifications emerge as significant predictors. Both father's and mother's education strongly correlate with career preferences, indicating that children of more educated parents tend to gravitate towards specific career paths. This finding underscores the intergenerational transmission of career aspirations and opportunities. Sjogen (2002) highlighted parental formal education as a significant factor shaping students' occupational choices. He suggested that young individuals from less educated households are particularly responsive to economic incentives, often gravitating towards professions offering higher returns on education. Similarly, Ali (2003) emphasized the pivotal role of parental education in shaping students' career preferences, which in turn impacts their performance in subjects like mathematics. De Ridder (1990) further corroborated this, noting that students from less educated backgrounds are less inclined to pursue higher education or attain professional career aspirations.

Maternal occupation stands out as a crucial determinant, displaying a robust positive correlation with career preferences. This implies that the mother's profession significantly shapes her children's career inclinations, possibly through role modeling or direct influence. Recent studies (Smith et al., 2023; Garcia & Lee, 2022; Choi et al., 2024) collectively indicate a positive influence of maternal occupation on children's career preferences; they found that maternal occupation had a stronger effect on children's career aspirations compared to paternal occupation. Specifically, children exhibited a greater tendency to consider careers aligned with their mothers' occupations, suggesting a gendered influence. Conversely, paternal occupation shows no notable correlation, implying that fathers may exert less direct influence on their children's career choices compared to mothers. Family income had very week correlation, indicating that individuals from higher-income households may have not any distinct career preferences compared to children from lower-income backgrounds. Patel and Nguyen (2021) explored the impact of socioeconomic background on the career aspirations of female college students. Their study examined how factors such as household income, level of parental education, and access to resources shape occupational preferences and opportunities for young women. Mass-media exposure emerges as a potent influencer, showing a there was a notable positive correlation with career preferences. This underscores the pervasive impact of media in shaping individuals' perceptions and aspirations regarding various professions. The literature reveals that mass media significantly influences children's career preferences. Anderson et al. (2021) meta-analysis confirms this, while studies by Lee et al. (2022), Martinez et al. (2020), and Kim et al. (2023), Reddy et. al. (2018) shows how different media forms shape children's career aspirations. Wang et al. (2019) emphasize the role of parental guidance in moderating these effects. Overall, the findings highlight the importance of media literacy and parental support in guiding children's career decisions. External influences, such as friends and teachers, also wield significant sway over career preferences. Both exhibit moderate to strong positive correlations, suggesting that peer and mentor interactions play pivotal roles in guiding individuals towards specific career paths. Several studies highlight the significant role of peer and teacher influence on children's career aspirations. Sharma et al. (2019) emphasize the effect of peer interactions and social networks on adolescents' career decision-making, while Patel et al. (2020)

underscore the importance of teacher support and guidance in secondary schools. Reddy et al. (2018) found that parental, peer, and teacher support all contribute to college students' career aspirations.

CONCLUSION

The study on occupational preferences among college girls reveals a significant shift towards individual fulfillment over traditional expectations. Factors such as independence, passion for the profession, and social service emerge as primary influencers, alongside prestige and financial considerations. Among students in arts and science fields, distinct patterns of career preferences are evident: scientists prioritize independence and passion, teachers emphasize social service, while banking & finance professionals seek prestige. Notably, familial occupation and social approval have minimal influence, signaling a trend towards self-actualization. The research also examines influences like parental occupation, mass media exposure, and cultural context, shaping career aspirations. Recognizing these factors is crucial for educators, parents, and policymakers to provide effective guidance and support to students. By fostering awareness of diverse career options, promoting media literacy, and challenging gender roles, stakeholders can empower students to make informed choices aligned with their interests and values. Ultimately, understanding these dynamics is vital for cultivating a diverse and inclusive workforce reflective of societal needs and aspirations.

SUGGESTION FOR FUTURE RESEARCH

Similar studies can be done to explore the longitudinal impact of socio economic and cultural shifts on occupational preference among Adolescence girls, another one can be done for investigating the barriers faced by girls in pursuing non-traditional courses and strategies to overcome them would be valuable.

Career guidance programs or workshop can be conducted in schools to assess their influence on students' awareness and preparedness for diverse career path.

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14

EDUCATIONAL ASPIRATIONS OF TRIBAL WOMEN IN HIGHER EDUCATION: A STUDY OF TEA – GARDENS IN NORTH BENGAL

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ABSTRACT

Educational aspirations of tribal women or girls address towards a strong desire to achieve something high or great in the society. Therefore, educational aspirations are a dream, which every girl student wants to achieve after completing their education. The different National Educational Policies and Commissions gave high priority to gender equality and which led the entire education system to work for the upliftment of women. The study was conducted at University of North Bengal, Siliguri, West Bengal, India. The study involves a total 88 students of Under Graduate and Post Graduate tribal students mainly from Goomguma, Hatigisha, Gayaganga, Bagdogra, Naxalbare, Panigahta and surrounding tea garden. The study found that good views from parents and the community encourage tribal women to have high educational aspirations, even though socio-cultural, political, and economic constraints still prevent tribal women from pursuing higher education in North Bengal's tea gardens.

Keywords: Education, Graduate, Post Graduate, Student, Women.

INTRODUCTION

The tribal population of North Bengal mainly Darjeeling and Jalpaiguri districts is an integral part of West Bengal. They were taken up by British people from different parts of India such as Jharkhand, Odisha, Chattisgarh and Madhya Pradesh as indentured labourers for their tea gardens between the 1980 – 90s. After independence, British left India but these people didn't leave and they became a very essential part of West Bengal. The educational status of the tribes of North Bengal is very poor. Parents engage their children in different house hold chores and send them to work in the tea garden from their childhood only. Therefore, the rate of literacy in the tea garden is still very low. Hence knowing the educational aspirations of the tribal girls of tea garden is a very essential study of today's society.

India is a developing economy and considered one of the largest democracies in the world. It is expanding in many areas of development, which is vital to the growth of the nation. Along with economic and infrastructural development, there is also a need for social development. During the time of independence, the female literacy rate was a mere 8.6%. According to the latest census, the female literacy rate in India is 65.5%. Though it has seen a rise, India has not met the world's average female literacy rate. Educated tribal women are always given better social status and respect from family members and peers. Goel (2004) explored the impact of environment in the home and gender on educational aspirations. Results revealed that girls had higher educational

aspirations than boys. Boys feel more rejected with the atmosphere at home in comparison to girls who experienced more nurturance than boys. Hektner et al. (2000) and Dai (1996) examined whether there were insignificant gender differences in educational aspirations between senior level high school students. Garg et al. (2002) studied that the impact of family factors had their influence on shaping student's educational aspirations through their impact on attitudes, extra-curricular reading towards homework, school and perceptions of students of their parent's educational aspirations. Koa et al. (2003) analyze that educational aspirations are a significant predictor of eventual educational attainment. Singh (2011) examined educational aspirations in high school students and found that girls have less educational aspirations than boys.

Changing roles for women worldwide have placed young adult women in a bind, caught between the customary role of wife and mother and newer aspirations for higher education and career (James-Hawkins et al. 2016). In Gulf countries, such as Qatar, gender norms about women's roles as wives and mothers may have a particularly strong influence on their aspirations (Liloia 2019). Despite strong gendered familial expectations for women to marry and bear children, competing influences place pressure on women to contribute to the nation-state (Liloia 2019; Moghadam2004).

LITERATURE REVIEW

According to Gupta (2015) in her book: Status of Tribal Women in Tripura says that Women play a central role in the pastoral way of life, providing labour for the livestock, land and household. In many societies, women are responsible for managing and processing small stock and other animals kept at the homestead. They are the backbone of the pastoral economic structure in Tripura's, a state substantial participation and contribution to pastoral economy, the role of women in in India, as the production system is much dependent on them. In spite of Tripura livestock production has not been paid enough attention. The status of the pastoral tribal women of Tripura has not remained static over time and is undergoing rapid changes at present. Status of Tribal Women in India says that the tribal women constitute like any other social group, about half of the total population. The tribal women, as women in all social groups, are more illiterate than men. Like others social groups, the tribal women share problems related to reproductive health. When primary and secondary subsistence activities are counted, women work more than men. Status of women varies in different societies. Despite several economic, political and social changes, women, are still far behind (Bhasin, 2017).

The study done by Dhal (2018) on Situating Tribal Women in Gender Discourse: A Study of the Socio-economic Roots of Gender Violence in Odisha points out that violence against the vulnerable sections of the society arising due to multitude factors in the era of globalization is a serious matter of social and academic discourse. The growing incidence of violence perpetrated against women in contemporary times is a testimony to the fast-eroding idea of human security in a globalized world, which originates from the patriarchal power structure existing in the society. The tribal communities of Odisha women have their unique status and much more empowered than non - tribal women due to their significant role in social, religious, political, cultural and economic field in their family as well as in village or community level. The women in the tribal society constitute about half of the tribal tribe population. Their role in the tribal society is very important, because the tribal women are work harder and the entire family economy and management depends on them. The tribal women better placed in many respects and more empowered in certain areas (Mohapatra, 2017).

The study done by Malla et al. (2013) in their work; Educational Participation of Scheduled Tribal Women in Rayagada district depicts the actual condition of tribal women education in the district and different obstacles on the path of women education as well as also tried to explore measures taken by government to improve the present situation and family attitudes towards their girls' education in tribal areas of Rayagada district. The development of tea garden people is the focus of numerous government strategies and initiatives. Despite the fact, children of tea garden workers continue to receive education in a dated manner. Several studies have found that children of tea garden workers encounter many obstacles in their educational journey (Begum & Islam 2022). Girls are more acceptable in between teacher and the boys and girls are not comfortable and expressive to share their problem. Female student performed better as compared to male students in the same schools (Das 2020). Tea gardens have set an educational aspiration that they hope to accomplish in the future. Students' career modifications are significantly influenced by their educational goals (Ghosh, 2024).

OBJECTIVES OF THE STUDY

1. To know the interest of tribal girls' students towards a particular job or profession.
2. To know the initiatives taken by the tribal girl students to achieve their aspirations

METHODOLOGY

Based on the above objectives the methodology of the study given below -

Design of the study - Survey method is used under the Descriptive research. The study has been conducted using quantitative research method.

Selection of tool - For the data collection the researcher has applied the survey method. A Self – made questionnaire was prepared by the researcher. The questions included such as – interest of the girls towards choosing a particular profession, interest for the higher education, feeling about the education, initiative to achieve towards their goal, about the attending the regular classes etc. It also included other items of their demographic and general information. The questionnaire was supplied to all the students through Google form by conduction online survey. To check the reliability and validity of the items, a pilot study was conducted before the survey.

Selection of Sample - The sample for the present study consists of 88 Under Graduate and Post Graduate tribal girl students from surrounding tea gardens of North Bengal. The sample for the study was selected from tribal students studying at University of North Bengal, Siliguri, North Bengal, India by using simple random sampling technique.

FINDING AND DISCUSSION

Objective: 1. **To know the interest of girls students towards a particular job or profession.**

Figure 1: Shows the attraction towards a particular profession

Choosing a career marks a determinant moment in the life of girl students. To choose any profession or attraction towards any profession depends on a series of intrinsic and extrinsic factors that relate to one another in different ways. As the survey reveals that out of 88 respondents, more than 50% of girl students want to become teachers or want to join the teaching profession. Figure: 1 depicts that 77.3 % of girl students say that they like that profession very much. Similarly, 12.5% of girl students say that their parents encourage them towards that profession, whereas we see that very few percentages of girl students respond that it is their teacher or siblings or friends that encourage them towards choosing their career.

Figure 2: Show the value towards higher education of tribal women

Last survey of All India Survey on Higher Education (2019 – 20) report shows that there is 49% share in total enrolment of women in higher education. Today, we find that girl students from all sections of society have entered the realm of higher education with full gusto. Figure: 2 reveals that 50% of girl students responded that going for higher studies is a value for them because they cannot achieve whatever they want in the society without education, again 28.4 % of girl students responded that going for higher studies is a value for them because they have seen many educated people well settled in life and 13.6 % of girl students responded that going for higher studies is a value for them because they have realized that there is big differences in educated and uneducated people.

My feeling about education is
88 responses

- It is a stepping stone for a successful life.
- It helps for progressive life.
- It is necessary for getting a status in life.
- It is helpful to lead a happy life.
- All of the above
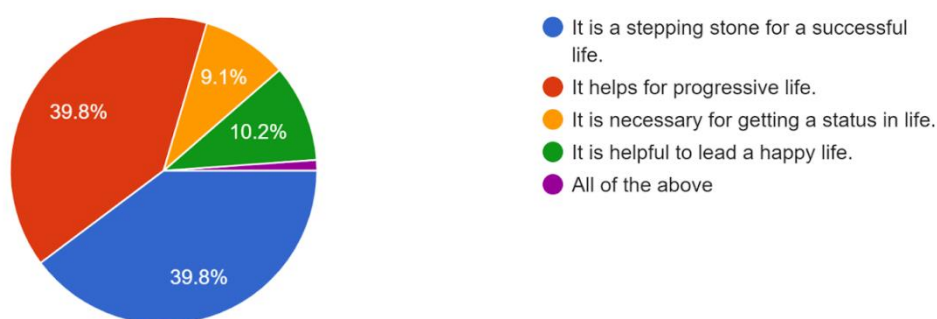
Figure 3: Shows the feeling towards education

There is a saying that if you educate a boy, you educate one person, when you educate a girl, you educate the whole family. Therefore, education of a girl student is very essential not only for equality but also for social transformation. Today, educated women are very much capable of taking care of their family, health, nutrition and education of their children. Figure: 3 shows that 39.8 % of girl students responded that their feeling about education is a stepping stone for a successful life and it helps for progressive life, respectively. Again, 10.2% of girl students responded that their feeling about education is helpful to lead a happy life, and 9.1% of girl students responded that their feeling about education is necessary for getting a status in life. Therefore, we see that education has a direct impact on women's empowerment by creating awareness about their rights and opportunities available to them.

Objective: 2 To know the initiatives taken by the girl students to achieve their aspirations.

What are the initiatives do you take to achieve your aspirations?
88 responses

Legend:
- Self - studies
- Help of coaching institution
- Help from parents
- Help from brothers and sisters
- Help from friends
- Help from teachers
- Online study materials
- I'll make myself more confident for that particular job and try to be more consi…
- All of the above according to the need…

Figure 4: Shows initiatives taken by the tribal women

Girl students who have set goals or career goals see university as one step towards achieving their goals. This can set a purpose and direction for girl students. It can increase their motivation because they see that each course is part of a greater whole that will help them in the future. Figure: 4 tells about the initiative taken by the girl students to achieve their aspirations. Figure shows that 51.1% of girl students responded that they do self – study to achieve their aspirations, 15.9% of girl students responded that they get help from their teacher to reach their aspirations, 12.5% of girl students responded that online study materials help them to reach their aspirations, and 8% of girl students responded that their parents help them to achieve their aspirations. Therefore, we see that aspirations help them set priorities and remain motivated and committed to their university success.

Do you attend class regularly?
88 responses

Legend:
- Always
- Sometimes
- Not at all
- Always unless I m late for class or network connection is poor or dealing with physical problem (accident or fever)
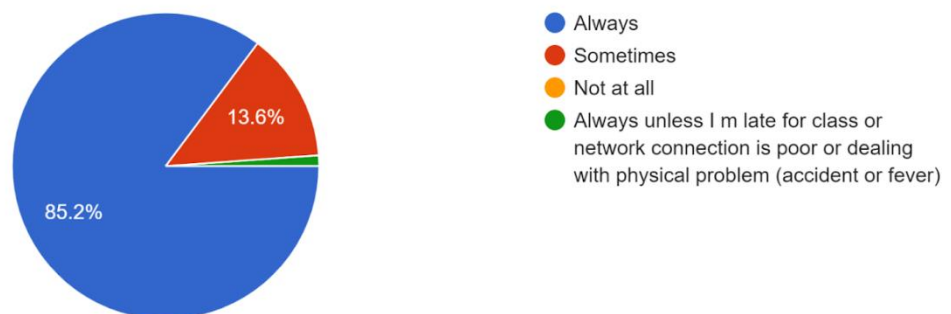
Figure 5: Shows the seriousness about their regular attendance

Figure 5 inquiries about the girl students attending class regularly. Figure shows that the majority of the girl students, around 85.2% responded that they attend class regularly and only a

few percentages around 13.6% of girl students responded that they attend class sometimes. Therefore, we see that attending class gives them another perspective on the knowledge beside just the text book. Even if they think they already understand the subject matter well, classes always add something new. It is also seen that teachers emphasize important concepts, giving them a better idea of what is important, what they should focus on. So, attending class provides them with more interaction with the teacher and other students in the class.

FINDINGS

The study looks into the educational aspirations of the tribal women of tea gardens in North Bengal. According to figure 1's interpretation, the highest percentage of female student's 77.3 percent chose a particular profession such as teaching because it was a particularly alluring career choice for them. According to figure 2, 50 percent of female students say that pursuing higher education is important for them because they cannot succeed in society without education. Additionally, 39.8 percent of female students respectively said that pursuing higher education is important for them because they have observed many educated people who are content with their lives and pursuing higher education is important for them because they have realized the significant differences between educated and uneducated people. Students stated that they believe education is vital to achieving a certain level of success in life (figure 3). It is also seen in figure 4 that around 51.1 percent of tribal girl students responded that they do self – study to achieve their aspirations, however online materials are very helpful for them. Last but not the least; it is surprising to see that more than 85% of tribal girl students responded that they attend their class regularly (figure 5).

RECOMMENDATIONS

1. The university should provide conducive environment for the education of tribal girl students.
2. The university should offer institute fellowships for the education of tribal girl students.
3. The university should take initiatives to guide the tribal girl students to achieve better life through education.
4. The university should take special initiatives to educate tribal girl students, those who belong to disadvantage groups.

SUGGESTIONS FOR FUTURE RESEARCH

The present study has been carried out to find the educational aspiration of Women in tea gardens of North Bengal. The tribes of tea gardens still lack awareness about higher education. Through the study an attempt has been made to know the aspirations of girl students still some further studies may be conducted in these areas such as –

1. A study may be conducted by including whole tea garden girl students of terrain area of Darjeeling district.

2. A study may be conducted by including other psychological variables such as educational motivation and academic achievement.

3. A study may be conducted by including the intelligence level of girl students of tea garden tribes.

4. A study may be conducted on the socio – economic status and health condition of tribal women of tea gardens in North Bengal.

CONCLUSION

The study provides an insight into the aspirations of tribal girl students, those presently studying at the university. Present day tribal girl students are more aspire to get government jobs and try to make comfortable life, through their earning and living standards. The study's investigates the aspirations of female student's raises critical issues concerning their future. Female students prioritize their education because they believe they cannot prosper without a high-quality education. There are special factors which influence the tribal girl students towards their academic performance; among them the level of aspiration has special significance. On the basis of this study it can be concluded that the overall educational aspiration of tribal girl students is very high.

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NUTRITIONAL AWARENESS AND FOOD PREFERENCES: A STUDY OF BANARAS HINDU UNIVERSITY HOSTEL RESIDENTS

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ABSTRACT

Youth are the cornerstone of a nation's future, as this period lays the foundation for a productive life, contributing to national progress. Their health is closely linked to eating habits, crucial for overall well-being. Many youths in universities live in hostels, away from home, affecting their diet and health. Recognizing this, the Government of India launched the "FIT INDIA MOVEMENT" for resident students in higher education institutions. This initiative, rooted in the belief that 'Health is Wealth,' aims to encourage young students to adopt healthy lifestyles by raising awareness of proper nutrition.

The present study was conducted to assess the level of awareness about nutrients among hostel residents at Banaras Hindu University, to understand their food habits, and to evaluate the availability of various food items in their hostels. The study employed a cross-sectional survey method, with 168 students aged 15–24 participating. Data were collected using a self-constructed, closed-ended questionnaire, which was then converted into a Google Form and shared through email and WhatsApp. The findings revealed that more than 80% of students were well aware of nutrients, and approximately 90% were knowledgeable about sources of iron. Study further revealed that nutritional awareness is not significantly affected by gender and faculty of the students while education level affects nutritional awareness. The Likert scale was used to determine the food preferences of the hostel residents. Despite their awareness of nutritional intake, many students still preferred consuming junk food. The study also showed that the food served and available in the hostels includes all essential food groups. Study suggests that an educational program should be organized to raise awareness among students about applying their nutritional knowledge in daily food consumption and avoiding junk foods.
Keywords- Hostellers, Food Preference, Nutritional Awareness, Food availability, BHU

INTRODUCTION

"A healthy mind lives in healthy body"- Roman poet Juvenal

In India, the National Youth Policy 2014 defines youth as individuals aged 15 to 29 years. The total population of youth is approximately 371.4 million, which covers **27.3%** of the total population

(Youth in India "2022" report). Youth represent the most crucial segment of the population, known for their passion, vibrancy, innovation, and dynamic nature.

They are the most precious human resource for promoting the economic, cultural, and political development of a country as they possess strong passion, motivation, and will power.

Globally, the numbers of student enrolled in universities or college education are higher and increasing. In India, according to the data from the **AISHE report 2020-21,** about **41.1** million students enrolled in higher education institutes, colleges, or universities reflecting a **7.1** million increase since **2014-15.**

In the contemporary era, students are often compelled to leave their homes and reside in campus hostels or dormitories to pursue higher education. The college years are a pivotal phase that can profoundly impact an individual's future well-being, lifestyle standards, and dietary choices as an adult **(Pullman, et al., 2009).**

In this crucial period of life, the health of the students specially nutritional status is more important as they are the future of our country. University students frequently have unhealthy eating habits, which linked to a higher risk of chronic illnesses and lifestyle-related diseases **(Mogeni & Oumi, 2022)**. **Brown, et al.(2017)** stated that students experience significant changes in their dietary habits due to the transition to college.

Entering university marks a significant period in one's life, where the level of personal responsibility heightened. This includes being accountable for making wise dietary decisions and adopting good living habits. **(Satalic, Z. et al., 2007).** Students who reside in campus hostels become choosy on food. For the higher education, most of the students live in hostels and hostel life has strong impact on the health **(Eikhalifa et.al, 2000).** Dietary practices among students vary widely in terms of nutritional intakes, dietary diversity, and food preparation methods, and portion sizes**.** While at the same time, young adults often lack of experience for choosing food and planning meals. Hostellers enjoy additional benefit of freedom because nobody keeps check on their food eating habits, which was usually done by family members. **Papadaki, et al., 2007** found in his research that University students, living away from home developed unhealthier dietary habits than students living at family. Students living in university dorms were at a higher risk of developing unhealthy dietary habits **(Aljohani, 2019).** Dietary habits developed in early life can have a considerable effect on the individual's health in the long term**.** The most common reasons to this effect of food choices of the young population include change in living arrangement cost and financial issues as well as increased availability of convenience and fast foods**.** Research indicates that well-nourished students perform better academically, with higher grades, better memory, alertness, and faster information processing. **(Burrows, et al., 2017a, 2017b).** Sufficient nutrition is crucial for physical development and energy supply **(Delvarianzadeh, et al., 2016 & Jiraut, et al., 2019).)**

Research indicates that well-nourished students perform better academically, with higher grades, better memory, alertness, and faster information processing. Sufficient nutrition is crucial for physical development and energy supply. Nutritional deficiency in adolescents can hinder social and economic development, impacting learning power and health in the long run.

Due the significance of nutrition for teenagers and young individuals, it is crucial to address nutritional deficiencies in order to prevent hindrances to their social and economic development. Furthermore, neglecting proper nutrition can have long-term consequences on their cognitive abilities and overall health. In such a situation, it is crucial that they possess accurate information and comprehension of nutrition. Without sufficient nutritional understanding, individuals may inadvertently consume food items that can have detrimental effects on their health. The results of such studies provide valuable insights into the existing level of nutritional awareness among students

living in campus hostels, including their dietary habits and the availability of food in the hostels. Therefore, this study was conducted with the primary objective of thoroughly examining the awareness, attitudes, and eating patterns of hostel residents (Girls and boys both) regarding nutrition.

OBJECTIVES

This study has three primary objectives: -
1. To assess the nutritional awareness among hostellers residing in Banaras Hindu University.
2. To identify the food preferences of the hostel residents
3. To explore the availability of food in campus hostels of BHU.

METHODOLOGY

The current study is a cross-sectional study, carried out at the campus hostels of Banaras Hindu University, Varanasi, Uttar-Pradesh. There are total 75 hostels in the university campus, out of them nine hostels (including boys and girls hostel) were selected by convenience sampling. Twenty students from each hostel were selected using a random sampling method, resulting in a target group of 180 hostellers. The respondents selected were in the age group of 17-25 years and were staying in the hostels during the investigation. To obtain data regarding awareness about nutrition, food habits, and the availability of food in campus hostels, a self-administered online questionnaire was distributed via email and WhatsApp among the target group. Twelve questionnaires were screened out due to improbable information, resulting in 168 usable questionnaires being selected for this study.

Statistical Package for the Social Sciences (SPSS, Windows 20) and MS Excel were used for the statistical analysis of the data. The questionnaire was divided into five sections. The first section consisted of the demographic details of the respondents. The second section dealt with information pertaining to the nutritional awareness of the hostellers. The respondents' levels of nutritional awareness were evaluated for each question using percentage analysis. Subsequently, the mean scores were compared across gender, faculty, and course groups using an independent t-test.

The third section of the questionnaire was designed to assess respondents' food preferences using a 5-point Likert scale, with items categorized into various food groups. To achieve this, a table listing 20 food items from each food group was included. The fourth section focused on the availability of these food items in BHU girls' and boys' hostels, where 16 food items were selected from all food groups. Respondents were required to indicate the availability by choosing either YES or NO. The fifth section examined the temporal availability of food items, classifying them into daily, weekly, monthly, seasonal, or never categories.

RESULTS AND DISCUSSION

Results of the study consisted of the following sections:
1. Demographic profile of the sample
2. Nutritional awareness among hostel residents
3. Factors affecting nutritional awareness
4. Food preference of the hostel residents
5. Availability of the food in hostels

1. **Demographic profile of the sample**: - Demographic profile of the sample is presented in Table-1.

Table 1. Demographic profile of the respondents

(N=168)

Variables	Group	Percentage
Age Groups (Years)	17-19	21.4
	20-22	67.9
	23-25	10.7
Gender	Female	71.4
	Male	28.6
Level of Education	Pursuing UG	55.4
	Pursuing PG	44.6
Faculty	Arts	37.5
	Science	53.5
	Social-science	8.9

The demographic characteristics of the respondents, as outlined in Table 1, provide valuable insights into the composition of the study sample. This detailed demographic analysis is crucial for contextualizing the findings and understanding how factors such as educational level, age, gender, and faculty affiliation may influence the study's results. The age of the respondents ranged from 17-25 years, with mean year of 20.71%. Findings of the study revealed that majority of the respondents were in the age group of 20-22 years (67.9%), followed by 17-19 years (21.4%) and 23-25 years (10.7%). The study depicted that the majority of students were female (71.4%), while 28.6% were male. It also indicated that most students (55.4%) were undergraduates, with the remaining 44.6% being postgraduate students. This distribution provides a robust foundation for investigating the impact of education on the variables of interest. Additionally, the majority of respondents were from the science faculty (53.5%), followed by those from the arts faculty (37.5%) and the social sciences (8.9%).

2. **Nutritional awareness among hostel residents**: Data regarding the knowledge of hostel residents about various nutrients, their health benefits, utilization methods, sources, and functions are presented in Table 2.

Table:2. Nutritional awareness of the respondents

N=168

Aspects/Items	Male (48) n (%)	Female (120) n (%)	Total n(%)
Food items provide good source of protein	24 (50)	57 (47)	81 (48.2)
Best source of protein for vegetarian.	9 (18)	27 (22)	36 (21.4)

Functions of protein.	39 (81)	93 (77)	132 (78.6)
Starch as a Carbs	42 (87.5)	111(92.5)	153 (91.1)
Source of vitamin D.	39 (81)	66 (55)	105 (62.5)
Role of minerals for healthy blood.	39 (81)	114 (95)	153 (91.1)
Mineral for healthy bone and teeth.	45 (93)	96 (80)	141 (84)
Sources of iron.	45 (93)	84 (70)	129 (76.7)
Consequences of excess intake of calories.	38 (79)	84 (70)	108 (64.2)
Sources of unsaturated fatty acid.	27 (56)	57 (47)	84 (50)
Mean value of correct answer	**72 %**	**65.5 %**	**66.7 %**

Table 2 illustrates the level of understanding among hostellers regarding the nutrients they regularly consumed. The mean score for nutritional awareness across both genders was M = 6.48, SD = ± 1.250. The table indicates that a significant proportion of students, over 91%, exhibited a high level of awareness regarding carbohydrates and iron. Males demonstrated a slightly higher level of knowledge about the optimal sources of protein, at 50%, compared to females (47%). While a minority of respondents (18% males and 22% females) recognized milk and dairy products as a decent source of protein for vegetarians, the majority (81% males and 75% females) identified pulses as the optimal source of protein. However, they were unaware that animal protein is the most suitable source of protein. A total of 77% of females and 81% of males demonstrated knowledge of protein's functions. Knowledge of the sources of saturated fatty acids was found to be 47% among females and 56% among males. Awareness of obesity as a consequence of excessive calorie consumption was reported by 81% of males and 70% of females. Among males, 81% were aware that iron-rich food is essential for maintaining healthy blood, and 93% of males, compared to 70% of females, were aware of the sources of iron-rich food. Regarding Vitamin D, 81% of males and 55% of females demonstrated awareness. Additionally, 93% of males and 80% of females recognized that a calcium-rich diet is essential for maintaining healthy bones. The average nutritional awareness score among males was slightly higher than that of females (72% compared to 65.5%). Overall, the nutritional awareness among hostellers, at 66%, can be considered average. Consistent with the findings of this study, Sharma et al. (2015) assessed and measured the nutritional awareness of college students, revealing that students had an average understanding of the nutritional components in their daily meals.

3. **Factors affecting nutritional awareness: -** In the present study, nutritional awareness was the dependent variable, while education level, gender, and faculty of the respondents were the independent variables. The results pertaining to the linkage between these variables are presented below:

Table.3 Education level of the respondents and nutritional awareness

S.no.	Degree programme	n	Mean	Std. Deviation	Std. Error Mean
1.	UG	93	5.99	1.452	.158
2.	PG	75	6.65	1.343	.146

The results of this table show whether there are any differences in nutritional knowledge between courses. The study revealed a significant difference in nutritional awareness between undergraduate and postgraduate students. The mean score of undergraduate students was $M = 5.99$ and postgraduate was $M = 6.65$; the t-test value was 0.670, df = 167, with a 0.03 p-value. This result also suggests that the level of education and nutritional knowledge had a significant effect. Similar studies have done by **Chih-Ping, L. (2017)** and found that education had higher effect of nutritional knowledge.

Table.4 Gender of the respondents and nutritional awareness

Gender	n	Mean	Std. Deviation	Std. Error Mean
Male	48	6.44	1.237	.179
Female	120	6.73	1.297	.118

Table -3 presents results on gender disparities in nutritional knowledge, revealing a statistically non-significant difference between males and females, with a t-value of 2.310, df = 167, and a p-value of 0.208. The mean scores for nutritional knowledge were 6.44 for males and 6.73 for females. The current study also provides evidence that gender differences do not influence nutritional knowledge, as both genders exhibited relatively equal levels of knowledge. It can be concluded that both genders have an awareness of basic food groups for nutritional purposes.

Similar findings were reported by Chih-Ping (2017), Ozgen (2015), and Salama & Esmail (2018), who found that gender has no effect on nutritional knowledge, with no significant differences observed between males and females. Further study by Chayal et al. (2022) found that gender does not affect the use of information resources (e-resources). However, various other studies have found contrary results, indicating that female students tend to have higher nutritional knowledge and attitudes than males (Ozgen, 2016; Yahia et al., 2016; La Caille et al., 2016)

Table.5 Faculty of the respondents and nutritional awareness

Faculty	n	Mean	Std. Deviation	Std. Error Mean
Arts	63	6.71	1.309	.286
Science	90	6.37	1.273	.232

Table 5 presents the results of an independent sample t-test comparing the nutritional awareness scores of Arts and Science students. The p-value of 0.308 is above the significance level of 0.05, indicating that there was no significant difference in nutritional awareness scores between students from Arts and Science backgrounds. This lack of difference may be attributed to variations in the curriculum. Arts and Humanities courses often cover topics related to general health and well-being,

allowing students greater flexibility in selecting their topics of study. In contrast, Science students may focus more intensively on specific subjects within their discipline.

4. **Food preference of the hostel residents**: Results regarding the food preference (based on nutritive value) of the hostel residents is presented in Figure-1
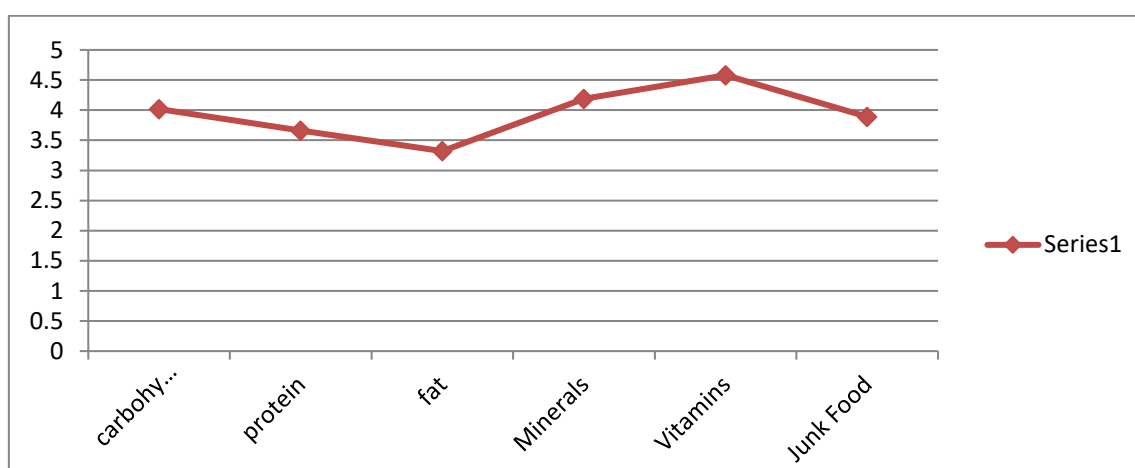
Figure - 1. **Food preferences of the respondents (based on the nutritive value)** .

Figure 1 depicts the food preferences of hostel residents. University years are a crucial stage for establishing and promoting healthy eating habits and lifestyles. Food preference is an essential factor that directly impacts students' health. Satapathy et al. (2021) found in their research that university life is critical for the development of unhealthy eating patterns among students, putting them at significant risk of obesity. As students transition from high school to university, they become more vulnerable to adopting unhealthy food preferences. This study focused on the food choices of hostel residents.

The participants were given a list of various food items (e.g., bread, bran cereals, steamed rice, pasta, spinach, carbonated beverages, junk food, eggs) and instructed to rate each item on a 5-point Likert scale, ranging from 'strongly like' to 'strongly dislike.' The average score of the food items was then computed. Furthermore, a list was prepared by categorizing items based on their nutritional content; for example, foods rich in carbohydrates were classified under the carbohydrate's category.

The results suggest that hostel residents had a strong preference for foods rich in vitamins and minerals, such as salads, fruits, and crisp green vegetables. They also preferred animal-based foods rich in protein, including eggs, fish, lentils, meat products, and dairy items. Foods high in fat were not strongly liked or disliked. Hostel residents showed a preference for junk food-related products, which fell within the 'like' range.

5. **Availability of food in hostels**

All hostellers, both male and female, agreed that basic Indian food—such as chapati, steamed rice, pulses, vegetables, and curd—was always available daily. Curd was also available daily but was optional, often served with a seasonal fruit. Additionally, 64% of hostellers agreed that fruits were available daily in their hostel, 18% reported weekly availability, and 16% said fruits were available

only occasionally. Both male and female hostellers agreed that meat and meat products were provided weekly, while eggs were available daily as an optional food item.

Regarding milk, 28% of female and 25% of male hostellers agreed that they found milk regularly in their hostels, while 60% mentioned that milk was always available but required an extra payment. All hostellers agreed that carbonated beverages were not available in the hostels or anywhere on campus. Rich sources of protein, such as paneer, meat products, fish, and mushrooms, were available alternately on a weekly basis. Complete protein meals like dosa, idli with sambhar, and mixed vegetable paratha were also provided in the hostels

CONCLUSION

Dietary intake during adolescence sets the foundation for a healthy life. The objective of the current study was to examine the level of nutritional awareness among hostel residents at Banaras Hindu University, their food preferences, and the food options available in hostel facilities, as these three factors are interrelated and significantly impact health. Participants were selected using a random sampling approach. Overall, the study found that nutritional awareness among hostellers was average. While gender and faculty affiliation had no effect on nutritional awareness, the level of education had influenced the nutritional knowledge. Hostellers showed a preference for foods rich in carbohydrates and proteins, and they also enjoyed junk food. They exhibited neither a strong preference nor aversion to foods high in fat, but they did express a strong preference for foods rich in minerals and proteins. The food provided in the campus hostels of BHU was found to be a balanced diet that serves as a source of all essential nutrients. This study highlights the need for enhanced nutritional education, particularly for undergraduate students, to improve their awareness and food choices. Given the preference for carbohydrate-rich and junk foods, it is recommended that nutrition workshops or seminars be conducted regularly to educate students about the importance of a balanced diet. Additionally, introducing more nutritious food options in hostel facilities and encouraging students to make healthier choices could further promote better dietary habits and overall health among adolescents.

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16

AWARENESS ABOUT THE PREVENTION OF SEXUAL HARASSMENT (POSH) ACT, 2013 AMONG EMPLOYEES WORKING IN CORPORATE ORGANIZATIONS: A STUDY IN DELHI NCR

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ABSTRACT

Gender-based violence includes sexual harassment at workplace. When a person joins the global workforce, he or she is vulnerable to such events. This not only degrades their self-esteem, dignity, and self-respect but also deprives them of their fundamental human and constitutional rights. Although sexual harassment is not a new occurrence, rapidly changing workplace dynamics have brought this dark and shady underground reality to the surface. To address this issue, it is vital to discourse about that as well, assess its extent and form, and comprehend its significance. The case of Vishaka vs. Rajasthan State was a watershed moment in India for this type of sensitive topic. Women were protected once this judgment was passed, allowing them to oppose this harmful social practice. In the context of Nirbhaya's gang rape case, the Justice Verma Committee's recommendations, and the passage of the Sexual Harassment at Workplace (Prevention, Prohibition, and Redressal) Act, 2013, provide some timely relief. As a result, it is recommended that awareness be raised through training programs, as well as the establishment of effective redressal cells and equitable action against abusers. The present study was undertaken to find out the awareness level of employees. The study was carried out in the Delhi NCR region. A sample of 50 employees 25 men and 25 women were taken from the corporate organizations using the snowball sampling technique. The findings revealed that the employees were aware of the sexual harassment act, the common forms of sexual harassment and redressal mechanisms. Organizations adopt all the preventive measures for sexual harassment to make it more effective and organize training sessions for their employees at regular intervals. It was found that most respondents were aware of the punishment, grievance procedures and redressal mechanism.

Keywords: sexual harassment, violence, workplace, corporate organisations, awareness

INTRODUCTION

Sexual harassment at the workplace is a systematic form of violence against women. Most working women have at one time, or another faced this type of violence from their co-workers, bosses, or employers. Although sexual harassment at the workplace is an age-old problem, women still have to protect themselves or sometimes seek the support of women's organizations. Sexual harassment is an expression of men's power over women in patriarchal relationships. Women are forced to conform to gender stereotypes in a society where violence against women, both subtle and direct, is entrenched in patriarchal beliefs.(Bothra, 2014)

Sexual harassment at workplace is a form of societal violence against women. The majority of working women face this type of harassment from their partners, managers, or bosses at some point. Landlords and contractual employees often harass women working in fields and mines. Factory owners, directors, and even male coworkers harass women in the workplace. Women in the service sector are accused of sexual harassment from coworkers, bosses, and clients. In educational institutions, women and female students are also victims of sexual harassment (Islam, Raihan & Uddin et al, 2020). Despite the fact that women have been faced with sexual harassment at work, they have been left to deal with it on their own or with the support of women's organizations in some situations. Women's surge of interest in all fields of work, as well as changes in social attitudes about women, have not led to significant advancement. There has been a dearth of comprehensive and effective policies to tackle it. In the Vishaka case, a three-judge panel of the Supreme Court led by the Chief Justice issued a ruling against sexual harassment at work on August 13, 1997, ratifying guidelines prepared by women's organizations.

No legislation or rule in India particularly addressed the awful issue of sexual harassment at work until the historic judgment in the Vishaka Case was handed down. The Indian Supreme Court issued guidelines (commonly known as the Vishakha Guidelines) relying on this case, requiring all employers to develop an effective procedure to ensure that working women's rights to gender equality are not obstructed in their companies. Furthermore, this case has strengthened the argument that every incidence of sexual harassment at work is a breach of human rights, as well as clearing the way for legislation in India to address sexual harassment of women at work.

The 'Protection of girls against sexual harassment at work Bill, 2010' was approved in India to define sexual harassment in a range of methods and establish a framework for complaint resolution. Furthermore, the 'Sexual Harassment at Work (Prevention, Prohibition and Redressal) Act, 2013' was passed to clarify what types of acts fall under the umbrella of sexual harassment and how organizations will take appropriate steps to ensure women's safety and dignity at work. (Ministry of Women of Women & Child Development, 2021)

Pradeep and Ray (2021) discussed the significant challenges in implementing laws related to sexual harassment of women in the workplace in India. They found out that despite the legal framework provided by the Sexual Harassment of Women at Workplace (Prevention, Prohibition, and Redressal) Act, 2013, the implementation remains weak due to various factors such as lack of awareness, inadequate training, and ineffective enforcement mechanisms. The authors highlight the role of organizations in ensuring compliance and fostering a safe working environment. In a similar study Srikanth (2018) examined incidents of sexual harassment in Indian educational institutions, highlighting the prevalence and impact on victims. It emphasizes the need for awareness programs, strict enforcement of policies, and proactive measures to create safer environments.

The problem of sexual harassment at the workplace arises from shared workplace relationships that involve individuals' professional and personal activities. Therefore, the most effective way to deal with the problem is to confront it at the workplace, where it can be dealt with immediately and effectively. For this, awareness of legislative tools available is essential. With this backdrop, the present study aimed to find out awareness about the Prevention of Sexual Harassment Act among employees in the corporate organization and the strategies adopted by various employers to address the same.

General Objective:

To study the awareness of the Prevention of Sexual Harassment Act, 2013 among employees in the corporate organization in Delhi.

SPECIFIC OBJECTIVES

- To study the perception about various forms of Sexual Harassment at the workplace.
- To find out the level of awareness about the Prevention of Sexual Harassment Act, 2013 among employees.
- To delineate the strategies adopted by the organization in creating awareness about the Prevention of Sexual Harassment Act, 2013.
- To study the awareness about the redressal mechanism established by the organization.

LIMITATIONS OF THE STUDY

- The study was restricted to corporate organizations only in Delhi NCR
- The issue is a sensitive one and the respondents were not very eager to fill out the questionnaire.

METHODOLOGY

Research design

The study was descriptive in nature. It was undertaken to find out the awareness of the prevention of sexual harassment Act among employees working in the corporate organizations across the Delhi-NCR region. The key domain under which the awareness of prevention of sexual harassment Act has been studied which includes demographic profile of respondents, work profile, perception about various forms of sexual harassment, awareness level, strategies, and redressal mechanism established by the organizations. The study aimed to obtain measurable and bias-free data to gain insights into the awareness of sexual harassment acts among various employees.

Locale of the study

The study was conducted in Delhi-NCR. According to the census of India (2011), Delhi has 5,227,523 numbers of workers. Delhi is one of the metropolitan cities which has various corporate houses and MNCs that tend to have their offices/branches across the city and in the NCR region, especially Gurugram & Noida. Thus Delhi-NCR region was selected for the study.

Sample of the study

The sample consisted of employees working in a corporate organization in Delhi NCR. Since the study aimed to know the awareness of employees and understand their perspective about the form of sexual harassment, strategies, and redressal mechanism established by the organization.

Inclusion /exclusion criteria

- ➢ Respondents working in the organizations for at least two years.
- ➢ Respondents in full-time roles in corporate organizations.

A total of 50 employees with 25 men and 25 women working in the corporate organization were selected for the study.
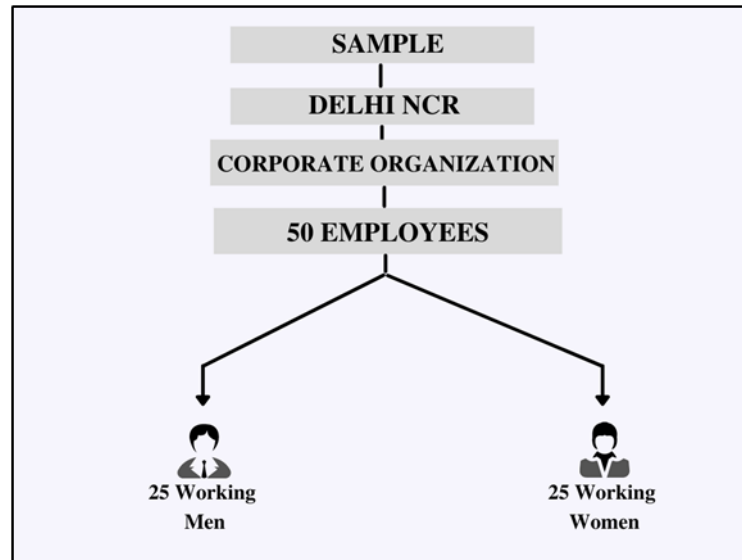
Figure 1: Sample Size

Snowball technique was used for selecting the sample for the study. A few respondents were selected. Then they are helped to identify other respondents, those who were willing were included in the study, and data was collected.

Tools for data collection

A questionnaire with open-ended and closed questions were developed to gain information from the respondents. The questions focussed on obtaining information related to perception about various forms of sexual harassment, the level of awareness about the prevention of sexual harassment act, 2013, strategies adopted by the organization in creating awareness about the prevention of sexual harassment act, 2013 and awareness about the redressal mechanism established by the organization included how to complain and where, observing any such complaint against sexual harassment, and awareness regarding Internal Complaint Committee and its composition.

Analysis of data

The data gathered from the employees were coded and tabulated in Microsoft Excel. A codebook was prepared and tabulated with the help of Excel. A descriptive statistical analysis was used to calculate frequencies, mean, and percentages that were determined to describe the data.

FINDINGS & DISCUSSIONS

Background information

Table 1: Background information of the respondents

Age (in years)	Male		Female		Total Respondents	
	Frequency (n)	(%)	Frequency (n)	(%)	Frequency (n)	(%)
18-35	19	76	22	88	41	82
35-50	4	16	3	12	7	14
50 and above	2	8	0	0	2	4
Total (N)	25	100	25	100	50	100
Marital status	**Male**		**Female**		**Total respondents**	
	Frequency (n)	(%)	Frequency (n)	(%)	Frequency (n)	(%)
Married	7	28	6	24	13	36
Unmarried	18	72	19	76	37	74
Total (N)	25	100	25	100	50	100
Educational Qualification	**Male**		**Female**		**Total respondents**	
	Frequency (n)	(%)	Frequency (n)	(%)	Frequency (n)	(%)
Graduate	14	56	12	48	26	52
Post Graduate	11	44	13	52	24	48
Doctorate	0	0	0	0	0	0
Any other (Specify)	0	0	0	0	0	0
Total (N)	25	100	25	100	50	100
Working experience (in years)	**Male**		**Female**		**Total respondents**	
	Frequency (n)	(%)	Frequency (n)	(%)	Frequency (n)	(%)
1-2 years	12	48	13	52	25	50

2-4 years	9	36	9	36	18	36
More than 5 years	4	16	3	12	7	14
Total (N)	25	100	25	100	50	100

Age of the respondents

The data shows that in corporate organizations, 76% of male respondents were in the age group of 18-35 years, followed by 16% that were in the age group of 35-50 years and 8% of male respondents were in the age group of 50 years and above. On the other hand, 88% of female respondents were in the age group of 18-35 years, followed by 12% who were in the age group of 35-50 years. It was observed that the majority of the respondents were in the age group of 18-35 years.

Educational qualification

It was found that 56% of male respondents were graduate, followed by 44% of male respondents who were postgraduate. On the contrary, 48% of female respondents were graduate, followed by 52% of female respondents who were postgraduate. There is no significant difference between the education of both male and female respondents.

Working experience

A little less than half i.e. 48% of male respondents had been working for 2 years, followed by 36% of male respondents who had been working for 2-4 years and 16% of male respondents who had been working for more than 5 years. Whereas in the case of female respondents, 52% of female respondents had been working for 1-2 years, followed by 36% of female respondents who had been working for 2-4 years and 12% of female respondents who had been working for more than 5 years.

Nature of job of the respondents

36% of male respondents had been working in IT and manufacturing department, followed by 28% of male respondents that had been working in the sales department, and 28% of male respondents had been working in the research and development department. On the other hand, 28% of female respondents had been working in the sales department, followed by 20% of female respondents had been working in the research and development department, 16% of female respondents had been working in the finance department, 16% of female respondents had been working in the marketing department, 4% of female respondents had been working in the human resource department.

Common forms of sexual harassment

Majority of male respondents that is 88% were aware of all the forms of sexual harassment. 12% of male respondents believed that physical harassment is a common form of sexual harassment, followed by 8% of male respondents who believed that Non-verbal, staring, stalking, and 4% of male respondents believed that expression of disgust. While on the other hand, the majority of female respondents that is 68% were aware of all the forms of sexual harassment, followed by 28% of female respondents who believed that physical harassment is a common form of sexual harassment, 24% of female respondents believed that obscene phone calls and 16% of female respondents believed that Non-verbal, staring, stalking.

Nature of sexual harassment
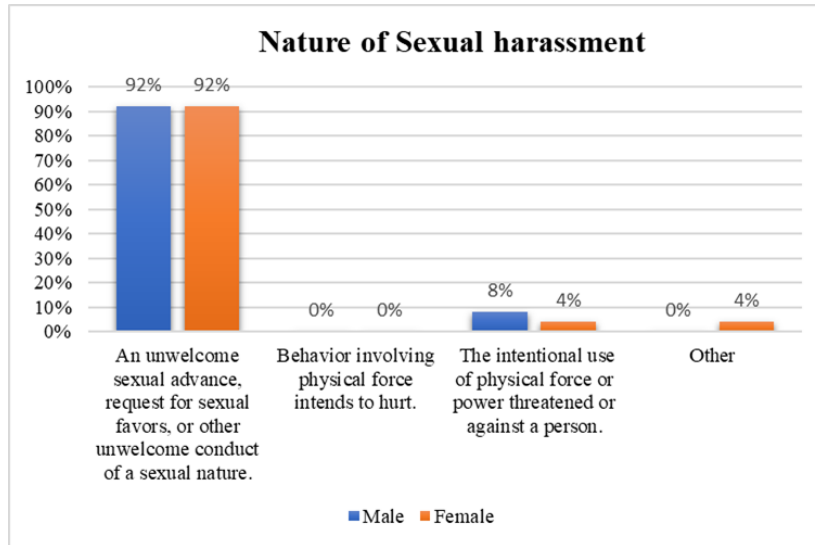
Figure 2: Nature of Sexual harassment

Maximum of respondents i.e., 92 % (both male and female respondents) perceived sexual harassment as an unwelcome sexual advance, request for sexual favours, or other unwelcome conduct of a sexual nature, and the rest of the respondents did not perceive sexual harassment as a request for sexual favours, an unwelcome sexual advance, followed by 8 % of male respondents were perceived sexual harassment as the intentional use of physical force or power threatened or against a person. While on the other hand, 4% of female respondents perceived sexual harassment as the intentional use of physical force or power to threaten or against a person.

Perpetrators of sexual harassment

Table 2: Perpetrators of Sexual Harassment

Perpetrators of Sexual Harassment	Male				Female				Total respondents			
	Frequency (n)		(%)		Frequency (n)		(%)		Frequency (n)		(%)	
	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO
Supervisor	0	25	0	100	1	24	4	96	1	49	2	98
Co-worker	0	25	0	100	1	24	4	96	1	49	2	98
Manger	1	24	4	96	1	24	4	96	2	48	4	96
Customer	1	24	4	96	1	24	4	96	2	48	4	96
Contract employee	0	25	0	100	1	24	4	96	1	49	2	4

All of the above	24	1	96	4	24	1	96	4	48	2	96	4

Most of male respondents stated that supervisors, co-workers, managers, customers, and contract employees could have been the perpetrators of sexual harassment, followed by 4% of them who stated that managers could have been the perpetrator and 4% of respondents who stated that customers could have been the perpetrator of sexual harassment. Whereas in the case of female respondents, 96% of female respondents stated that supervisors, co-workers, managers, customers, and contract employees could have been the perpetrators of sexual harassment, followed by 4% of them who stated that only managers could have been the perpetrator, and 4% of respondents who stated that only customers could have been the perpetrator of sexual harassment.

Awareness of the POSH Act, 2013
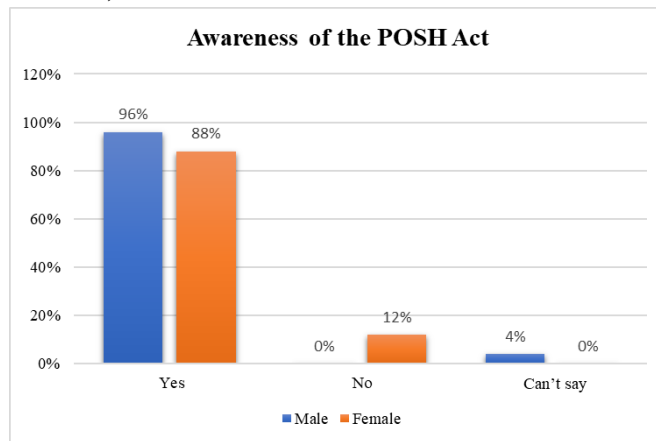
Figure 3: Awareness of the Prevention of Sexual Harassment Act

It was found that out of 25 male employees' 96% of respondents were aware of the sexual harassment act, followed by 4% of respondents who acknowledged that they could not say whether they were aware of the prevention of the sexual harassment act. On the contrary, 88% of female respondents were aware of the prevention of sexual harassment act, and 12% of female respondents were not aware of the prevention of sexual harassment act.

Awareness of the punishments under the POSH Act
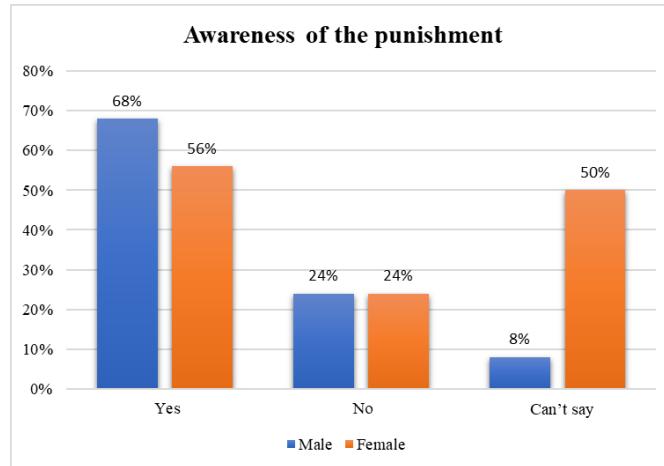
Figure 4: Awareness of the Punishment

The majority of male respondents were aware of the punishment for sexual harassment, followed by 24% of respondents who were not aware of the punishment. While on the other hand, 56% of female respondents were aware of the punishment, followed by 24% of respondents who were not aware of the punishment for sexual harassment.

Preventive measures adopted to reduce sexual harassment at workplace

64% of male respondents suggested that ensuring the workplace has a sexual harassment policy reduces the sexual harassment at workplace. Raise awareness was suggested by the 60% of male respondents, and 48% of male respondents suggested keeping sexual harassment prevention training positively. Whereas in the case of female respondents, 88% of female respondents suggested ensuring the workplace has a sexual harassment policy to reduce the sexual harassment, followed by 76% of respondents suggested that raise awareness, and 68% of female respondents who suggested that create a positive workplace for all to reduce the sexual harassment at workplace.

POSH ACT awareness training conducted by the organization
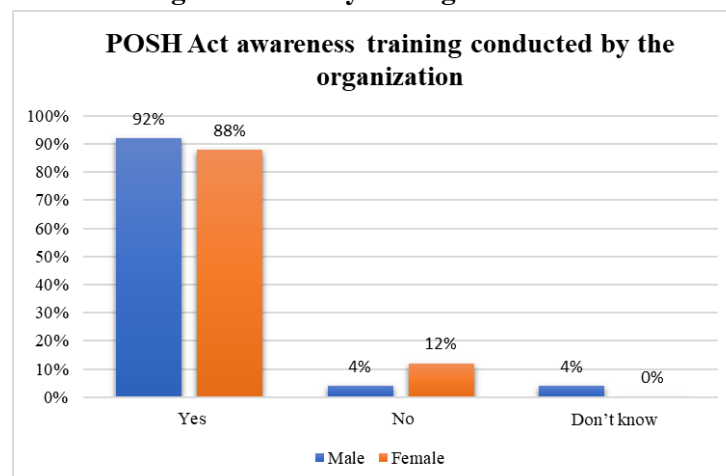
Figure 5: POSH Act Awareness Training Conducted by the Organization

It was found that the maximum of male respondents i.e., 92% of them acknowledged that their organization had conducted POSH training, followed by 4% of respondents who acknowledged that their organization had not conducted POSH training. On the contrary, the majority of female respondents i.e., 88% of them acknowledged that their organization had conducted POSH training, followed by 4% of respondents who acknowledged that their organization had not conducted POSH training.

Awareness of the complaint policy & procedures
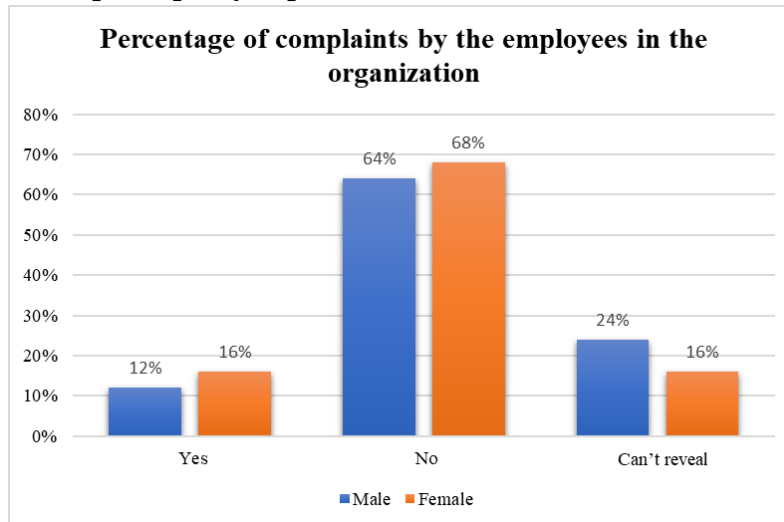
Figure 6: Percentage of Complaints by the Employees in the Organization

96% of male respondents were aware of the complaint policy such as how and where to lodge a complaint, followed by 4% of respondents who were not aware of the complaint policy. On the contrary, all the female respondents i.e. 100% of them were aware of the complaint policy.

Action taken by the organization against the sexual harassment
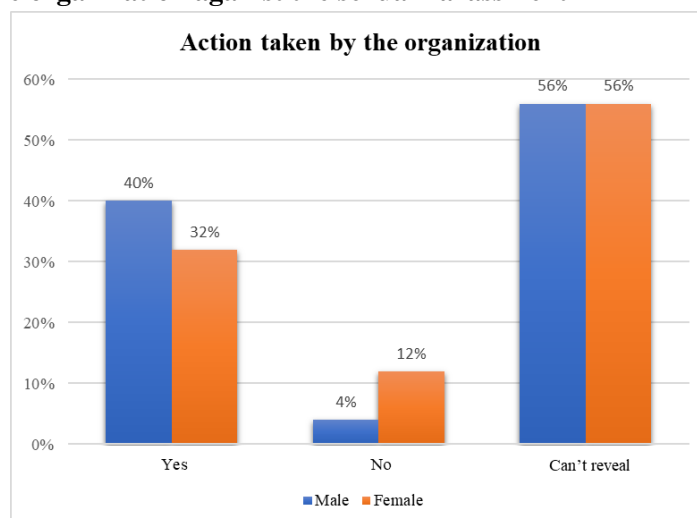
Figure 7: Action Taken by the Organization Against the Sexual Harassment

40% of male respondents felt that the internal committee had taken action against the perpetrators and had given a strong warning that if they committed any such activity once more, they would face the consequences. 4% of respondents felt that the internal committee had not taken action against the perpetrators, which showed the internal committee's irresponsible behavior toward employees and 56% of male respondents stated that they could not have been revealed the internal information of the organization. On the contrary, 32% of male respondents felt that the internal committee had taken action against the perpetrators, followed by 12% of female respondents who felt that the internal committee had not taken action against the perpetrators and 56% of female respondents stated that they could not have been revealed the internal information of the organization.

Satisfaction with the redressal mechanism

It was found that 46% of respondents were very satisfied with the organization's redressal mechanism and whether they were aware of who they might contact or report to regarding sexual harassment, followed by 24% of respondents who were extremely satisfied with the complaint registration process, inquiry process and responsibilities of complaint redressal.

Awareness of provisions under POSH Act, 2013

86% of male respondents were aware of provisions related to sexual harassment, followed by 16% of male respondents who were not aware of the provision under the act. After the POSH Act, it was expected that the male respondents became aware of all the IPC sections related posh act and other important details of the provisions. On the other hand, 88% of female respondents were aware of provisions related to sexual harassment, followed by 12% of female respondents of them who were not aware of a provision under the act.

Awareness about the Internal Complaint Committee (ICC)
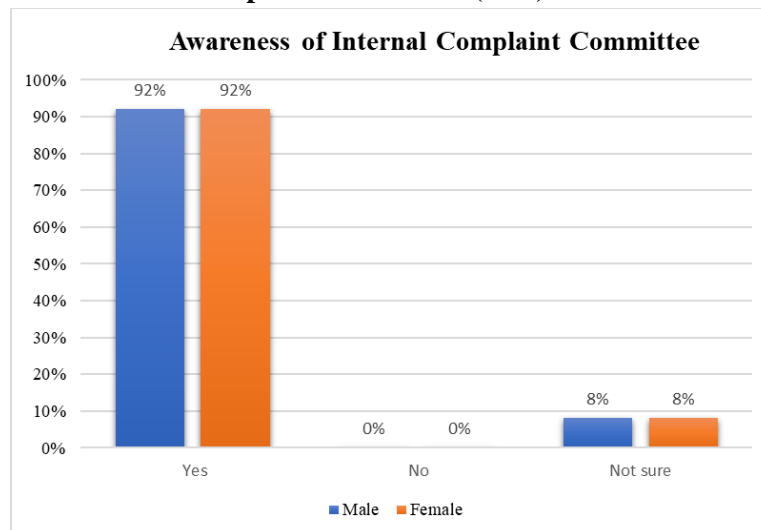
Figure 8: Awareness of Internal Complaint Committee

92% of the respondents were aware of the internal committee and had a clear understanding of the internal committee's role and responsibilities. It can be seen that there is no lack of awareness between both male and female respondents. 80% of male respondents were aware of the internal committee members, followed by 8% of respondents who were not aware of the ICC members and

the remaining respondents remembered as internal committee members. Whereas in the case of female respondents' 64% of respondents were aware of internal committee members, followed by 12% of respondents who were not aware and 24% of respondents were not remember the internal committee members.

Satisfaction with sufficient women members in the Internal Complaints Committee
It was found that 48% of male respondents were very satisfied that there are sufficient women members in the Internal Complaint Committee of the organization while 24% of male respondents were extremely satisfied. On the contrary, 36% of them were very satisfied while 24% of female respondents were moderately satisfied and 20% of female respondents were extremely satisfied.

CONCLUSION

The study showed that respondents were aware of POSH Act. Consistent with the Vishakha guidelines, the POSH Act 2013 is primarily meant to provide a safe work environment for employees so that they can work without any fear. The constitution of the POSH Act have carved out safeguards to ensure the betterment of employees at workplace. Most of the respondents were aware of the implementation of the POSH Act, and perceived it to be gender-neutral. Apart from this, the organisations had legal provisions and POSH training which directly dealt with the enhancing awareness of employees regarding the POSH Act. Organizations made use of the POSH Act and preventive measures which provided protection to employees in order to deal with the issue of sexual harassment in an as efficient a manner as possible. Also, complaint policy grievance procedure was explained to the employees so that they had clarity about the complaint process and the period to resolve the issue of sexual harassment.

Organizations provide preventive measures by setting up a committee for the speedy redressal of such complaints. They provide for the redressal mechanism by mandating the constitution of the ICC. It has been found that there was a lack of awareness among the employees concerning ICC members and their names. Thus, it can be recommended that names of members could be displayed on the company's website or inhouse directories for easy reach of employees.

SUGGESTIONS FOR FUTURE RESEARCH

- A study can be conducted to prepare an intervention training module for employees with low awareness level and the training module can be placed on the government portal and organization portal for access to every employee.
- A similar study can be conducted in future with the government sector employees to assess their awareness level and find out the gaps.

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<div align="center">17</div>

THE WEIGHT OF WORDS: EXPLORING THE CORRELATION BETWEEN BODY SHAMING AND SOCIAL APPEARANCE ANXIETY AMONG YOUNG WOMEN IN SOUTH ASIA

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ABSTRACT

The present study intends to comprehend the prevalence of body shaming faced by young women and to examine the extent of body-checking behavior and social anxiety among them. The study was carried out among 500 young women (15-45 years) in the districts of Kerala State in the Southern tip of South Asia. Body Shape Questionnaire (BSQ) was used to measure how much the respondents are affected by social pressures and beauty standards, which can contribute to body shaming. It remains disheartening to observe that a significant 40 percent of individuals continue to endure consistent body shaming throughout their lives, and the extent of body-checking behavior was also found to be high. The study revealed a significantly high positive correlation between Body shape and Body-checking behavior (0.783, $P < 0.001$). Hence, as Body shaming on body shape is high, the Body checking behavior also increases significantly. The distressing prevalence of body shaming among young women underscores the urgent need for comprehensive and empathetic interventions to foster a more inclusive and supportive environment.

Keywords: Body shaming, social appearance anxiety, body checking behaviour, self-image, body image, social behaviours

INTRODUCTION

The act of body shaming is a widespread problem in our modern world. It involves the act of criticizing or making unfavorable comments regarding an individual's physical appearance. Body shaming significantly impacts women's mental health, leading to a range of psychological issues and unhealthy behaviors. This phenomenon involves making individuals feel ashamed or inferior about their bodies, which can stem from societal standards of beauty that often prioritize unrealistic ideals. The prevalence of body shaming is exacerbated by media portrayals that glorify specific body types while stigmatizing others. Social media platforms, in particular, bombard users with images that reinforce narrow definitions of beauty, leading to increased body dissatisfaction among women.

Social appearance anxiety (SAA) is a form of social anxiety characterized by the fear of negative evaluation based on one's physical appearance. This anxiety can significantly contribute to body shaming and its psychological effects, particularly among women (Papapanou, 2023).

Given the extensive impact of this issue on society and individuals, we must investigate and address it. The media and social platforms promote unrealistic beauty standards that contribute to a culture of excessively emphasizing looks. This has a profound effect on individuals, particularly young women, who are often subject to body shaming due to societal norms that equate physical appearance with worth. This issue all negatively impacts the mental health, social anxiety, and self-esteem of individuals. Therefore, it is necessary to analyze the significance of this problem.

One of the most troubling consequences of body shaming is the increase in social appearance anxiety among young women. The constant scrutiny and comparison to idealized beauty standards depicted in the media lead to feelings of inadequacy and self-doubt. As young women strive to meet these unrealistic expectations, they often experience heightened anxiety about how others perceive them (Sulaiman, et.al 2022). This anxiety can manifest in different ways, such as withdrawing from social activities, reluctance to engage in social situations, and even developing eating disorders to conform to societal norms. Body shaming is a pervasive issue that affects individuals of all ages, with a particular focus on young women. It encompasses various factors, including weight, appearance, and skin conditions, and occurs in various settings, including homes, schools, workplaces, and digital spaces. It is often perpetuated by mainstream media and even by close connections such as family, friends, and colleagues, as well as through self-criticism.

SIGNIFICANCE

The negative impact of body shaming on social appearance anxiety is complex and far-reaching. It promotes an unrealistic standard of beauty, causing young women to compare themselves to an unattainable ideal. As a result, they may feel inadequate, doubt themselves, and become obsessed with striving for physical perfection that is impossible to achieve. Exposure to body shaming content on social media platforms can worsen feelings of anxiety and depression, as individuals feel judged and scrutinized for their appearance, which can further damage their self-esteem. Moreover, body shaming can contribute to the perpetuation of harmful behaviors, such as extreme dieting, excessive exercise, and eating disorders. Young women may engage in these activities to conform to societal norms, which can negatively impact their mental and physical well-being. Additionally, the fear of judgment and ridicule can cause social withdrawal, impeding healthy relationships and social interactions.

Those who struggle with this form of anxiety may find it difficult to form genuine connections with others as their focus on their perceived flaws inhibits their ability to engage authentically. Additionally, the perpetuation of body shaming can create a toxic environment where a woman's worth is disproportionately linked to her appearance, which can hinder her personal and professional growth. By promoting body positivity, fostering emotional intelligence, and creating safe spaces for open conversations one can work towards a more inclusive and empathetic society where individuals are valued for their inner qualities rather than their external appearance.

OBJECTIVES OF THE STUDY
1. To understand the demographic profile of the respondents selected for the study.
2. To identify the prevalence of body shaming among young women selected for the study
3. To examine the extend of body checking behavior and social anxiety among the respondents.

HYPOTHESIS
H_0 : There is no significant correlation between Body shape and Body-checking behaviour.

METHODOLOGY

The present paper, "The Weight of Words: Exploring the Correlation between Body Shaming and Social Appearance Anxiety in Young Women in South Asia," focuses on understanding the demographic profile of the respondents selected for the study, identifying the prevalence of body shaming among young women and to examine the extend of body checking behavior and social anxiety among the respondents. The study was carried out among 500 young women (15-45 years) in the districts of Kerala State in the Southern tip of South Asia. Stratified Random sampling was used to identify the geographical locations of the study. The respondents of the study were selected from three districts in the state, representing South, Central and North parts such as Thiruvananthapuram (n=200), Ernakulam (n=150) and Kannur (n=150) respectively. Further different clusters were identified such as schools, colleges, workplaces, public places and the respondents were identified to ensure randomness. Special attention was given to ensure that the respondents belong to the said age group. Both primary and secondary data were collected for the study. The collected data was statistically analysed and interpreted using percentage analysis and pearsons correlation analysis.

TOOLS USED

A well-structured interview schedule was used to collect the basic information related to the samples, including questions related to the respondents' age, height, weight, marital status, employment, and body shame concerns. The interview method and online survey were used to collect the data. Body Shape Questionnaire (BSQ) was used to measure how much the respondents are affected by social pressures and beauty standards, which can contribute to body shaming. The body shape questionnaire (BSQ) is a self-report questionnaire developed by Cooper Z, Tylor M, and Fairbum (1987) to measure the concerns about body weight and shape experienced by people with eating disorders or related body image problems. The questionnaire comprises 34 items. Each has 1, 2, 3, 4, and 6 points. 'I' is Never and 6' is Always.
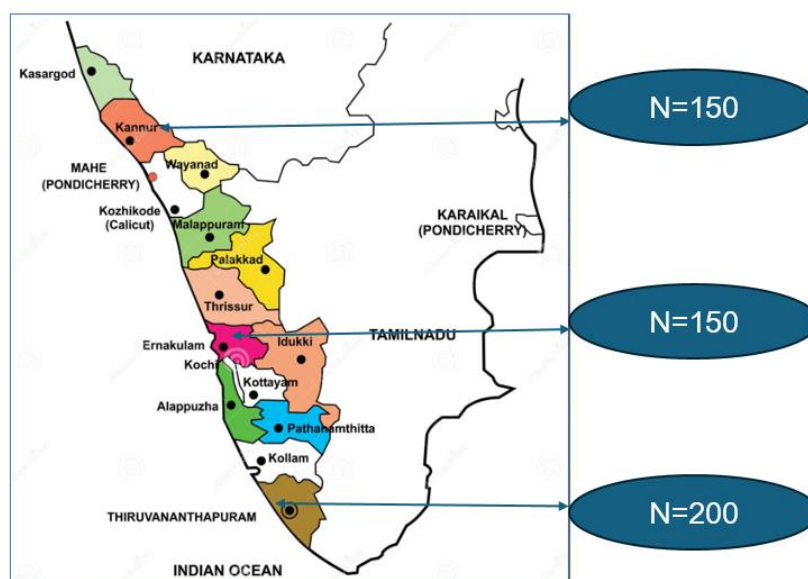
Fig no: 1

LOCALE FOR THE STUDY

Apart from that, the Body Checking Questionnaire (BCQ), introduced by Reas et al. in 2002, a comprehensive 23-item self-report tool meticulously designed to gauge the occurrence of body checking behaviors was also used along with BSQ. These behaviors encompass actions such as measuring or pinching specific body parts, using mirrors to monitor one's body shape, and employing specialized clothing or accessories to assess fit. Each of the BCQ's items is evaluated on a 5-point Likert scale spanning from "never" to "very often," thereby indicating the frequency of engagement in these checking behaviors. Consequently, higher cumulative scores on the BCQ are indicative of a heightened frequency of body checking, with the total scores encompassing a range of 23 to 115. Notably, the BCQ is distinctive as the first instrument explicitly crafted to evaluate and quantify body-checking behaviors.

While studying the extent of body shaming and its effect on the population, it is also necessary to understand the extent of social appearance anxiety of the people. The Social Appearance Anxiety Scale (SAAS), developed by Hart, Wearing, and Newlove (1999), a well-established 16-item self-report tool designed to measure individuals' fear of situations involving the evaluation of their appearance, was also used. It has demonstrated its reliability and validity across various populations, encompassing adults, adolescents, and those grappling with eating disorders. Respondents rate their anxiety levels across scenarios where appearance scrutiny is anticipated, utilizing a 5-point Likert scale spanning from 1 (not at all) to 5 (extremely). By summing the item scores, the SAAS generates a total score within the 16 to 80 range, with higher scores denoting heightened levels of social appearance anxiety.

The collected data were analyzed using appropriate statistical techniques. Mean, Standard Deviation, frequency, and percent were calculated as summary measures. The correlation analysis was used to find a significant relationship between the respective study variables (BSQ, BCQ, and SAAS). Although the analysis was well calculated with the help of SPSS version 23.0 software

FINDINGS AND DISCUSSION

Among the 500 respondents selected for the study, about 45.2 percent belong to the 15-25 age group, 30.3 percent belong to 26-35 years, and 24.5 percent belong to 36-45 years of age. Fifty-two percent have completed their undergraduate, 17.0 percent have completed school education, and about 31.0 percent have post-graduation and higher qualifications.
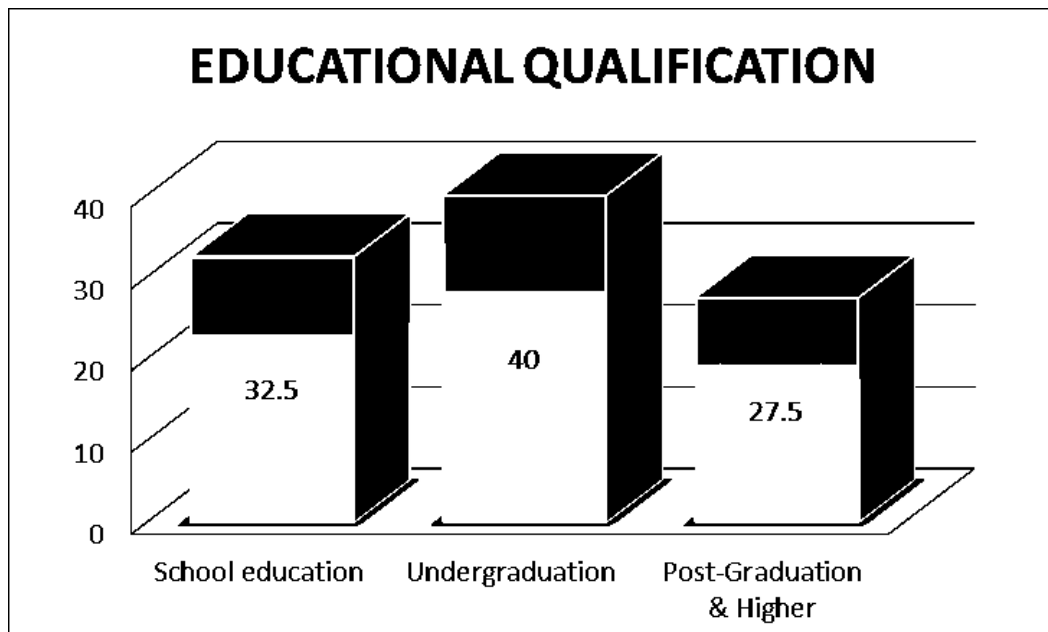
Fig no: 2: Educational status of the Respondents

Among the respondents of the study, 40 percent have completed their under graduation; 32.5 percent have school education and about 27.5 percent have post-graduation and higher qualifications.

Regarding the current employment of the respondents, about 41.5 percent were either employed\ self-employed, 24.5 percent were students, 13.5 percent were unemployed and about 5percent were retired, even at the age of 45, due to many personal reasons.
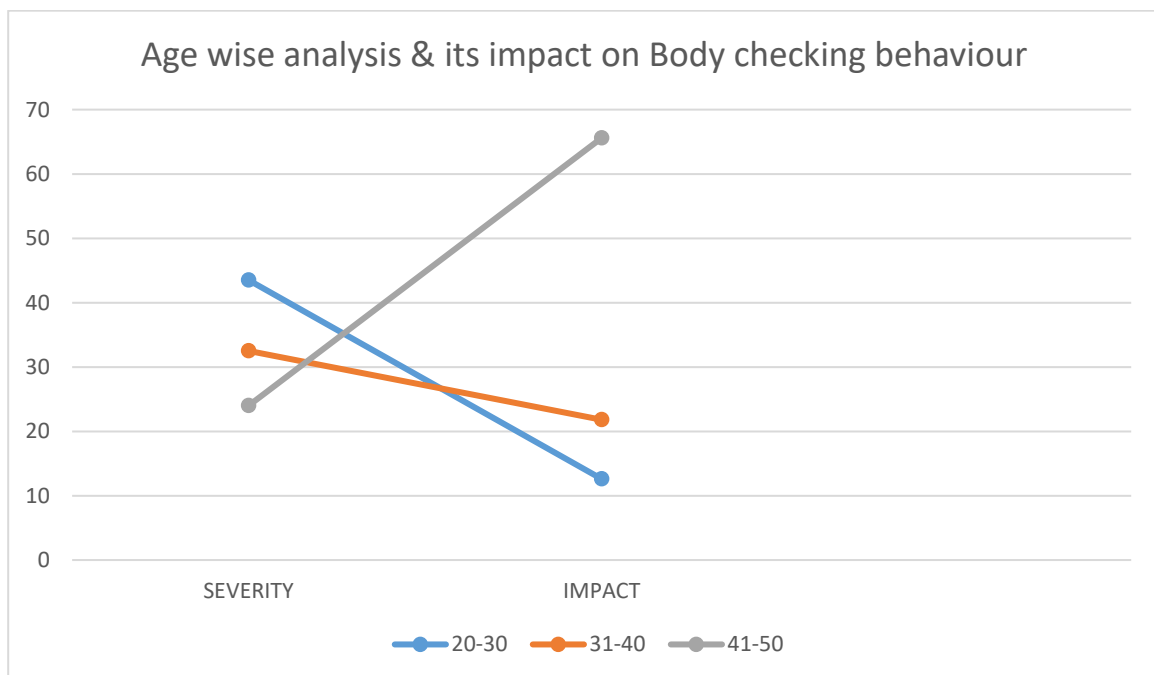
Fig no: 3: Age wise analysis & its impact on body checking behaviour

The survey revealed that while women between the ages of 20-30 are often the targets of body shaming, those above 40 expressed more concern and distress when faced with body shaming.

Interestingly, the younger generation showed minimal concern about body shaming, possibly indicating generational differences and the influence of positive discussions on social media regarding these concepts.
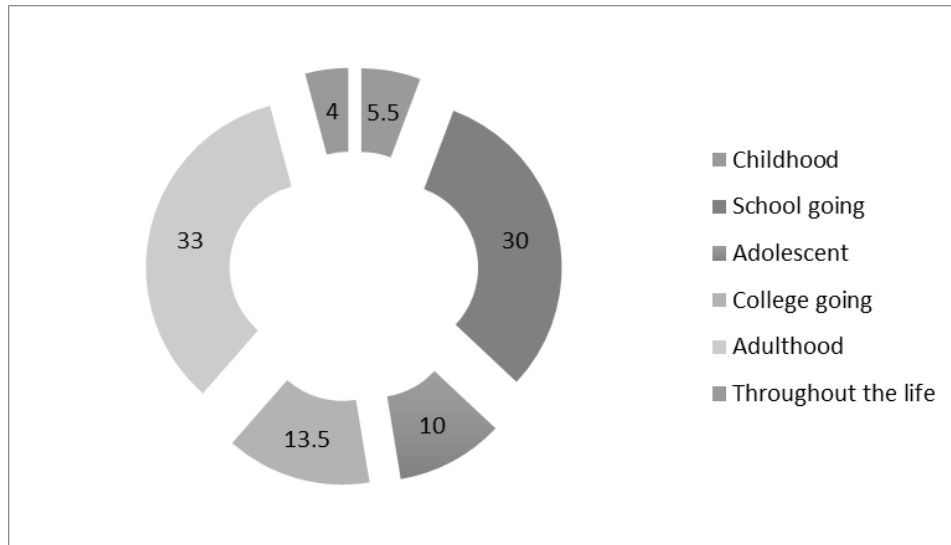
Fig no: 4: Age at which body shaming occurred first

Body shaming can occur to anyone regardless of age. One or the other sort of physical embarrassment was reported commonly during adulthood (33 percent), school-going age (30 percent), and childhood (5.5 percent). It is pretty disheartening to know that some people experience body shaming (4 percent) consistently throughout their lives. In a study conducted by Gam et al. (2020), the prevalence of body shaming among school-going children in Lucknow was 44.6 percent.

The study also revealed that the effect of body shaming on respondent's confidence levels is substantial, with 51 percent of the respondents experienced a moderate decline, 28 percent reported a slight decrease ,14 percent undergone an extreme reduction and 7 percent encountering only a minor effect. Body shaming that results in poor self-confidence affects an individual adversely. It further lowers their self-esteem and affects even their energy levels, lowering productivity and engagement in day-to-day affairs.

Anthropometric measurements have been used to identify and screen the population's weight categories. These include the respondents' height, weight, and Body Mass Index (BMI).
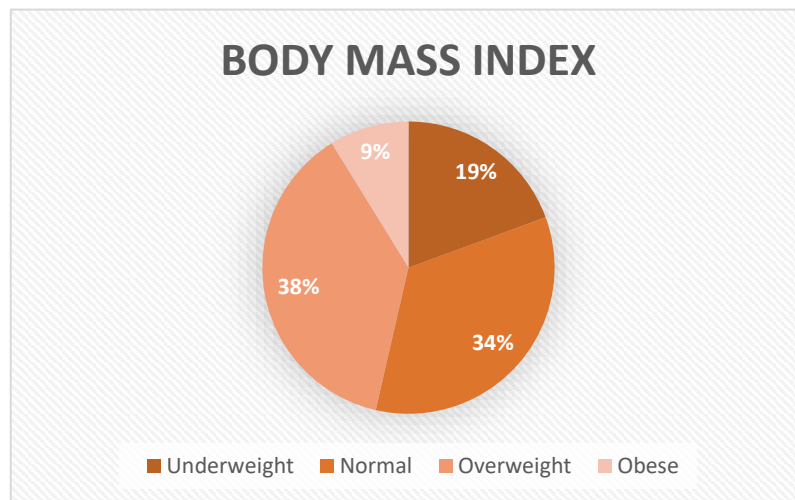
Fig no:5
BMI of the respondents

Based on the respondents' data, about 38 percent reported being overweight, 34 percent had a normal BMI, 19 percent were underweight, and 9 percent were obese.

Criticizing someone's weight, height, skin color, or any other part of their appearance can significantly influence their emotional and psychological well-being. Body shaming is a hurtful and insensitive act that involves making derogatory remarks or negative comments about a person's physical appearance. The practice of body shaming can trigger a vicious cycle of negative self-talk, low self-esteem, and even depression, leading to feelings of worthlessness and inadequacy. Therefore, it is essential to understand the harmful effects of body shaming and to promote a culture of acceptance, kindness, and respect for all individuals, regardless of their physical appearance. The extent of body shaming experienced by the respondents was also identified, and it was found that around 81.9 percent of them experienced the act of body shaming in one way or the other.
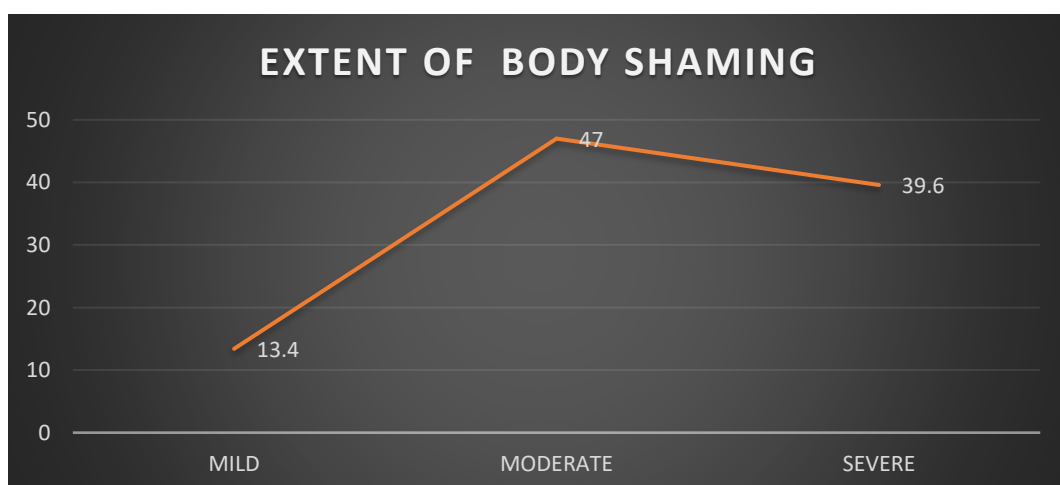
Fig no:6 Extent of Body shaming experienced by the respondents

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Table no:1: Concerns about Body Shaming

Sl No	Concerns	Response*	Percentage (n=500)	Ranking
1	Blemishes and Acne	150	30	5
2	Hair thinning	196	39.2	4
3	Skin Colour	291	58.2	1
4	Skinny	150	30	5
5	Short height	218	43.6	2
6	Body shape	209	41.8	3
7	Fat	148	29.6	6

*indicates Multiple response

An opinion regarding the respondent's concerns about body shaming was asked, and it was understood that about 81.9 percent of them had experienced body shaming in one form or the other. It was observed that the color of the skin (58.2 percent), shortness in height (43.6), body shape (41.8) thinning of the hair (39.2), blemishes and acne, and skinny nature of the body (30 percent each) fatty body (29.6) were the frequent concerns faced by the respondents at their school, college, workplace, or even at home and in 46.1 percent of the cases it was their close friends who made negative remarks.

The study evaluated the impact of body shaming on individuals using the Body Shape Questionnaire (BSQ). The scores were classified as mild, moderate, and severe. The findings revealed that 50% of the respondents had an average level of impact, while 42.5% indicated a lower level of concern about their bodies, and only 7.5% reported high levels of body concerns. Despite facing severe body shaming, the respondents showed minimal worry about their bodies. This could be attributed to the powerful influence of media, especially how social and mainstream media shape and change beauty standards.

The study showed that there exist statistically no significant mean differences based on demographic variables such as age, BMI, Marital status, education, and employment. That is, there is no association between the demographic variables of the respondents and their body shape, body-checking behaviors, and social appearance anxiety. These specific demographic variables didn't show a clear connection to how participants perceived their bodies, engaged in body checking, or experienced anxiety related to their appearance. This suggests that these factors may not play a significant role in influencing these aspects of respondent's experiences. Claudat &Warren, 2014 has carried out a similar study on body shame and body self-consciousness during sexual activity and were negatively correlated with sexual satisfaction.

Table no: 2 Correlation Analysis of Body shape, Body checking behavior, Social appearance anxiety

Variable 1	Variable 2	Correlation	P value
Body shape	**Body checking behaviour**	0.783 *	$p < 0.001$
Body shape	**Social appearance anxiety**	0.445*	$P < 0.05$

Body checking behaviour	Social appearance anxiety	0.320 **	P < 0.05

(* Significant at 0.05 % level; ** Significant level 0.001 %)

Pearson's Correlation analysis was used to determine the relationship between the selected variables. Correlation analysis showed that there exists a significant strong positive correlation between Body shape and Body-checking behavior (r = 0.783) between body shape and body checking behavior, and this correlation is statistically significant (p < 0.001). This suggests that individuals with certain body shapes are more likely to engage in body-checking behaviors. Hence the hypothesis stated is rejected.

There is a moderate positive correlation (r = 0.445) between body shape and social appearance anxiety, and this correlation is statistically significant (p < 0.05). This indicates that individuals with certain body shapes may experience higher levels of social appearance anxiety. There is also a positive correlation (r = 0.320) between body-checking behavior and social appearance anxiety, and this correlation is statistically significant (p < 0.05). This suggests that individuals who engage in more body-checking behaviors may also experience higher levels of social appearance anxiety.

SUMMARY, CONCLUSION AND IMPLICATIONS

Based on the study findings, a strong and noteworthy association was found between an individual's body shape, body-checking behavior, and social appearance anxiety. The study indicates that there is a significant link between the way a person perceives their body shape, the frequency of their body-checking behavior, and their level of anxiety related to their social appearance. Furthermore, it was identified that people who are more concerned about their social appearance tend to engage in body-checking behavior more frequently and are more likely to focus on their body form. These findings may help to have a better understanding of the relationship between body image and mental health and will also help to design interventions to reduce negative body image and promote positive mental health outcomes.

SUGGESTIONS FOR FURTHER RESEARCH

The impact of social media, to an extent has contributed positively and negatively on shaping the body images and appearance of the individuals. Interventions aiming at promoting body positivity, self-esteem and resilience among the youth could be designed through workshops and behaviour change messages. Community forums on breaking the stereotypes on body images could be created with the help of local government combining self-help groups and community neighbourhood groups. Further research could be carried out on exploring the impact of culture and societal beauty standards could be explored.

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A HOLISTIC EXAMINATION ON FLOOD IMPACT ON RICE FARMING AND CRAFTING RESILIENCE STRATEGIES FOR SUSTAINABLE AGRICULTURE

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HSAI Membership No[1]: HSAI-2024-AS-1757-LF

ABSTRACT

This study investigates the impact of floods on rice farming in the Bordoloni Development Block of Dhemaji District, Assam. Using random sampling, 200 tribal farmers from Uriamguri and Kathal Guri Village within the Ming Mang Gram Panchayat were selected, with 100 farmers from each village. The primary goal is to understand farmers' socio-economic status and assess flood-induced rice crop damage in terms of yield reduction and economic consequences. Additionally, the research aims to identify the strategies adopted by farmers to enhance resilience against flood impacts. Data collection involved face-to-face interviews using structured interview schedules to gain insights into the challenges faced by tribal farmers and their coping mechanisms against flood-related adversities. The findings reveal floods as a significant challenge for rice farmers, particularly during the long rainy season, with the river Jiyadhal and its tributaries causing widespread inundation, especially between May and August. Floods have led to substantial crop losses for the majority of the farmers, with some farmers reporting severe damage. Additionally, post-flood crop diseases have further deteriorated rice quality. Farmers have employed various strategies such as adjusting planting schedules, utilizing flood-tolerant hybrid rice varieties, and diversifying crops to withstand floods. These adaptive measures hold promise in enhancing farmers' resilience against floods and other adverse weather events in the future.

Keywords: Flood impact, Rice Farming, Tribal Farmers, Resilience Strategies, Flood Tolerant Rice Varieties.

INTRODUCTION

"AGRICULTURE is the most healthful, useful and noble employment of men."

-George Washington

Rice farming is one of the most vital agricultural activities worldwide, serving as a staple food for millions of people and playing a crucial role in sustaining local economies. Many regions, particularly in South and Southeast Asia, rely heavily on rice cultivation as a primary source of food security and economic livelihood. However, the

sustainability of rice farming is often threatened by various challenges, among which natural disasters, especially floods, pose severe risks (Das B. & Bora D. 2020).

Floods are among the most devastating natural calamities that disrupt agricultural activities, particularly in low-lying and flood-prone areas where rice farming is prevalent. The impact of floods extends beyond immediate crop loss, leading to long-term socio-economic distress for farming communities. Farmers not only face financial setbacks due to reduced yields but also struggle with soil degradation, loss of seeds, increased pest infestation, and damage to critical infrastructure such as irrigation systems, storage facilities, and transportation networks. In addition, floods contribute to food insecurity by reducing the availability of rice, affecting both farmers' livelihoods and consumer markets.

The vulnerability of rice farmers to floods is often exacerbated by limited access to adaptive strategies, financial resources, and institutional support. Smallholder farmers, in particular, suffer disproportionately, as they may lack the necessary means to recover from successive flood events. Given the increasing frequency and intensity of floods due to climate change, there is a growing need to assess the full extent of flood-induced damages to rice farming and explore effective resilience-building measures.

This study embarks on a comprehensive examination of the complex relationship between floods and rice farming, aiming to provide a nuanced understanding of the socio-economic and agricultural landscape in flood-prone regions. By evaluating the extent of flood-induced rice crop damage, analyzing the coping mechanisms adopted by farmers, and identifying potential adaptive strategies, this research seeks to highlight both the challenges faced and the opportunities available for mitigating flood-related risks. Furthermore, the study will explore innovative solutions such as flood-resistant rice varieties, improved drainage systems, climate-smart farming techniques, and policy interventions that can enhance the resilience of rice farmers against future flood events.

By shedding light on these critical issues, the research aims to contribute valuable insights that can inform policymakers, agricultural scientists, and development organizations in their efforts to support farmers and strengthen the sustainability of rice farming in vulnerable regions.

OBJECTIVES

The objectives of the study are:

- Understand the socio-economic and agricultural background of the farmers
- Assess the extent of rice crop damage caused by floods, quantifying the losses in terms of yield reduction and economic impact on farmers and
- Explore existing and potential measures farmers adopt to enhance resilience against flood impacts on rice farming.

REVIEW OF LITERATURE

The review of literature examines various studies on the challenges and adaptation strategies related to climate change impacts on agriculture, particularly in flood-prone regions, with a focus on rice production.

According to **Baishakhy et.al; (2023)** Climate change threatens global agriculture, especially in flood-prone regions like Bangladesh, where rice production faces severe challenges. Studies highlight key barriers to adaptation, including the lack of submergence-tolerant rice varieties, limited market access and inadequate agricultural inputs. Socio-economic factors such as income, education and media exposure influence farmers' resilience, while perceptions of climate change shape their adaptation choices. Community-based measures like early warning systems and flood management infrastructure are crucial for improving resilience. Policy recommendations emphasize government support, better market access and farmer education to ensure sustainable rice farming in vulnerable areas.

Das and Bora (2020) opined that the study of agricultural productivity has been a focal point of research, particularly in regions prone to environmental challenges. Various studies highlight that farm productivity is influenced by multiple factors, including access to quality inputs, technological advancements, socio-economic conditions, and climate variability. Research emphasizes the role of education, training and extension services in enhancing farmers' adaptive capacity, while market accessibility and government policies play a crucial role in ensuring resource availability. Additionally, studies underline the significance of climate-resilient farming techniques, such as crop diversification and improved irrigation, in mitigating risks. Effective adaptation strategies, supported by institutional interventions and policy frameworks, are essential for sustaining agricultural growth in vulnerable regions.

A study conducted by **Jamal et. al; (2023),** they expressed that agricultural systems worldwide face numerous challenges due to climate change, environmental degradation and socio-economic transformations. Key challenges include rising temperatures, erratic rainfall, soil degradation, salinization, water scarcity and shrinking arable land. Additionally, issues such as labour shortages, market fluctuations and low profitability further strain agricultural productivity. Farmers are responding to these challenges through a combination of autonomous and centrally planned adaptation strategies. These include the adoption of stress-tolerant crop varieties, improved irrigation techniques, mechanization, crop diversification, and sustainable soil management. Moreover, government interventions such as infrastructure development, financial incentives, and research support—are crucial in enhancing resilience. Strengthening agribusiness involvement, extension services and equitable value chain participation further enables farmers to sustain productivity in the face of evolving agricultural risks.

Panda and Barik (2021) review the mechanisms and approaches related to flooding tolerance in rice, a major stress that significantly impacts global rice

production, especially in rainfed lowland areas prone to seasonal flooding. The review highlights key physiological and molecular mechanisms underlying rice's adaptation to flooding and submergence, covering various types of flooding stress, its environmental characteristics and the morphological, physiological and metabolic responses of rice plants. The authors also discuss the role of specific genes, like Sub1, in flooding tolerance and suggest future directions for crop improvement programs aimed at developing flood-tolerant rice varieties.

Sujono (2010) explores the effectiveness of various water-saving irrigation techniques (WSI) in mitigating flood volumes in paddy fields. The study demonstrates that semi-dry cultivation is particularly efficient in retaining a significant portion of rainfall—up to 55.7% of the total rainfall—while maintaining yields, making it the most effective method for flood reduction among the techniques tested. In comparison, the alternate wetting and drying (AWD) method, although less effective than semi-dry cultivation, performed similarly to the traditional continuous flooding technique in terms of reducing flood volume, with reductions of 37.2% and 40.8%, respectively. This suggests that while water-saving techniques like semi-dry cultivation can provide substantial benefits in flood management, AWD remains a viable alternative for balancing flood reduction and water conservation without severely impacting rice production.

HYPOTHESIS

H1 There is a significant association between the socio-economic profile of the farmers and the adoption of resilience Strategies.

METHODOLOGY

The Bordoloni Development Block of Dhemaji District in Assam was chosen purposively for the study due to its vulnerability to flood-related challenges that significantly impact rice farming. The area is prone to seasonal flooding, particularly during the long rainy season, which often leads to substantial crop losses. By focusing on this area, the study aims to provide insights into the coping strategies of tribal farmers in flood-prone regions, as well as to assess the socio-economic impacts of floods on their livelihoods. A sample of 200 tribal farmers were randomly selected and evenly split, with 100 farmers from Uriamguri and 100 farmers from Kathal Guri villages. The farmers were interviewed personally through a well-structured interview schedule tool to gather relevant information from the farmers. For Analysis and Interpretation of Data, Descriptive statistics, including frequencies and percentages, were used to analyze socio-economic and agricultural background of the farmers. Chi-square tests were applied to assess the association between socio-economic factors (age, education) and the adoption of flood resilience strategies. The impact of floods and resilience strategies were analyzed using mean scores.

FINDINGS & DISCUSSION

The findings made in the current study have been given in this section.

Table 1

Socio-economic profile of farmers

The analysis of the socio-economic characteristics of the selected farmers revealed the following findings:

				n=200
Sl no	**Socio economic profile**		**f**	**%**
1	Age	1. 18-35 years	60	30
		2. 36-50 years	108	54
		3. Above 50 years	32	16
2	Gender	1. Male	133	66.5
		2. Female	67	33.5
3	Educational qualification	1. Illiterate	22	11
		2. Primary school	12	6
		3. Middle school	33	16.5
		4. Higher secondary	78	39
		5. Graduation	28	14
		6. Diploma	27	13.5
4	Type of family	1. Nuclear	89	44.5
		2. Joint	111	55.5
6	Marital status	1. Married	102	51
		2. Unmarried	81	40.5
		3. Widow/widower	17	8.5
7	Annual Income (In Rs.)	1. Less than 50,000	48	24.0
		2. 50,001 – 2,00,000	54	27.0
		3. 2,00,001 – 4,00,000	68	34.0
		4. More than 4,00,000	30	15.0

Table 1 explains about the socio-economic profile of the farmers. A significant 54% of the farmers are between the ages of 35 and 50. This distribution suggests that middle-aged farmers constitute the largest proportion of the sample. The data reveals a notable gender disparity among farmers, with males comprising the majority at 66.5%. In terms of educational attainment, the highest proportion of farmers, at 39%, have completed higher secondary education, indicating a substantial portion of the farming population achieving at least this level of schooling. Concerning family structure, the prevailing arrangement is joint families, representing 55.5% of the total. Maritally, approximately half of the farmers are married, constituting 51%. Economically, the largest proportion of

farmers, at 34%, fall within the annual income range of 2,00,001 – 4,00,000 INR, suggesting a notable concentration within the middle-income bracket.

Table 2 Agricultural background of the farmers

SL N0.	Existing Status of the farmers		n=200	
			f	%
1	Size of the land	Small (less than 2.5 acre)	229	38.2
		Medium (2.51- 5 acre)	305	50.8
		Large (More than 5 acre)	66	11.0
2	Experience in farming	Upto 10 years	197	32.8
		11 to 20 years	232	38.7
		Above 20 years	171	28.5
3	Godown storage	Available	465	77.5
		Not available	135	22.5
4	If available then,	Pucca	298	64.1
		Kaccha	167	35.9
5	Is Farming Main Occupation	Yes	102	51.0
		No	98	49.0
6	Family Members Participation in Rice Crop Production	Yes	121	60.5
		No	79	39.5

Table 2 presents various aspects of the existing status of farmers. Among the farmers surveyed, the highest proportion, at 50.8%, own medium-sized land holdings (2.51-5 acres). This suggests that a majority of the farming population operates on medium-sized land. In terms of farming experience, the largest group, representing 38.7% of the farmers, have been farming for 11 to 20 years. This indicates a considerable number of farmers with a moderate level of experience in agriculture. A substantial majority of farmers, comprising 77.5%, have access to godown storage facilities. Among those with godown storage, the majority, accounting for 64.1%, have pucca (permanent) storage facilities. Exactly half of the farmers surveyed (51.0%) consider farming as their main occupation. This highlights the importance of agriculture as a primary livelihood for a significant portion of the surveyed population. A majority of farmers, representing 60.5%, report that their family members participate in rice crop production. This indicates a high level of involvement of family members in agricultural activities, which is common in many farming households.

Table 3 Effect of Flood on Rice Crop: Quantifying Yield Reduction and Economic Consequences

						n=200
Sl no	Effect of flood on Rice crop	Yes		No		Mean
		f	%	f	%	(range of scores 0.51 to 0.89)
1	Yield Reduction	147	73.5	53	26.5	.74
2	Quality Degradation	177	88.5	23	11.5	.89
3	Delayed Planting or Replanting	102	51	98	49	.51
4	Spread of Diseases and Pests	129	64.5	71	35.5	.65
5	Soil Erosion and Nutrient Loss	124	62	76	38	.62
6	Loss of Income and Livelihoods	155	77.5	45	22.5	.78
7	Disruption of transportation networks, hindering the timely delivery of inputs like seeds, fertilizers, and pesticides	122	61	78	39	.61
8	Disruption of transportation of harvested crops to markets.	130	65	70	35	.65

Table 3 presents data on the effects of floods on rice crop production, highlighting the predominant impacts experienced by farmers. The majority, accounting for 88.5%, reported degradation in crop quality following floods, attributable to waterlogging and contamination. 77.5% of farmers suffered income and livelihood losses due to reduced yield and quality, disrupting their economic stability. Furthermore, 73.5% experienced decreased yields, indicating significant agricultural productivity setbacks. These findings underscore the profound challenges floods pose on rice farming communities, emphasizing the urgent need for targeted interventions and resilience-building strategies to mitigate the adverse impacts and enhance farmers' adaptive capacity in the face of such natural disasters. The highest mean found to be 0.89 in terms of quality degradation.

Table 4 Strategies for Enhancing Resilience Against Floods in Rice Farming Communities

						n=200
Sl no	Resilience Strategies	Yes		No		Mean
		f	%	f	%	(range of scores 0.55 to 1.00)
1	Early Warning Systems	139	69.5	61	30.5	.70
2	Improved Drainage Systems	110	55	90	45	.55
3	Flood-Resistant Rice Varieties	200	100	-	-	1.00

4	Crop Diversification	182	91	18	9	.91
5	Integrated Pest and Disease Management	200	100	-	-	1.00
6	Soil Conservation and Management	116	58	84	42	.58
7	Invest in infrastructure upgrades, such as raised platforms for seedling beds and elevated storage facilities.	179	89.5	21	10.5	.90
8	Community Preparedness and Training	197	98.5	3	1.5	.99
9	Insurance and Financial Instruments	155	77.5	34	17	.78
10	Ecosystem-Based Approaches	172	86	28	14	.86
11	Community-Based Adaptation Strategies	128	64	72	36	.64
12	Policy Support and Governance	193	96.5	7	3.5	.97

Table 4 presents data on the adoption of resilience strategies by farmers to mitigate the impact of floods on rice crop production. Notably, flood-resistant rice varieties and integrated pest and disease management strategies were universally adopted by all surveyed farmers, with 100% implementation. Furthermore, early warning systems and crop diversification were widely embraced, with 69.5% and 91% adoption rates, respectively. These findings suggest a recognition among farmers of the importance of proactive measures to cope with flood-related challenges. However, certain strategies such as improved drainage systems and soil conservation and management had relatively lower adoption rates at 55% and 58%, respectively. This indicates potential areas for improvement and targeted support to enhance the resilience of rice farming communities. Additionally, the high adoption rates for community preparedness and training (98.5%) and policy support and governance (96.5%) underscore the significance of community engagement and supportive policy frameworks in building resilience to flood risks in agriculture. Overall, the data highlights both the successes and areas for further enhancement in resilience-building efforts within rice farming communities facing flood-related challenges. Highest mean value is .99 which represents Community Preparedness and Training among farmers.

Table 5 Chi-square test for significant association between the socio-economic profile of the farmers and the adoption of resilience Strategies

Socio economic profile	Chi square	df	P value
Age	233.804a	20	<.001
Eduational Qualification	405.789a	50	<.001

With p-values less than 0.001 for both age and educational qualification, it indicates strong evidence to accept the alternative hypothesis suggesting that there is indeed an association between these variables.

Therefore, it can be inferred that age and educational qualification play significant roles in determining whether farmers adopt resilience strategies against floods. This finding has important implications for agricultural policies and interventions, as it suggests that targeting specific age groups or educational levels might be effective in promoting the adoption of resilience strategies among farmers.

Table 6 Recommendations by the Farmers for Enhancing Resilience Against Floods in Rice Farming Communities

						n=200
Sl no	Recommendations	Yes		No		Mean
		f	%	f	%	
1	Adjust planting schedules to avoid peak flood periods	122	61	78	39	.61
2	Utilize flood-tolerant rice varieties	155	77.5	45	22.5	.78
3	Implement crop rotation or diversification to include flood-resistant crops	189	94.5	11	5.5	.95
4	Improve drainage systems in rice fields to mitigate flood damage	171	85.5	29	14.5	.86
5	Implement early warning systems for floods to enable timely actions	184	92	16	8	.92
6	Utilize temporary flood barriers or levees to protect rice fields	120	60	80	40	.60
7	Develop community-based flood management plans and strategies	111	55.5	89	44.5	.56
8	Promote integrated pest management to address pest outbreaks exacerbated by floods	200	100	-	-	1.00
9	Enhance farmer knowledge and capacity through training programs on flood preparedness and mitigation measures	200	100	-	-	1.00

Table 6 presents recommendations provided by farmers for enhancing resilience against floods in rice farming communities. The highest percentage of farmers, at 100%, suggested promoting integrated pest management and enhancing farmer knowledge and capacity through training programs on flood preparedness and mitigation measures. These recommendations reflect a strong emphasis on proactive measures aimed at addressing both the immediate and long-term impacts of floods on rice crop production. Furthermore, recommendations such as implementing crop rotation or diversification (94.5%) and improving drainage systems in rice fields (85.5%) highlight the importance of sustainable agricultural practices in mitigating flood-related risks. The widespread support for early warning systems (92%) and community-based flood management plans (55.5%) denotes the recognition among farmers of the value of collaborative approaches and timely interventions in enhancing resilience against flood events. Overall, these recommendations provide valuable insights into the priorities and preferences of rice farming communities in managing flood risks and building resilience in agriculture. The highest mean value is 1 which represents both Promote integrated pest management to address pest outbreaks exacerbated by floods and Enhance farmer knowledge and capacity through training programs on flood preparedness and mitigation measures.

CONCLUSION & IMPLICATIONS

This study provides valuable insights into the profound impact of floods on rice farming in the Bordoloni Development Block of Dhemaji District, Assam. The findings imply that floods not only threaten agricultural productivity but also pose severe socio-economic challenges for farmers who depend on rice cultivation as their primary livelihood. A significant proportion of farmers in the region face yield losses, deterioration in grain quality, and substantial reductions in income due to recurrent flooding. These adverse effects highlight the vulnerability of rice farming communities and emphasize the urgent need for effective mitigation measures.

Despite these challenges, the study also sheds light on the resilience strategies that farmers have adopted to cope with flood-related adversities. Many farmers have embraced adaptive practices such as cultivating flood-resistant rice varieties, diversifying their crops to reduce dependency on a single source of income, and engaging in community-based adaptation strategies. These approaches not only demonstrate the resourcefulness of the farming community but also highlight the potential of locally driven solutions in strengthening resilience against climate-induced threats.

Understanding the multifaceted relationship between floods, socio-economic factors, and agricultural practices is crucial for developing targeted interventions. The study reveals that key demographic factors, such as age and educational background, play a significant role in influencing farmers' ability to adopt resilience measures. Younger and more educated farmers tend to be more receptive to innovative agricultural techniques and risk management strategies. Additionally, the recommendations provided by farmers emphasize the necessity of tailored interventions that address their specific challenges. These include the need for capacity-building programs to enhance farmers' knowledge, improvements in drainage

infrastructure to manage excess water effectively, and the establishment of robust early warning systems to minimize flood-related damages.

By integrating these findings into policy frameworks and agricultural development strategies, stakeholders—including government agencies, agricultural institutions, and non-governmental organizations—can contribute to strengthening the resilience of rice farming communities. A collaborative approach that combines scientific research, community engagement, and policy support will be instrumental in mitigating flood risks, ensuring sustainable rice production, and securing the livelihoods of farmers in flood-prone regions. Ultimately, fostering resilience in rice farming is not only essential for the well-being of farming communities but also for safeguarding regional food security in the face of increasing environmental uncertainties.

SUGGESTIONS FOR FUTURE RESEARCH

- Conduct longitudinal studies to assess the long-term effectiveness and sustainability of resilience strategies adopted by rice farming communities against floods.
- Compare the effectiveness of different resilience strategies across regions with varying socio-economic and environmental contexts. This comparative analysis can help identify context-specific strategies and best practices for flood mitigation in rice farming and
- Evaluate existing policies and governance mechanisms related to flood management and agricultural resilience. Identify gaps in policy implementation and recommend policy reforms to better support rice farming communities in flood-prone areas.

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ASSESSING THE DEGREE OF AWARENESS ABOUT GENDER BIAS AMONG ADOLESCENTS IN NCR

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ABSTRACT

The social construction of gender roles begins from the moment we are born and then we are treated, nurtured, and cared for in a manner that is per our assigned gender. Adolescence is when we tend to feel pressured to ascribe to gender roles. This study tried to explore the dynamics of gender role development among adolescents. A part of that study has been discussed in detail, which explores adolescents' awareness level about explicit gender biases. The sample size was 405 adolescents from the age group 14-16 years belonging to different economic groups. A Gender Socialisation Marking Scale with 30 statements was used. There was a statistically significant relationship between the sex, type of school, parent's education, and monthly household income with their level of awareness. Male adolescents showed higher levels of biases than their female counterparts. This trend was reflected across all themes but was significant for: decision-making, gender attributes, and technology usage. The variable that had the most impact on the awareness levels of the adolescents was the mother's education level. This concludes that boys do not truly realise the level of privilege they are being raised with as compared to the restrictions girls might face. This learning must be adapted to further academic and policy-level implications when designing adolescent empowerment programs.

Keywords: Adolescents; Gender Awareness; Gender Explicit Biases; Gender Privileges and Restrictions; Gender Socialization Agents

INTRODUCTION

Gender can be understood as the socio-economic, cultural, and institutional associations of being a man or a woman that are reflected in their expected attributes and the opportunities offered to them. These expectations and attributes might change over time and vary among cultures. (JHPieGo, 2018).

The gender intensification hypothesis states that the onset of puberty leads to changing social dynamics within intimate relationships that create pressure to conform to socio-culturally sanctioned gender roles. This is established through a lot of sources such as parents, peers, educators, and the media. These lay out what appropriate gender roles are for an adolescent to transition into a man and woman building the foundation of their gender-role identities (Priess et al., 2009). Gender socialization is defined as the process by which adolescents are taught to 'do'

gender by internalizing culturally relevant norms and roles reinforced agents of socialization. (Trachtenberg et al., 2022).

Parents introduce children to gender-specific objects that include their toys, books, clothes, and many more things as well as, treat them differently throughout their childhood. (Lawson et al., 2015). Peers of the same and the opposite sex, have a substantial impact on adolescents' gender self-concepts and affirming stereo-typicality or atypicality through interactions and friendships (Leaper & Friedman, 2007). It is noted that not just the presence of these interactions and friendships but also their lack of or being prohibited from fostering reinforces gender roles and stereotypes that shape their identities (Witt, 2000). Research argues that adolescents learn gendered behaviours and attitudes at home which gets reinforced by the school environment through teachers and their peers (Giovannini, 2023).

JUSTIFICATION OF THE STUDY

Studies have focused on perusing the impact of structural and individual level changes but few consider the social settings. Researches need to address the unique needs of sub-populations of adolescents for which studies need to develop key intervention points of how gender attitudes unfold in adolescence (Kågesten et al., 2016). Realising this research gap this study was designed to study the socio-interactional level by exploring adolescents' interactions within their immediate environment from their perspective.

Kågesten et al. (2016) suggested that sociodemographic factors that affect the gender socialisation of an adolescent can be divided into two subsets, the first being individual factors and the second being interpersonal level factors. The individual variables would include sex and social class the adolescent belongs to while the interpersonal level would include their family, peers, and school. The study also highlighted the need to understand how these socio-demographic variables play out in influencing gender role development among adolescents. It emphasised the necessity to correlate these variables to different themes representing gender role development.

SIGNIFICANCE OF THE STUDY

The focus on gender discrimination emphasizes the missed opportunities. While exploring gender privileges the locus of attention is on additional advantages gained. Understanding this advantage helps us realize how even with increased awareness and action toward gender equality not much has been achieved (*What if We Flipped the Conversation From Gender Discrimination to Gender Privilege?*, 2022). With explicit bias, individuals are aware of their negative attitudes or prejudices and allow those attitudes to affect their behaviour (Shah, 2023). Explicit biases are conscious and personally endorsed assumptions that are identified and communicated with ease (Vela et al., 2022). Explicit biases, the attitudes and assumptions that people acknowledge as part of their belief systems, can be assessed directly through self-report (Sabin, 2022).

Going against a gender-discriminating culture requires internal reflection and a strong will to change (Soken-Huberty, 2021). Going through the study process would benefit adolescents as well, and these reflections would help them explore their identities better. So, that in-turn these agents of socialisation are better aware and prepared to manage themselves and future generations. Also, these findings would inform the policy of developing a life course approach

that accounts for social changes during the socialisation process (John et al., 2017). Hence, moving towards a gender-just society where everyone feels accepted and respected.

OBJECTIVES

General Objective: Assessing adolescents' opinions about gendered privileges and restrictions within their immediate environments.

Specific Objectives:

1. To measure the degree of awareness among adolescents about the gendered privileges and restrictions experienced by themselves and peers of the opposite sex.
2. To determine the effect of different socio-demographic variables on adolescents' awareness of gender biases.
3. To ascertain the relationship between socio-demographic variables and adolescents' awareness of gender biases.

METHODOLOGY

To address these objectives a quantitative research design was incorporated to get a representation of the population at a specific point in time across the diverse population in NCR. This research was descriptive as it aimed at enhancing the generalizability of the findings by using a larger and more diverse sample so statistical analysis could establish relationships between different variables.

The universe or target population of the study consists of all adolescents aged 14-16 years living in the National Capital Region. A total of 405 adolescents were selected for the study, belonging to various socio-economic groups to ensure a diverse sample.

Ethical approval for this study and the tool used was obtained from the Institutional Review Board (IRB) at the Lady Irwin College IRB Committee. Informed consent was obtained from both participants and their guardians before data collection.

For the study, a five-point scale marking tool, the Gender Socialisation Marking Scale was developed based on previous research Girl Rising Gender Sensitisation Program (Vyas et al., 2019) and Global Early Adolescent Study (Blum et al., 2019) to quantify the degree of awareness. It was further refined through pilot testing with a small sample of adolescents from similar demographics as the target population and was also subjected to expert review and item analysis. The final version comprising 30 items across six thematic areas, demonstrated good internal consistency and was deemed suitable for assessing adolescents' awareness of gender biases in their immediate environments. The statements were designed to express adolescents' degree of agreeability on statements by rating on a 5-point Likert scale (1=Strongly Disagree, 5= Strongly Agree). The tool captured experiences of differential gender socialisation among adolescents within their immediate environments by exploring the selected 6 domains:

a. Mobility
b. Decision-making
c. Gender Attributes
d. Voice
e. Behavioural Restrictions
f. Technology Usage

For ensuring the validity of the study several measures and checks were done. The content validity of the tool was established by doing an extensive literature review. The themes were derived from the learnings of already published studies (Vyas et al., 2019; Blum et al., 2019) conducted in the same socio-demographic context. This also ensured that the researcher's bias was minimized. The internal validity of the study was ensured by following the established protocols for data collection while the external validity of the study was ensured by collecting data from geographically diverse Districts within NCR so the generalizability of the findings can be enhanced. The test-retest method and expert review were used to ensure the reliability of the tool used for the study.

The data collected was cleaned, coded, and entered in Microsoft Excel. The data were analyzed using Statistical Package for Social Science (SPSS) for descriptive and inferential statistics. The main goal of this analysis was to understand the impact each variable had on the specific domain of gender socialization of adolescents.

FINDINGS AND DISCUSSIONS

The results of the study have been divided into four sections: demographic and socioeconomic variables chosen for the study, theme-wise comparison of means, comparative analysis of the effect of each variable on the total and theme-wise awareness levels of the adolescents, inferential analysis of adolescents' mean score to ascertain the variable with the most impact and the least impact.

Demographic Variables of the Respondents: 405 adolescents were selected for the study, 171 were females and 234 were males. Each age group had a similar representation (40-25%), except for 17 years old, which was just 11%. About 25% were 14 years old, 40% were 15 years old and 24% were 16 years old. 52.3% of the adolescents were from government-run schools while 47.6% were from private schools. Almost half of the adolescents' mothers were a graduate (42.5%) while surprisingly 31.6% just knew how to sign their name while about 26% had at least completed their schooling. The percentage of adolescents' fathers' educational level was higher for both having completed school that is 30% as compared to 26% of mothers and similarly, almost 50% of the fathers had a graduate degree as compared to 42.5% of mothers. But still, 20% just knew how to sign their name. Most (80%) of the adolescents belonged to either a monthly household income below 25,000 INR or more than 50,000 INR while just 20% belonged to the income bracket of 25,000-50,000 INR.

Scoring of Tool: The tool consists of 30 statements, of which 4 were coded positively and the others were coded negatively. A higher score on the tool indicated adolescents' inclination towards gender-biased behaviors and attitudes. The total maximum score that could be scored on the Gender Socialisation Marking Scale was 150 while the total mean score was 78.06. This means again inferring moderate levels of awareness and a high level of gender bias.

Theme-wise comparison of means was carried out to comprehend the adolescents' understanding of gender biases about different aspects of it. From the comparison, it was revealed that Voice (Mean = 15.08), was the theme adolescents felt most biased toward while Mobility (Mean = 10.89) had the least biased opinions. It validates the previous literature that clearly states

young women and girls' voices are suppressed to conform them to stereotypical gender roles of submission and subordination (Jewkes & Morrell, 2010).

The Mean score for different socio-demographic variables was collected to understand their performance theme-wise. The mean score for each variable was compared for all the themes to understand the relationship of variables for different themes. Then post-hoc analysis was conducted to ascertain their effect on the variable for the given theme. This clearly shows how a variable impacts which aspects of adolescents' understanding of explicit gender biases.

Table 1: Effect of Variables on Theme-wise Total Mean Score

Theme	Mobility	Decision-Making	Gender Attributes	Voice	Behavioral Restrictions	Technology Usage	Total Score
Theme-wise Total Mean Score							
Total Score	10.89	12.62	14.53	15.08	11.51	13.41	78.06
Mean Score Comparison Based on Sex							
Female	10.04	10.70	12.97	13.97	10.40	11.35	69.46
Male	11.52	14.03	15.67	15.89	12.32	14.91	84.35
Mean Score Comparison Based on Type of School							
Government	11.81	13.71	16.06	16.80	13.13	14.82	86.34
Private	9.89	11.43	12.84	13.19	9.73	11.86	68.96
Mean Score Comparison Based on Mother's Education							
Functional Literate	12.89	14.56	16.55	17.33	13.65	15.25	90.25
Completed Schooling	11.40	13.40	15.21	16.06	12.89	14.25	83.23
Graduation and above	9.09	10.71	12.61	12.80	9.07	11.52	65.83
Mean Score Comparison Based on Father's Education							
Functional Literate	12.67	14.58	16.35	17.28	13.38	14.91	89.19
Completed Schooling	11.88	13.76	16.05	16.63	13.26	14.86	86.45
Graduation and above	9.58	11.15	12.88	13.26	9.70	11.93	68.53
Mean Score Comparison Based on Monthly Household Income							
Up to Rs. 25,000	12.39	13.94	16.25	16.87	13.37	14.94	87.79
Rs. 25,000 - 50,000	11.12	13.64	15.38	16.16	12.50	14.00	82.81
More than Rs. 50,000	9.30	10.82	12.41	12.77	9.17	11.60	66.09

From the above statistics, the mother's education was the most important variable as the lowest total mean score was observed for the category 'graduation and above.' Also, the lowest mean

score for a theme was for 'behavioural restrictions' for the same category of mother's education being 'graduation and above.' Cunningham (2001), found that maternal educational levels during early childhood and mid-adolescence shape their children's gender role attitudes.

Sex Differences in Awareness Levels: The total Mean Score of all the adolescents revealed a higher level of bias among males (Mean = 84.35) than females (Mean = 69.46). The difference between females' mean score (Mean = 10.70) for theme decision-making was the most significant while the smallest gap was noticed for the theme voice. This means that though adolescent boys displayed higher levels of bias, it was specifically found to be more pronounced in the themes of decision-making, gender attributes, and technology usage. A one-way ANOVA found the effect of sex on the mean score to be statistically significant (F (1,403) =64.094, p=0.001). This was reflected in all the themes as well.

Table 2: Post-hoc Analysis

Independent Variable	p-value	Post-Hoc Significant Differences
Sex	0.001	Females have significantly higher total scores than males
Type of School	0.001	Private school students have significantly higher total scores than Government school students
Mother's Education	0.000	Graduation and above > Completed Schooling > Functional Literate
Father's Education	0.000	Graduation and above > Completed Schooling > Functional Literate
Monthly Household Income	0.002	More than Rs. 50,000 > From Rs. 25,000 - 50,000

Impact of Type of School: The total mean score for both types of schools showed that government schools (Mean = 83.34) had a much higher score. This means that the adolescents enrolled in government schools had expressed a higher inclination towards explicit gender-biased behaviours as compared to private schools (Mean = 68.96). The most significant differences were observed in the theme, gender attributes and behavioural restrictions while the lowest was for decision-making. A one-way ANOVA found the effect of the type of school to be statistically significant (F (2,402) =95.205, p=0.001). This was reflected in all the themes as well. It can be inferred that the type of school attended by the adolescent, which might be a subset of the economic conditions of the household, has a significant impact on their total mean score on the tool.

Parental Education and Awareness: The total mean score for adolescents based on their mother's education showed an inverse relation between the mother's education level and the total mean score on the tool. Adolescents whose mothers had graduated from college scored the lowest on the tool (Mean = 65.83) compared to adolescents whose mothers were functionally literate (Mean = 90.25). This was reflected in all the themes as well. The most significant difference was observed in the theme, voice while the least impact was mobility. Interferential statistics were used to ascertain the relationship between different levels of mothers' education and the awareness levels of adolescents. The impact of the mother's education on the tool's mean score was compared using a one-way ANOVA, and the results showed that the relationship was statistically significant (F(2,402)=85.24, p=0.001). All of the themes also showed this, with p < 0.001. This indicates that all facets of gender socialization are significantly impacted by a mother's educational background. According to the

Scheffe Test for multiple comparisons found that the mother's education above graduation made a statistically significant impact while being functionally literate or having completed schooling didn't show much difference in their socialisation.

The total mean score for adolescents based on their father's education showed a similar trend as there was for the mother's education level, as the father's education level increased the adolescent's score on the tool went down. Kulik (2002) also found that parents' education and work status affected their parenting style, which directly translated into children displaying more egalitarian gender role behaviours and attitudes. Adolescents whose fathers had graduated from college scored the lowest on the tool (Mean = 68.53) compared to adolescents whose fathers were functionally literate (Mean = 89.19). This was reflected in all the themes as well. The most significant difference was observed in two themes, gender attributes and behavioural restrictions while the least impact was noticed in the theme of technology usage. The influence of the father's education on the tool's mean score was compared using a one-way ANOVA, and the results showed that it was statistically significant ($F_{(2,402)} = 60.57$, $p=0.001$). All of the themes also showed this, with $p < 0.001$. This indicates that the teenagers' levels of gender awareness were significantly influenced by the father's educational background. Like the trend observed in the mother's education, the father's education graduation and above had a significant impact on the awareness levels of the adolescents while being functionally literate or completing school didn't make much difference. This was reflected in all the themes as well.

Income Level Correlation: The total mean score showed an inversely proportional decrease with the increase in the monthly income of the household. This was reflected throughout the themes as well. Gender attribute theme showed the highest impact on the adolescents from households with income below Rs.25000/- (Mean = 16.25) compared to adolescents with monthly income more than Rs. 50000/- (Mean = 12.41). The impact of monthly household income on the tool's mean total score was compared using a one-way ANOVA, and the results showed that the relationship was statistically significant ($F_{(2,402)} = 68.09$, $p=0.001$). All of the themes also showed this, with $p < 0.001$. This indicates that adolescents' awareness levels were significantly influenced by household wealth. As per the Scheffe Test for multiple comparisons increasing household income had an impact on the awareness levels of the adolescents, with no statistically significant difference for income below Rs. 50,000/- This was reflected in all the themes as well.

1. **Summary, Conclusion, and Implications**

Summary: From the above findings, it can be concluded that adolescents scoring 78.06 out of 150 on the Gender Socialisation Marking Scale reflected a high level of bias being participated and practised by the adolescent. A comparison of means showed that theme voice had the highest mean total score while mobility had the lowest. Adolescents practised and participated in the most gender inequitable behaviours by controlling and restricting their or their peers of the opposite sex's voices as a way of conforming to the stereotyped gender norms (Jewkes & Morrell, 2010).

From the study, it was inferred that socio-demographic variables that have a statistically significant impact on the awareness levels of adolescents about gender-biased experiences are their sex, the type of school they are enrolled in, their parent's education, and their monthly household income. Patel et al. (2021) share that during a longitudinal study done with adolescents in India, UDAYA, it was found that girls tend to have more egalitarian views than boys, regardless of age.

Hence, there is a need to address this gap through adolescent education programs both formal and non-formal, to facilitate gender equity in later years of life and prepare boys for being gender-responsive partners in the future (Landry et al., 2019).

Molla (2016) emphasizes that though the family may be the primary agent of gender socialisation for an adolescent, peers and the school experience are the ones reinforcing or challenging it. The difference in the type of school being reflected in the gender awareness levels can be understood from two perspectives, private schools have more resources to be allocated for better curriculum development, and that hidden curriculum in the form of co-learning and experiential from peers and teachers is way more potent (Sahni et al.,2018).

Limitations: These findings have important implications for future research and policy development. However, it is to be noted that the study might have some limitations given, the time and resource constraints of a PhD study, it had to have a limited scope which restricts its generalisability beyond NCR. A longitudinal study would have helped realise the impact of this self-reflection process on adolescents in the long term.

In conclusion, the study effectively contributes to the growing literature on the gender socialisation of adolescents, offering valuable insights about significant variables shaping different aspects of gender attitudes. A **recommendation** based on the study would be that having conservation is not enough, it needs to be modelled in the day-to-day workings. Sex-segregated behavior violates adolescents' ability to achieve their full potential as well as takes away from the freedom to explore their identity. Literature suggests that it is parents, schools, and policymakers' onus to structure adolescents' environments that maximise peer interactions. Mixed-gender groups provide them a safe space to explore their similarities and differences across genders as well as develop skills required for healthy and effective interactions (L. Hanish & Fabes, 2014).

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KNOWLEDGE REGARDING XERISCAPE: A NEW WAY OF GREENING THE RESIDENCES OF KUWAIT

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ABSTRACT

Global climate change has impacted regions with fluctuating temperatures, erratic weather patterns, hot and humid atmosphere, poor air quality, high rate of evaporation and desertification. Such environmental changes have resulted in major environmental degradation, declined water resources and water availability, reduced biodiversity and desertification. In comparison with other GCC (Gulf Cooperation Council) nations, Kuwait has hot and humid atmosphere mostly affected by climate change with threat of global warming, reduced air quality and increased desertification. The challenges faced are apparent while developing a garden in a desert area with harsh hot and humid climate with limited water resources. In such climatic regions, developing landscape with the use of native and xeric plants has high survival rate, easy adoption, lower maintenance and less use of water supply. The present study aimed to assess the knowledge of the respondents with regards to Xeriscape Landscaping method. A descriptive research design was adapted to assess the in-depth knowledge of the respondents regarding Xeriscape landscape technique. The present study was conducted in Kuwait; wherein knowledge of 150 respondents were assessed with regards to xeriscaping meaning, benefits, planning, soil preparation, irrigation & watering, plantation methods, soil covering materials etc. through the means of questionnaire. It was found that majority of the respondents had low level of knowledge for xeriscape landscaping method in hot and arid desert climate areas. To enhance the knowledge of the respondents, an educational manual was developed for better understanding of Xeriscape Landscaping. The educational manual focused on various aspects of Xeriscaping to be followed while developing xeriscape landscaping. The outcome of the study would help the students, landscape & garden designers and residents residing in such climatic conditions to adopt the method of xeriscape landscaping and develop xeriscaping in deserted areas where water is a limited resource.

Keywords: Desert, Desertification, Landscaping, Xeriscaping

INTRODUCTION

Landscape gardens have now become a key part of most people's lives. Similarly, Residential gardens also play a significant role in life of the individuals. Residential gardens help in improving the quality of life as well as controlling the environmental pollution. These spaces are highly beneficial in providing physical and mental relaxation and leisure activities and bringing individuals

close to the nature. Even parks and open spaces are considered as a necessity in every country because they provide several health advantages. Green areas reduce environmental health risks and provide a healthier environment. Parks and open green spaces have grown in popularity in many developing nations, owing to the relevance of climate change adaptation and mitigation, however this is not the only cause. As a result, various advantages to green open spaces and parks contribute in the growth and greening of a region. (AlHammad, 2022).

Unfortunately, the evolution of human civilization has been a leading cause of urbanization. Rapid urbanization and industrialization have derogatory impact on land use and environmental conditions. The cities, natural green spaces are transforming into desert creating a global environmental concern. Desertification has now become an alarming cause, with many regions and countries facing development and environmental challenges posed by desertification. The United Nations Environment Programme (UNEP), 1992, has defined desertification as the process of land degradation in arid, semi-arid and dry sub-humid areas resulted mainly from adverse human impact and partially from the changing climate factors. Arid and semi-arid areas are extremely prone to land degradation, leading to desertification. According to Ma (2018), Desertification is usually regarded as areas with desert or sand dunes. By its definition, however, it refers to the process changing from degraded land to desert land, forming desertification through wind erosion and water erosion. Arid and semi-arid climatic areas are extremely prone to land degradation which leads to desertification. Many regions and countries are facing development issues and environmental challenges regarding desertification.

State of Desertification Worldwide

Over 100 countries worldwide have been affected by desertification, currently around 2 billion people are living in drylands which are prone to desertification. The Middle East and North Africa (MENA) is the most vulnerable countries which are affected by desertification. The most affected countries apart from the Middle East and North Africa (MENA) which had been classified as having a dessert prone climate since 1980's are Africa and Eastern and Central Asia. According to the US National Integrated Drought Information System (IDIS), nearly 40% of the lower 48 states are facing environmental problems which can lead to desertification. In Spain, desertification and overexploitation have severely affected the phenomenon of "Europe's Kitchen Garden" as well as the European Union has alerted the vulnerability of possible desertification in Portugal, Italy, Greece, Cyprus, Bulgaria and Romania. The Aralkum desert in the Central Asia is also considered as one the example of desertification as in the 1960's the area was covered by the world's fourth largest lake, the Aral Sea, since then it has now dried and reduced into three small saline lakes the change in climate and with the human influence Aralkum desert turned the dry seabed into a salt-covered desert.

State of Desertification in Kuwait

Kuwait is a Middle Eastern country with an extreme climate, low soils quality and few water supplies. Several initiatives have been made to counteract desertification in the dry country of Kuwait (AlHammad, 2022). Kuwait's climate is characterized by harsh summers and mild winters. The soil of Kuwait is sandy, alkaline, and deficient in plant nutrients due to the extreme temperatures (Suleiman & Bhat, 2004). Al- Mutawa (1993) conducted research on Landscape design recommendations for Kuwait, it was concluded that the design methods of the parks do not match

the criteria of the nation, justifying that the methods and techniques were not appropriate for Kuwait's weather and socioeconomic circumstances. As irrigation is an essential aspect of developing and creating a garden but, water is also a limited resource in such dry and arid climatic regions. Keeping the soil and climatic conditions in mind developing a sustainable landscape in Kuwait is considered difficult. Thus, Xeriscaping can be the solution which is developed with less utilization of water and also is specifically designed for drought areas (Çetin, et.al, 2018).

The researcher came across various studies related to residential gardening, landscape irrigation, desertification, care and maintenance of plants but a dearth of researches was found focusing on the extent of knowledge related to Xeriscaping in residential areas and development of Xeriscaping in the residential areas of Kuwait. Therefore, the present study was undertaken with the objective to assess the knowledge of the respondents regarding xeriscaping. An educational manual was developed to enhance the knowledge of the homeowners regarding various aspects of Xeriscaping Landscaping. The educational manual was developed in English and in regional language (Arabic) for better understanding of the audience.

OBJECTIVES OF THE STUDY

1. To assess the background information of the respondents having residential gardens in Kuwait.
2. To assess the knowledge of the respondents regarding Xeriscaping method of landscaping.
3. To develop an educational manual on Xeriscaping in English and Arabic Language.

DELIMITATIONS OF THE STUDY

1. The study was limited to the residential gardens
2. The study was limited to those residences having land garden.
3. The study was limited to the residences of Kuwait.

METHODOLOGY

The research design adopted for the study was descriptive in nature. A sample size of 150 respondents residing in Kuwait and having a residential land garden was selected by purposive convenience sampling method and the respondents were contacted through snowball sampling technique. The unit of inquiry were the respondents having residential garden space in their existing residence. A structured questionnaire was prepared and administered to the respondents to collect the data. Prior consent was taken from the respondents before collecting the data. The questionnaire sheet comprised of two sections: Section I dealt with the background information of the respondents such as gender, educational qualification, occupation of the respondent, type of family and number of family members whereas Section II dealt with the knowledge of the respondents regarding Xeriscaping. The respondents were asked to respond to a 3-point continuum in terms of "Aware", "Unaware", "Undecided" and the scores from 3 through 1 were given to the respondents respectively. the minimum score of the scale was 91 and the maximum was 273. Based on the extent of knowledge of the respondents the researcher developed an educational manual to enhance the knowledge of the

respondents regarding various aspects of xeriscaping. The manual was developed in English and in Arabic language. The study has been approved by the Institutional Ethics Committee with IECHR/FCSc/PhD/10/2023/01.

FINDINGS AND DISCUSSION

Section I-Demographic Profile of the respondent

The background information included the aspects related to the respondents such as gender, educational qualification, occupation, type of family and number of family members. The background information of the respondents was collected through the means of questionnaire filled by the respondents. The respondents were selected through the Purposive sampling method and were contacted through Snowball sampling method.

Table-1: Frequency and percentage distribution of respondents on the basis of their Background Information

Background Information of the Respondents			
Particulars	**Variables**	**f**	**%**
Gender	Male	67	44.67
	Female	83	55.33
Educational Qualification	10th Pass	2	1.3
	12th Pass	9	6
	Graduate	121	80.7
	Post-Graduate	18	12
Occupation	Service	115	76.67
	Self-Employed	13	8.67
	Unemployed	22	14.66
Type of Family	Nuclear	94	62.67
	Joint	56	37.33
Number of Family Members	01-03	43	28.67
	04-06	77	51.33
	06 & above members	30	20.00

The results from the above table reveal that the highest per cent of the respondent's 55.33 percent were female whereas 44.67 percent of the respondents were male. Majority of the respondents i.e. 80.7 percent were graduate, 12 percent of the respondents were post-graduate whereas 6 percent of the respondents were 12th pass and only 1.3 percent of the respondents were 10th pass. The respondent's occupation information revealed that majority of the respondent's 76.67 percent were doing service, 14.66 percent of the respondents were unemployed whereas only 8.67 percent of them were self-employed. Nearly 62.67 percent of the respondents belonged to nuclear families followed by 37.33 percent of the respondents living in joint families. More than one-half of the respondent's 51.33 percent had 04-06 members in the family, whereas 28.67 percent of the respondents had 01-03 members in the family and 20 percent of the respondents had 06 & above members in the family.

Section II-Extent of knowledge of the respondents regarding various aspects of Xeriscaping

The knowledge of the respondents regarding Xeriscaping was divided into ten categories viz; meaning of Xeriscape, benefits of xeriscape, planning of xeriscape, soil preparation, irrigation and watering, plantation, soil covering material, shade material, spacing and artificial greenery. The scale comprised of 91 statements. The scores assigned were 3, 2, 1 for Aware, Unaware and Undecided. The minimum score was 91 and the maximum score was 273. After calculating the scores for each statement, the knowledge scale was categorized into three categories i.e., high, moderate and low knowledge on the basis of equal interval scoring method.
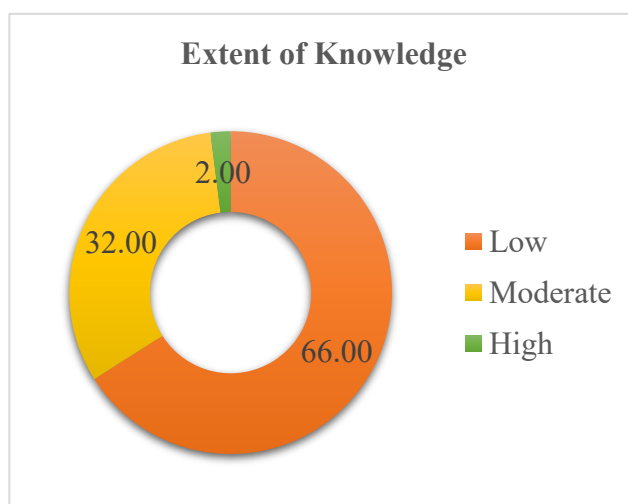
Fig-1: Extent of knowledge of the respondents regarding Xeriscaping

The results revealed that majority of the respondent's 66 percent were having low extent of knowledge, 32 percent of the respondents were having moderate extent of knowledge and only 2 percent of the respondents were having high extent of knowledge about the various aspects of Xeriscaping such as meaning, benefits of xeriscaping, planning of xeriscape, irrigation, plantation, soil covering materials is xeriscaping, shade materials, spacing of plants and artificial greenery.

Development of the Educational Manual

The educational manual was prepared based on the data gathered regarding the knowledge of the respondents on Xeriscaping. From the overall data gathered, it was found that the respondents had lack of knowledge regarding various aspects of Xeriscaping which motivated the researcher to develop an educational manual for providing practical and theory-based learning to the respondents. The Educational Manual was developed in both English and in Arabic language for better understanding of the users. The contents of the manual included Introduction to Xeriscaping, benefits of Xeriscaping, choosing a site, planning and designing, soil testing and soil amendments, seed sowing and plantation, spacing of plants, soil covering and mulching, water budgeting, irrigation and watering, trimming and pruning, care and maintenance and list of native plants of Kuwait. The content and the language of the text was validated by a panel of experts from landscaping and desert garden design fields. The developed manual can be used as a reference book for those users who are willing to develop a xeriscape landscape at their residence as it can help the users with step-by-step guide and procedure

Fig.-2: Xeriscaping Educational Manual cover page

Fig.-3: Xeriscaping Educational Manual content page

Fig.-4: Xeriscaping Educational Manual cover page (Arabic Language)

Fig.-5: Xeriscaping Educational Manual content page (Arabic Language)

CONCLUSION AND IMPLICATIONS

In comparison with other GCC (Gulf Cooperation Council) nations, Kuwait has hot and humid atmosphere which is majorly affected by climate change with threat of global warming, reduced air quality and increased desertification. In such climatic regions, developing landscape with the use of native and xeric plants has high survival rate, easy adoption, lower maintenance and less use of water supply. Thus, Xeriscaping is the most relevant method to add landscape in the deserted areas of Kuwait. The extent of knowledge of the respondents regarding xeriscaping was found to be low which motivated the researcher to develop an educational manual. The manual will help the users in increasing their knowledge regarding xeriscaping and in creating a xeriscape landscape at their residence. The outcome of the study would help the students, landscape & garden designers and residents residing in such climatic conditions to adopt the method of xeriscape landscaping and develop xeriscaping in desert areas with harsh hot and humid climate where water is a limited resource.

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THE CHANGING TRENDS IN HOUSING STRUCTURE OF NICOBAR TRIBES

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ABSTRACT

Aboriginal Nicobar tribes or Nicobarese, were the last indigenous people who have racial mixture with the natives of Southeast Asia. The present study interprets the features of the old traditional housing of the Nicobarese. The research highlights the changes in construction practices adopted by the government post-tsunami disaster where tribes live currently. They follow a traditional Indian joint family system, referred to as **"Tuhet".** Tuhet is a unique family dwelling comprising of 30 to 40 families living together under one roof. The typical form of habitation was a hut with thatched domical roof made of lallang grass. The dome was supported by a single tall central post that passed through the interior space. The early dwelling was perched on thick timber piles along the circular edge of the hut at a height of 7-8 feet. This enabled structural stability to withstand cyclonic winds. Lounge space beneath the platform accommodated space for livestock rearing. This space also facilitated the practice of their occupations such as snack making and selling. The idea behind the raised dwelling is to ward off creepy reptiles crawling to their residential areas. These windowless dwellings comprised of two independent areas, one used for living and the other as a kitchen. The living room is the principal space of tuhet is called the **'ma pati tuhet'** where they socialize, relax and sleep. The **'taliko'** is the communal kitchen where the entire family's meal is cooked. With the progression of urbanization, toilet and bathing spaces were added. At night, a timber ladder was attached to allow access to hut through a hinged door. Nicobarese follow eco-friendly and sustainable construction practices that supports the basic human survival mechanism. Their cultural practices need deep understanding to fully appreciate the Vernacular architecture of the Nicobarese.

Key words: Circular plan, Traditional house, timber, Nicobarese, Tuhet, Vernacular architecture.

INTRODUCTION

The living styles of tribes are always unique and vary from one group to another and from one place to another. The Nicobar group of islands, located in the eastern Indian Ocean approximately 1200km from the Indian mainland, is home to indigenous Nicobar tribes with a total population of 23,681. They are the only "Scheduled Tribes" in India exempted from the Indian Wildlife Act of 1972, allowing them to legally hunt wildlife for subsistence and bonafide uses. They depend on horticulture, pig rearing, fishing and coconut plantation. Among the six aboriginal tribes of the Andaman and Nicobar Islands, the Nicobarese are the most widespread, forming 97.2 percent of the tribal population. The Nicobar headquarters is at Car Nicobar (Tripathi, 2016).

With the enactment of the Andaman and Nicobar Protection of Aboriginal Tribes Regulation (ANPATR) in 1956, the entire Nicobar, except for a few isolated areas was declared as a tribal reserve where the entry of non-tribal outsiders is strictly forbidden. With Nicobarese status as a Tribal reserve and the lack of cross-cultural contacts, access for social scientists is challenging. There exists a paucity of understanding regarding the significance of the cultural practices of the indigenous Nicobar tribes, which are essential parts of human survival mechanisms. Some aspects of the indigenous lifestyle are based on resource availability in the environment/habitat and are harmonious within a fragile ecosystem (Sehgal & Babu, 2021).

There is no indication of domestic violence but women, children and the elderly are all handled with the highest care. Matrilocal and patrilocal marriages are customary in the villages and women have equal rights in the home and in pursuits of livelihood. The Nicobarese have a strong social support network that gives the impression of one big, close-knit family. Aboriginal tribal families of Nicobar follow a traditional Indian joint family system, referred to as Tuhet. During the Tsunami, many Nicobarese tuhets lost 20-25 members, leaving numerous children and the elderly unattended, who were readily adopted by the community. Tribal life is based on the principle of egalitarianism and their cultural practices have been self-sustaining and ecologically balanced (Saini, 2016).

The indigenous people of the Nicobar Islands lived in huts and other temporary houses made of bamboo, wood, with thatch roofs covered with hay and mud as the principal materials. Traditional Nicobari huts resemble an inverted basin. These shelters were built with easily accessible lightweight building materials. Occupants of these dwellings stated that grass, coconut, melon tree wood, stems and bamboo were widely utilized. However, their construction is predicated on locally accessible, environmentally friendly resources. Their traditional mode of construction uses indigenous materials and occupants had erected the huts. Numerous such houses can be seen on the Nicobar archipelago's populated islands. These locally built shelters appear to be earthquake-proof, incredibly comfortable, well-ventilated and environmentally beneficial in an equatorial climate (source: https://www.mapsofindia.com/).

The earthquake and associated tsunami waves, reaching up to 1000 meters high on December 26, 2004, devastated the Andaman and Nicobar Islands, an archipelago located in the southeastern region of the Bay of Bengal. Official reports list over 3500 people as dead or missing, while unofficial estimates place the number far higher. The indigenous people were severely affected, experiencing massive losses in terms of human lives, livestock, plantations, and settlements. The government's rehabilitation program aimed to replace over 10,000 demolished homes, but it faced several critical challenges. Communities' major issues included the design, location, and expense of proposed housing, as well as the lack of opportunity for them to participate in the process. Hence, all the Nicobar tribes were allotted houses by the government from the Tsunami relief fund (Krishnakumar et al., 2020).

Interventions after the tsunami included both traditional and contemporary methods. Nicobari hut construction was a traditional practice of these tribes, but it was altered by fast urbanization and other modern developments. This involved modifications to the home plan, the type of material used for the stilts, their height, the walls and roof and the overall standard of construction. The plan of the house changed from circular to either a square or rectangular shape. Masonry walls were installed in newer homes, although stilts and floors remained made of wood initially. Timber stilts were gradually replaced by plain concrete stilts and concrete walls were

introduced in some houses. In certain cases, hollow blocks were used instead of traditional walls. Over time, stilts became shorter and disappeared in modern construction, leading to some houses being built on the ground without stilts and any platform.

SCOPE OF THE STUDY

The Nicobar tribes were the last indigenous people to have racial mixture with the natives of Southeast Asia. Unlike other tribal groups, they have much greater contact with the outside world. Socially and economically, they are more developed than any other tribal groups in the Andaman and Nicobar Islands. Hence, this study will provide new information to society and researchers about the different stages of their housing structure from their traditional period to the modern style of construction. Tuhet is one of the unique features of these tribes, which reflects the joint family system of more than 40 members living together as a single family.

OBJECTIVES OF THE STUDY

Given these backgrounds, the study on "The Changing Trends in Housing Structure of Nicobar Tribes" is framed with the following objectives:

- To understand settlement site of Nicobarese
- To study the materials used for constructing the houses of Nicobar tribes
- To highlight the significance of traditional housing pattern of Nicobar tribes and other housing structures existed in the surveyed tribal areas.

METHODOLOGY

Research methodology refers to the systematic, theoretical analysis of the procedures employed in a particular field of study. It involves describing, explaining and projecting events to solve a problem. Research methodology encompasses the approach or tactics taken when conducting research (Kothari, 2019). A field study was conducted on Nicobar Island by the investigator, tracing the lifestyle of Nicobar tribes. It was mandatory to acquire permission from the captain of every village to gain entry for research. The investigator obtained permission from the captains, who were the leaders of the tribal reserve and gained entry into the settlements.

Figure 1 shows the research design followed for the study.

Figure 1: Research Design
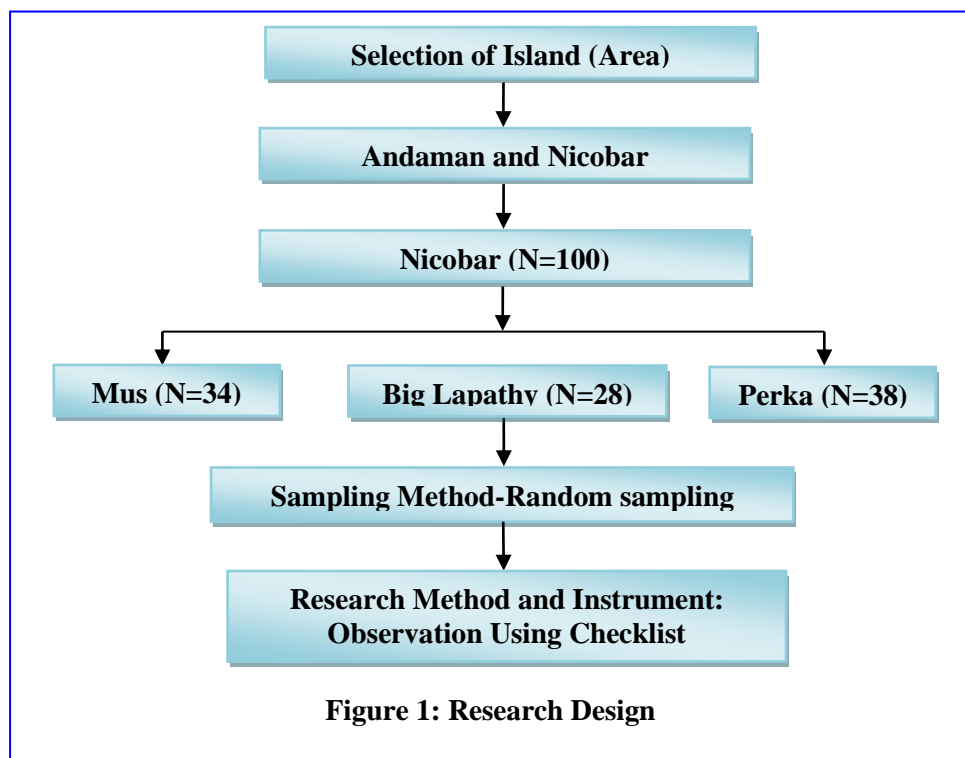
Among the 15 villages in Car Nicobar, three tribal villages, namely Mus Big Lapathy and Perka were selected for this research using purposive sampling. These tribes were more social and volunteered to share information with the researcher. A total of 100 samples from the three villages of Nicobar were chosen using random sampling methods. An interview method was followed by administering a well-structured interview schedule. The researcher was able to enter and conduct the survey after receiving permissions from the Tribal Council. Captains Mr. George led the investigator to Mus Village, while Rueben and Mr.Othneil accompanied in Perka and Big Lapathy respectively.

The observation method was adopted to identify the Topography, Climate, vegetation, social organizations, details on materials used for Nicobarese house construction, Government House Structure-Post Tsunami, and development in housing patterns. The data obtained from the survey was consolidated and presented in the results and discussion.

RESULTS AND DISCUSSION

The results pertaining to the settlement, housing construction, and materials used for different houses constructed by the Nicobarese living in Mus, Big Lapathi, and Perka are discussed in detail below. The settlement had identical site features in the selected hamlets.

1. Topography: The Andaman and Nicobar Islands are mountainous, hilly and undulating, folded and arranged in a north-south axis, forming deep valleys and plains. They are surrounded by the sea, forming longitudinal bays. The highest elevation of the islands is in the east, and the lowest is in the south. The moderate slopes are prone to soil erosion during rainfall. Tropical and dense mangrove forests support the coral reefs that fringe the islands.

Due to the absence of rivers, rainwater and groundwater are the primary sources of potable water.

2. Climate: Nicobar experiences an equatorial climate with rainfall throughout the year. The monsoons first reach the Andaman and Nicobar Islands before moving on to the Indian mainland. They receive both southwest and northeast monsoons, with an annual rainfall of 3000mm. Relative humidity ranges between 70-80 percent.

3. Vegetation: The Nicobar Islands are a biodiversity hotspot. Cultivation and trading of marine and horticultural products are integral to the islands' natural and cultural environments. The coconut (Cocos nucifera) is a significant crop in the Nicobar Islands. Analyses of Nicobarese communities' diet, vocabulary, folklore, rituals, traditional medicine, and lifestyles have shown historical use of the coconut palm for food, fuel, medicine, shelter, trade, and rituals, besides being an export commodity. The Nicobarese people are mostly self-sufficient and engage in fishing, hunting, and pig farming. Some cultivate gardens with fruits and vegetables such as papaya, jackfruit, bananas, pineapples, yams, and sugarcane. They also forage for edible leaves, fruits, and tubers from the forest, as well as seafood from the coral reefs and mangroves around the islands. Traditional Nicobarese cuisine includes coconut, pandanus (Pandanus leram), yams, fish, pig, and poultry.

4. Social Organization and Domestic Unit: A named "tuhet" is the smallest unit in Car Nicobarese society. It comprises more than just the people living in the main farmhouse or nearby households. A tuhet is a sizable lineage group living in its own houses (each with a separate kitchen), constructed next to the main household or within its plantations and gardens. Thus, a tuhet includes adopted children, cousins, distant relatives, and close family members. The "ma kuo tuhet," or head of a tuhet, is typically a male chosen for life based on seniority, leadership abilities, and an understanding of customary regulations. Some tuhets may have over a hundred members.

5. Details on Materials Used for Nicobarese House Construction

Nicobarese communities are generally located along or near the coast, often hidden behind mangroves or within a bay. Villages along the shore or on neighboring islands are easily accessible by paddle canoes. Their traditional method of construction utilizes indigenous materials, which are eco-friendly. However, due to advanced technologies and a growing interest in different lifestyles, modern houses have also been constructed. Below are the details on the structure of traditional housing, modern houses and the materials used by the tribes of Nicobar Island.

Plate 1 shows the traditional house of Nicobar tribes (Pre-tsunami).

Plate 1: Traditional House of Nicobar tribes (pre-Tsunami)

a. **Roof**: The typical form of habitation was a hut, with thatched domical roof or pitched one (due to rainfall throughout the year) made of lallang grass. The dome was supported by a single tall central post that passes through the interior space. The early dwelling perched on a raised platform of thick timber piles along the circular edge of the hut at a height of 7-8 feet. This was done to provide structural stability and withstand the cyclonic winds. This created a lounge space at the ground level which accommodated space for livestock rearing. This space also facilitated practicing their occupation like snack making and selling. The tribes used thatch on timber substructures and on certain occasions, CGI roofs on timber infrastructure.

b. **Wall**: Stilted house supported by timber or masonry posts which edged and supported the circular walls. Areca palm battens were used to form wall lining. Timber planks or bamboo matting were set on wooden supports for walling. A semispherical thatch roof covers the side walls of a traditional Nicobar hut.

c. **Floor**: Bamboo and timber patterned flooring was laid which also facilitated ventilation. Areca palm mats were laid over the flooring for sleeping.

The traditional houses with a stilt platform had the facility of leaving the unused food to their piggery and pet animals. This is not observed in the newly constructed pucca houses. However, the pucca houses lack enough space for their cultural activities during ritual and ceremonial occasions as they are considered very important in their traditional village pattern. Previously, Nicobarese have built traditional homes near their horticultural patch utilizing their knowledge of local resources and building methods in order to address this problem. After the tsunami, the government started constructing roads and other municipal infrastructure, including low-cost enterprises, community centers, schools, mortuaries, and delivery homes. Followed by tsunami, the authorities began building roads and other municipal infrastructure facilities such as schools, community halls, delivery and mortuary houses, medical sub-centers, anganwadi centers and low-cost businesses.

1. Government House Structure- Post-Tsunami

The 2004 earthquake and tsunami had devastated not just human lives but also material culture. The government has created an intervention project for Nicobar tribal households, as the majority of their homes were destroyed by the tsunami wave. Soon after the catastrophe, the islands are inundated with development plans combining international and national voluntary agencies, as well as the government, all in the name of rehabilitation and relocation. One such scheme is house construction utilizing tsunami disaster funds. (Shankar et al, 2004). The following image shows the houses constructed and allotted by the government for the tribes after tsunami.

Plate 2 shows the housing structure of Nicobar tribes (Post-tsunami).

Plate 2: Housing Structure of Nicobar tribes (Post-Tsunami)

The materials used for the house constructed by government after tsunami is given below:

a. **Roof**: If there is more than one storey, the ground floor will have corrugated AC sheeting on a timber understructure and RCC slab.

b. **Wall**: RC frame from foundation to roof level with 100x200x400 concrete block wall infill. Up to sill level concrete blocks and wooden panels on wood posts fastened to MS angles implanted in concrete.

c. **Floor**: Cement flooring is commonly utilized, in certain cases tiles were also used.

d. **Timber**: The settlers of these islands who were brought in by the government were given timber to construct their houses for many years. But later they were provided only for repair and maintenance every five years. When this practice was stopped, the timber required for the construction needs of all the communities were obtained from the Government-owned saw mill at Chatham Saw Mill in Port Blair.

2. **Different Housing pattern of Nicobar Tribes**

Table 1 depicts the different type of house preferred by the Nicobari tribes of three selected villages.

Table 1: Different Housing Pattern of Nicobar Tribes

Village	Tsunami house		Tuhet		Modern house		Other house	
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Big Lapathy	14	50.0	7	25.0	4	14..0	3	11.0
Mus	13	38.0	9	26.0	8	24.0	4	12.0
Perka	15	39.0	8	21.0	11	30.0	4	10.0
Total = 100								

The table-1 provides evidence that the Nicobar tribes resided in four distinct types of dwellings, including the tsunami house, tühét, modern home and one additional unspecified house. The term "tsunami house" pertains to the housing units that were provided by the government to individuals in the aftermath of a tsunami event. The term "Tuhet" is a residential dwelling where a collective of over 40 individuals reside in a shared location. The term "modern house" denotes a dwelling that encompasses contemporary amenities and exhibits a modernised focus (Prasad, 2010). Other house which denotes the extension made by the tribes as multi-purpose room in addition to tsunami permanent shelter provided by the government.

The village of Perka was characterized by a high population density and convenient connectivity. The respondents exhibited a notable concentration in the aforementioned region, with 39 per cent of the tribes still residing in tsunami houses. Additionally, 30 per cent of the respondents were found to be living in contemporary houses, while 21 per cent were residing in tuhets. The remaining 10 per cent of respondents reported living in alternative types of housing.

The subsequent inhabited and easily reachable settlement was Mus, where 38 per cent of the respondents resided in tsunami houses. The other respondents lived in Tuhet, contemporary houses and other dwellings, accounting for 26 per cent, 24 per cent and 12 per cent respectively. In Big Lapathy village, a notable proportion of the population, specifically 50 per cent, continued

to reside in tsunami houses. Additionally, 25 per cent of the population lived in tuhet houses, while 14 per cent occupied modern houses and the remaining 11 per cent were the occupants of other type of houses. It is evident that a significant portion of the tribes in the Nicobar Islands continue to reside in tsunami houses. However, a few respondents have reported progress in their living conditions, having transitioned to contemporary houses. Additionally, tribes who lived collectively were found to be located in Tuhet. Even now these tribes favour the tuhet because it facilitates socio-economic integrity of its members. Tuhet is more popular in Nicobar Island than other surrounding islands. Different housing structures are given in Plate 3.

Tsunami House

Tuhet

Modern House

Other House

Plate 3: Type of House

3. Development in housing pattern

With the developing lifestyle pattern of the Nicobar tribes, they made modifications in the houses built by the government to meet their family needs. Development made in the habitation of the tribal group is depicted below:

a. **Roof:** The roofing of the Nicobar tribes had undergone drastic change wherein their roofing was made of fiber sheet and very limited number of the houses were constructed with thatched roofing.

b. **Wall**: The walls were made of wood, cement and bamboo.

c. **Floor**: The flooring of the houses was found to be of cement finishing or tiles and few houses had wooden floor.

d. **Rooms**: As the Nicobar tribes were preferred to live in joint family system most of them were found to have nearly 40 members in one family due to which they had issues in number of rooms so they started following `Tuhet` housing pattern.

CONCLUSION

Many of the Nicobar tribes are progressing towards development and have begun to move away from their traditional ways. When government programs and policies reach them, they are utilizing for their positive development. Over time, the Nicobar tribes are expected to achieve full development and be able to live a lifestyle similar to that of non-tribal communities. Additionally, they are known for their unity, as despite undergoing significant development, they continue to reside in joint family systems and maintain strong family ties.

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ANALYZING THE PREVALENCE AND PERCEPTIONS OF WALL MURALS IN DIFFERENT SETTINGS

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ABSTRACT

This study explores the prevalence, placement, types, expenditure, and maintenance practices of wall murals across various settings such as the food industry, educational institutions, transportation hubs, parks and recreation centers, offices, shops, and malls. The demographic analysis of respondents reveals a predominance of males aged 31-40 years with higher education qualifications residing in Urban areas. Education institutions exhibit the highest use of wall murals for aesthetic enhancement and thematic expression, while transportation hubs have the least. Painted directly on walls murals are the most popular type, with digital prints being the second choice. Expenditure on wall murals varies, with the food industry spending in the lower range and education institutions in the higher ranges. The study finds that the purposes of wall murals differ across age groups, with younger respondents focusing on attracting people and achieving a unique look, and older respondents prioritizing aesthetic appearance and gaining identity. Maintenance practices are diverse, with dusting being the most common task, but a significant portion of respondents never engage in maintenance activities, potentially impacting the longevity and appearance of the murals. The findings highlight the importance of considering both the aesthetic and practical aspects of wall murals to ensure their longevity and continued impact.

Key words : Wall murals, Interior design, Aesthetics, Institutions, Unique look.

INTRODUCTION

Wall decoration is the act of enhancing the appearance of walls and ceilings, a practice that dates back to prehistoric times when early humans adorned cave walls with paintings to express their thoughts and beliefs. Throughout history, wall art and murals have been a favored method for decorating a variety of spaces, from castles and temples to government buildings, warehouses, libraries, and homes (Ganguly,2019). Remnants of ancient wall decorations can still be seen in caves around the world, such as those in Borneo and Mexico, as well as in the ruins of Pompeii, the Ajanta caves in India, and the tombs of Egypt. These decorative elements bring art into the public and private spheres, influencing the daily lives of individuals and communities, and impacting the

environments in which they live and work (Shantha A., 2019). Wall art and paintings come in a wide range of artistic styles and themes, including floral and foliage designs, coastal motifs, metallic finishes, animal illustrations, maps, themes for bath and laundry areas, kitchen and dining spaces, vintage aesthetics, classic elegance, modern and abstract expressions, and kid-friendly imagery (Anu H. Gupta et.al, 2022). These wall decorations can be crafted in various sizes, from miniature to oversized, to achieve the desired visual impact.

An article highlights the significance of showcasing art in upscale hotels. Art paintings contribute a distinctive atmosphere to the environment while also enhancing the aesthetic appeal and ambiance (Vents, 2021). The creative presentation of artworks within the hotel sector has a significant impact on the guest experience. Fascinating and visually striking artworks can offer their clients a unique and memorable experience (Gupta, 2017).

The use of wall murals has become a popular form of interior and exterior decoration across various types of buildings. These murals not only serve as a means of aesthetic enhancement but also convey a sense of identity and thematic expression (Obinwanne, et. al. 2019). This study aims to explore the placement, types, and expenditure on wall murals in different settings such as the food industry, educational institutions, transportation hubs, parks and recreation centers, offices, shops, and malls. Additionally, the study investigates the demographic characteristics of respondents, including age, gender, education qualification, and area of residence, in relation to their perceptions of wall murals. The research also examines the maintenance practices associated with wall murals to understand their longevity and upkeep.

SCOPE OF STUDY

A blank wall can be quite dull. However, with the right decoration adorning it, any living space can be transformed from ordinary and mundane to distinctive and personal. A single piece of art has the power to set the mood or theme for an entire room or space. Wall decoration serves as a focal point and can also introduce a splash of color to the room or area.

Wall decorations are not only crucial for residential spaces but also for the commercial sector, particularly in the hotel industry. Wall paintings are a significant form of wall decoration utilized in hotels. Every nook and cranny of the hotels is adorned in such a manner that visitors find joy in their stay, which in turn boosts the number of occupants and customers. Wall paintings contribute to several aspects:

- They help in creating a strong first impression, ensuring that guests are captivated from the moment they enter.
- They contribute to a warm, friendly, and luxurious ambiance, making guests feel welcomed and pampered.
- They play a role in attracting guests, as appealing wall decor can be a draw for potential visitors looking for a memorable stay.
- Ultimately, they help in maximizing profit, as a well-decorated hotel can command higher rates and encourage repeat business.

The scope of this study is to analyze the data collected on the prevalence of wall murals in various types of buildings and to assess the demographic factors that influence the perception and maintenance of these murals. The findings are intended to provide a snapshot of current trends in wall mural usage and to identify patterns in expenditure, placement, and maintenance practices.

METHODOLOGY

Survey Design: A structured questionnaire was developed to gather information on the demographic characteristics of respondents, their perceptions of wall murals, and the maintenance practices associated with these artworks. The questionnaire included closed-ended questions to facilitate quantitative analysis and open-ended questions to capture qualitative insights.

Sampling: A total of 100 samples were surveyed in the study. The study utilized a non-probability sampling method, specifically convenience sampling, to recruit participants. Respondents were selected based on their accessibility and willingness to participate, ensuring a diverse range of perspectives from individuals with different backgrounds and experiences with wall murals.

Data Collection: The survey was conducted by direct contact with individuals and organizations known to have an interest in or experience with wall murals. Participants from different age groups, genders, educational qualifications, and areas of residence were encouraged to respond.

Data Analysis: Quantitative data were analyzed using statistical software to calculate percentages, means, and other descriptive statistics. Chi-square tests were conducted to determine the significance of associations between demographic variables and perceptions of wall murals. Correlation analysis was used to explore the strength of relationships between variables. Qualitative data from open-ended questions were analyzed through thematic analysis to identify patterns and themes in respondents' perceptions and experiences.

Ethical Considerations: Participation in the survey was voluntary, and respondents were informed about the purpose of the study and the confidentiality of their responses. Consent was implied by the completion and submission of the survey.

Reporting: The findings were compiled into a comprehensive report that included tables, figures, and narratives to present the data in a clear and accessible manner.

This methodology ensured a systematic and rigorous approach to investigating the prevalence and perceptions of wall murals in different settings, contributing valuable knowledge to the field of interior design and art appreciation.

RESULT AND DISCUSSION

Table 1: Demographic profile of the respondents

Age of Respondents	Gender (Percentage)		Education Qualification (Percentage)					Area (Percentage)	
	Male	Female	School level	Diploma	Graduate	Post Graduate	Professional	Urban	Sub -Urban
21-30 Years	14	8	0	1	8	10	3	22	0
31-40 Years	33	24	4	2	18	17	16	56	1
41-50 Years	16	5	3	3	8	5	2	21	0

The table presents a demographic analysis of the respondents based on their age, gender, education qualification, and area of residence. The age groups are divided into three categories: 21-30 Years, 31-40 Years, and 41-50 Years. The largest proportion of respondents falls into the 31-40 Years age group, indicating that this demographic is more actively engaged in the survey or is more prevalent among the stakeholders interested in wall murals. Males constitute a higher percentage in all age groups, suggesting they are more represented in the survey responses. The majority of respondents have either a Graduate or Post Graduate degree, with the highest percentage in the 31-40 Years age group, which aligns with the typical age range for these qualifications. There is a notable absence of respondents with a School level qualification in the 21-30 Years age group, which could imply that this age group is still pursuing higher education or has already completed it. The majority of respondents reside in Urban areas, with a significant representation in the 31-40 Years age group. There is a minimal representation of Sub-Urban residents, with only 1% in the 31-40 Years age group, indicating that the survey may have been more accessible or appealing to Urban dwellers. The table highlights that the survey respondents are predominantly male, aged between 31-40 years, with a Graduate or Post Graduate degree, and residing in Urban areas.

Table 2: Use of wall murals in building and placement of murals in different buildings

Type of Building	Placement of Wall Murals(Percentage)								Total
	Entrance	Front office	Waiting hall	Rooms/Cabins	Whole interior	Inside compound walls	Outdoor walls	Outdoor staircase	
Food industry	16	14	17	10	10	5	4	3	79
Education institution	22	13	15	15	12	24	27	14	142
Transportation	3	0	0	0	2	2	2	0	9
Park and Recreation	6	4	4	1	3	0	4	2	24
Office	4	2	2	0	2	1	4	0	15

| Shop | 5 | 4 | 5 | 2 | 0 | 2 | 5 | 1 | 24 |
| Mall | 2 | 2 | 2 | 0 | 1 | 1 | 2 | 0 | 10 |

The table provides a detailed percentage breakdown of wall mural placements across various building types.

In the food industry, wall murals are most commonly placed in the entrance (16%) and waiting hall (17%), followed by the front office (14%) and rooms/cabins (10%). There is also a notable presence on outdoor walls (4%) and outdoor staircases (3%), with the remaining percentages distributed among other locations. Education institutions have the highest total percentage of wall murals, with significant placements in the entrance (22%), front office (13%), waiting hall (15%), rooms/cabins (15%), and whole interior (12%). There is also a considerable use of murals inside compound walls (24%) and outdoor walls (27%). Transportation hubs have the least amount of wall murals, with only 9% in total. The majority are placed at the entrance (3%) and inside compound walls (2%), with outdoor walls also accounting for 2%.

Parks and recreation facilities show a relatively even distribution of wall murals, with the entrance (6%), front office (4%), waiting hall (4%), and outdoor walls (4%) having the highest percentages. Offices have a modest use of wall murals, with the entrance (4%) and outdoor walls (4%) being the most popular locations. Shops have a balanced distribution of wall murals, with the entrance (5%), front office (4%), and outdoor walls (5%) being the top choices. Malls have the lowest total percentage of wall murals among the listed buildings, with the entrance (2%) and outdoor walls (2%) being the primary locations for mural placement.

The table illustrates that wall murals are utilized in various locations within different types of buildings, with education institutions having the most extensive use of murals and transportation hubs having the least.

Table 3: Wall murals types in different buildings

Type of Building	Type of Wall Murals(Percentage)		
	Painted Directly on walls	Digital Print	Relief/Embossed
Food industry	16	5	2
Education institution	26	7	3
Transportation	2	2	0
Park and Recreation	7	4	0
Office	6	3	1
Shop	10	3	0
Mall	3	0	0

In the food industry, the most common type of wall mural is painted directly on walls (16%), followed by digital prints (5%) and relief/embossed murals (2%). Education institutions have the highest percentage of wall murals painted directly on walls (26%), followed by digital prints (7%) and relief/embossed murals (3%). Transportation hubs have a minimal use of wall murals, with painted directly on walls (2%) and digital prints (2%) being the only types mentioned, and no relief/embossed murals. Parks and recreation facilities utilize painted directly on walls murals (7%) and digital prints (4%) but do not use relief/embossed murals. Offices have a modest use of wall murals, with painted directly on walls (6%) being the most common, followed by digital prints (3%) and relief/embossed murals (1%). Shops have a balanced use of wall murals, with painted directly on walls (10%) and digital prints (3%) being the primary types, and no relief/embossed murals. Malls have the least variety in wall mural types, with painted directly on walls murals (3%) being the only type mentioned, and no digital prints or relief/embossed murals.

Overall, the table shows that painted directly on walls murals are the most popular type across all types of buildings, with digital prints being the second choice in most cases.
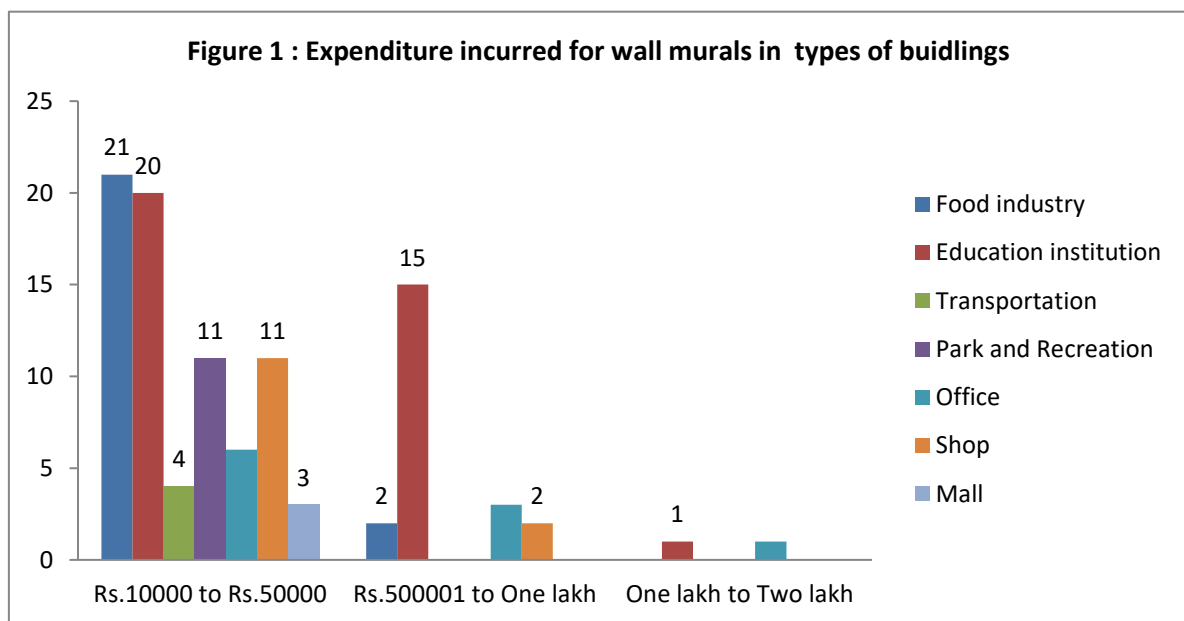
The figure 1 illustrates the expenditure on wall murals across different types of buildings, with the costs categorized into three ranges: Rs.10,000 to Rs.50,000, Rs.50,001 to One lakh, and One lakh to Two lakhs. The food industry spends the majority of its budget on wall murals in the Rs.10,000 to Rs.50,000 range (21%), with a smaller percentage (2%) in the Rs.50,001 to One lakh range, and no expenditure in the highest range. Education institutions also allocate most of their funds to the Rs.10,000 to Rs.50,000 range (20%), but they have a significant investment in the Rs.50,001 to One lakh range (15%) and a minimal expenditure in the One lakh to Two lakhs range (1%). Transportation hubs have the least expenditure on wall murals, with only 4% in the lowest range and no expenditure in the higher ranges.

Parks and recreation facilities spend 11% in the Rs.10,000 to Rs.50,000 range and do not invest in the higher ranges. Offices have a modest expenditure, with 6% in the lowest range, 3% in the middle range, and 1% in the highest range. Shops allocate 11% to the lowest range, 2% to the

middle range, and do not invest in the highest range. Malls have the least expenditure among all types of buildings, with only 3% in the lowest range and no expenditure in the higher ranges. Education institutions have the highest expenditure in the Rs.50,001 to One lakh range, while offices are the only ones with notable expenditure in the One lakh to Two lakhs range. This suggests that the budget for wall murals is influenced by the type of building and its specific needs or preferences.

Table 4 : Chisquare and correlation analysis of purpose of wall murals with the age of respondents

Age of Respondents	Purpose of Wall murals (Percentage)						
	To get identity	Improve the quality of living	Provide aesthetic appearance	Vaasthu Benefits	Create Theme and livability	Unique Look	Attract People
21-30 Years	17	11	11	0	9	16	14
31-40 Years	34	13	34	2	29	28	50
41-50 Years	15	7	18	2	13	13	14
Chi- Square value	2.546	5.555	6.518	2.621	1.896	3.869	7.355
Correlation value	0.043	0.122	0.241	0.15	0.138	0.075	0.029
Chi-square Probability value	0.280	0.062	0.038	0.270	0.388	0.144	0.025
Correlation Probability value	0.670	0.228	0.016	0.115	0.172	0.459	0.777

Probability value : <0.05(Significant), > 0.05 (Non significant)

The table delineates the purposes of wall murals as perceived by respondents across different age groups, along with statistical measures such as chi-square values, correlation values, and their respective probability values. For the 21-30 Years age group, the most significant purposes are to provide a unique look (16%) and to attract people (14%), followed by improving the quality of living (11%) and providing aesthetic appearance (11%). This age group does not consider Vaasthu benefits as a purpose for wall murals.

The 31-40 Years age group places a high emphasis on attracting people (50%), followed by providing aesthetic appearance (34%) and gaining identity (34%). This group also values creating theme and livability (29%) and achieving a unique look (28%), with a minimal consideration for Vaasthu benefits (2%). The 41-50 Years age group prioritizes providing aesthetic appearance (18%) and gaining identity (15%), followed by creating theme and livability (13%) and achieving a unique look (13%). Similar to the younger age group, they do not prioritize Vaasthu benefits.

The chi-square probability value for attracting people is 0.025, which is relatively low, suggesting a significant association between age and this purpose. Conversely, the correlation probability value for attracting people is 0.777, indicating a weak linear relationship between age and this purpose. The table reveals that the purposes of wall murals vary across different age groups, with

younger respondents focusing more on attracting people and achieving a unique look, while older respondents prioritize aesthetic appearance and gaining identity. The statistical measures provide insights into the strength and significance of these associations and relationships.

Table 5 : Maintenance of the wall murals in different buildings

Maintenance	Frequency of Maintenance (Percentage)				
	Weekly once	Monthly Once	Once in three Months	Once in six months	Never
Wet Cleaning	17	20	20	7	36
Dusting	26	34	12	8	20
Wiping	5	7	6	4	78
Brushing	3	1	3	6	87
Soaping	0	0	1	2	97
Sponging	0	0	0	1	99
Vacuuming	1	0	0	1	98

The table outlines the frequency of maintenance activities for wall murals, with specific percentages allocated to different maintenance tasks and their corresponding frequencies.

Wet cleaning is done weekly by 17% of respondents, monthly by 20%, every three months by 20%, every six months by 7%, and never by 36%. This suggests that there is a diverse approach to cleaning wall murals, with a notable portion choosing to never clean them. Dusting is the most frequent maintenance task, with 26% doing it weekly, 34% monthly, 12% every three months, 8% every six months, and 20% never dusting their wall murals. This indicates that dusting is a common practice, but there is still a significant percentage that does not engage in this activity. Wiping is the least frequent maintenance task, with the majority (78%) never wiping their wall murals. Only 5% wipe weekly, 7% monthly, 6% every three months, and 4% every six months.

Brushing is also infrequent, with 87% never brushing their wall murals. Just 3% brush weekly, 1% monthly, 3% every three months, and 6% every six months. Soaping is rarely used as a maintenance method, with 97% never using soap for their wall murals. Only 1% soap their murals every three months, and 2% every six months. Sponging is almost never done, with 99% never using a sponge for maintenance. Just 1% sponge their wall murals every six months. Vacuuming is also a rarely used maintenance technique, with 98% never vacuuming their wall murals. Only 1% vacuum monthly and 1% every six months.

Maintenance practices for wall murals vary widely, with dusting being the most common and wiping, brushing, soaping, sponging, and vacuuming being much less common. A considerable percentage of respondents never engage in any maintenance activities for their wall murals, which could have implications for the longevity and appearance of the murals over time.

CONCLUSION

This study has provided a comprehensive analysis of the prevalence, placement, types, expenditure, and maintenance practices of wall murals across various settings, including the food industry, educational institutions, transportation hubs, parks and recreation centers, offices, shops, and malls. The demographic breakdown of respondents indicates that the majority are male, aged between 31-40 years, with a Graduate or Post Graduate degree, and residing in Urban areas. This suggests that the survey was more accessible or appealing to this particular demographic, which may influence the generalizability of the findings.

The research reveals that education institutions have the highest total percentage of wall murals, indicating a strong emphasis on aesthetic enhancement and thematic expression in these settings. Parks and recreation facilities show a relatively even distribution of wall murals across different locations, indicating a balanced approach to their use. The study also finds that painted directly on walls murals are the most popular type across all types of buildings, with digital prints being the second choice in most cases. In terms of expenditure, the food industry spends the majority of its budget on wall murals in the lower range, while education institutions have significant investments in the higher ranges. The purposes of wall murals vary across different age groups, with younger respondents focusing more on attracting people and achieving a unique look, while older respondents prioritize aesthetic appearance and gaining identity. Maintenance practices for wall murals are diverse, with dusting being the most common maintenance task. However, a significant percentage of respondents never engage in any maintenance activities, which could have implications for the longevity and appearance of the murals over time. This lack of maintenance may lead to the deterioration of the murals, impacting their aesthetic appeal and thematic expression.

The findings have several practical implications that can guide businesses, institutions, and policymakers in utilizing wall murals effectively. Strategically designing and placing murals can maximize their appeal and effectiveness, helping attract target audiences or enhance the ambiance of a space. The study also highlights distinct expenditure patterns, enabling industries to optimize budgets for murals based on specific goals, whether for aesthetic enhancement or customer engagement. Moreover, the emphasis on murals in educational institutions underscores their potential to foster creativity and thematic storytelling, presenting opportunities to enrich learning environments. Insights into demographic preferences further support targeted marketing strategies, focusing on urban, educated, and middle-aged demographics that are more likely to engage with and appreciate murals. Additionally, the lack of maintenance practices highlights the importance of raising awareness and implementing solutions to sustain murals over time. This can enhance their durability and ensure their aesthetic and functional benefits. By leveraging these insights, stakeholders can better integrate wall murals into various environments, enhancing their cultural and aesthetic value while ensuring long-term sustainability.

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COMPARATIVE STUDY OF MOOD PROVOKED BY THEME AND NON-THEME RESTAURANT INTERIORS IN CHENNAI CITY

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ABSTRACT

The designer's primary role involves giving the interior a unique personality through elements such as style, color, lighting, layout, and furnishings (Grimley and Love, 2007). The main objectives of this study are to examine customer preferences when visiting themed and non-themed restaurants, analyze different types of themes and the moods they evoke in restaurant interiors, and raise awareness about innovative concepts in theme restaurants. The study also aimed to explore the various moods elicited by restaurant interiors. Surveys were conducted in selected areas of North Chennai and South Chennai, using interview schedules and observation methods as primary tools for data collection. The research employed a univariate cross-sectional design, with the commercial sector restaurant serving as the independent variable and the interior theme as the dependent variable. The study included 80 samples, comprising 40 customers and 40 restaurant managers. The objective was to evaluate the impact of specific interior designs in both themed and non-themed restaurants on customers' moods. The findings revealed that themed restaurants were preferred over non-themed ones due to their entertainment value, thematic decor and music. The moods evoked by interiors significantly differed between the two types of restaurants, with themed interiors creating a more enthusiastic and engaging atmosphere. The unique features of themed restaurant interiors were found to be more appealing. Additionally, a new concept, the "Friends Theme," was introduced, which was widely appreciated by customers for its enjoyable and inviting ambiance.

Key words: Chennai Restaurants, Interior Moods, Interior Theme, Restaurant Theme.

INTRODUCTION
"Design is not just what it looks like and feels like. Design is how it works."
- Steve Jobs

Restaurants have transformed into some of the most thoughtfully designed spaces, as dining has become a fashionable and experiential activity. Modern customers seek exceptional

environments when they visit restaurants. According to Knackstedt (2012), restaurants are often noisy, with fast food and fast casual establishments being the loudest, while fine dining venues typically maintain quieter atmospheres. The exterior environment plays a vital role in shaping customers' first and last impressions of a restaurant. However, Walter and Edvardsson (2012) emphasize that interior design has an even greater impact, significantly influencing both positive and negative customer experiences. The physical environment of a restaurant greatly affects its overall image and can either enhance or diminish customer perceptions (Ryu et al., 2010).

The concept of "Restaurant Interior Design" encompasses various elements such as layout, style, decor, furniture, colours, lighting, and architecture, all of which contribute to the overall impression of the space. For an optimal experience, these components must work together harmoniously. In the competitive restaurant industry, understanding the impact of interior design on customer moods is essential. As dining experiences continue to evolve, the ambiance created by themed and non-themed interiors plays a significant role in influencing customer satisfaction and overall experience. This research seeks to examine these effects, offering valuable insights for restaurant owners and designers to enhance their spaces and better meet customer expectations. The study on "A Comparative Study of Moods Induced by Themed and Non-Themed Restaurant Interiors in Chennai City" rationalizes the need for this Research.

OBJECTIVES

The main aim of the study is to

- Study the preference of customers in visiting theme and non-theme restaurants.
- Analyze the various features used in interiors of restaurants.
- Identifying various moods provoked by Interiors.
- Create awareness on a new concept of theme restaurant.

HYPOTHESES

1. Significant differences would exist between the features of the restaurant.
2. There would be a significant difference between mood provoked by the interiors as per the type of restaurant.
3. There would be significant differences in the relationship between the location, theme and mood with the types of restaurants.
4. There would be a significant relationship between satisfactions obtained by the interiors of the restaurant.

METHODOLOGY OF THE STUDY

The study, A Comparative Study of Moods Induced by Themed and Non-Themed Restaurant Interiors in Chennai City, aligns with determined principles of research methodology. Comparative studies, as highlighted by Creswell (2014), are fundamental for identifying differences and drawing meaningful conclusions about the impact of distinct variables. This study seeks to examine the influence of themed and non-themed interiors on specific outcome, particularly customer moods. Employing these comparative techniques, the research provides valuable insights into how different restaurant interior designs shape customer experiences.

Research Design

For the present study, a univariate, cross sectional research design was used with variables such as commercial sector Restaurant as independent variable and the Interior theme as dependent variables. The primary aim of this study is to compare various moods provoked by interiors of the theme and non-theme restaurants. A statistical test was conducted to identify the main problem and to evaluate the two formulated hypotheses. The primary tools for data collection were the interview schedule and the observation method.

Sampling Design

The samples were drawn from various regions within Chennai city. The sample size was 80, consisting of 40 participants from each group. 40 customers and 40 managers of the restaurant were chosen for the study. The surveys were conducted in North Chennai and South Chennai in selected areas. The sample size was diagrammatically represented.

Tools for Assessment

The interview schedule was deemed an appropriate method for this study. It includes a carefully selected and arranged list of questions relevant to the investigation. The primary tools used in this study were the interview schedule and the observation method.

Main Study

The main study involved forty restaurant customers and forty restaurant managers, who were interviewed using the prepared interview schedule. Each participant was contacted personally, and the purpose of the study was explained to them. The sample size was diagrammatically represented
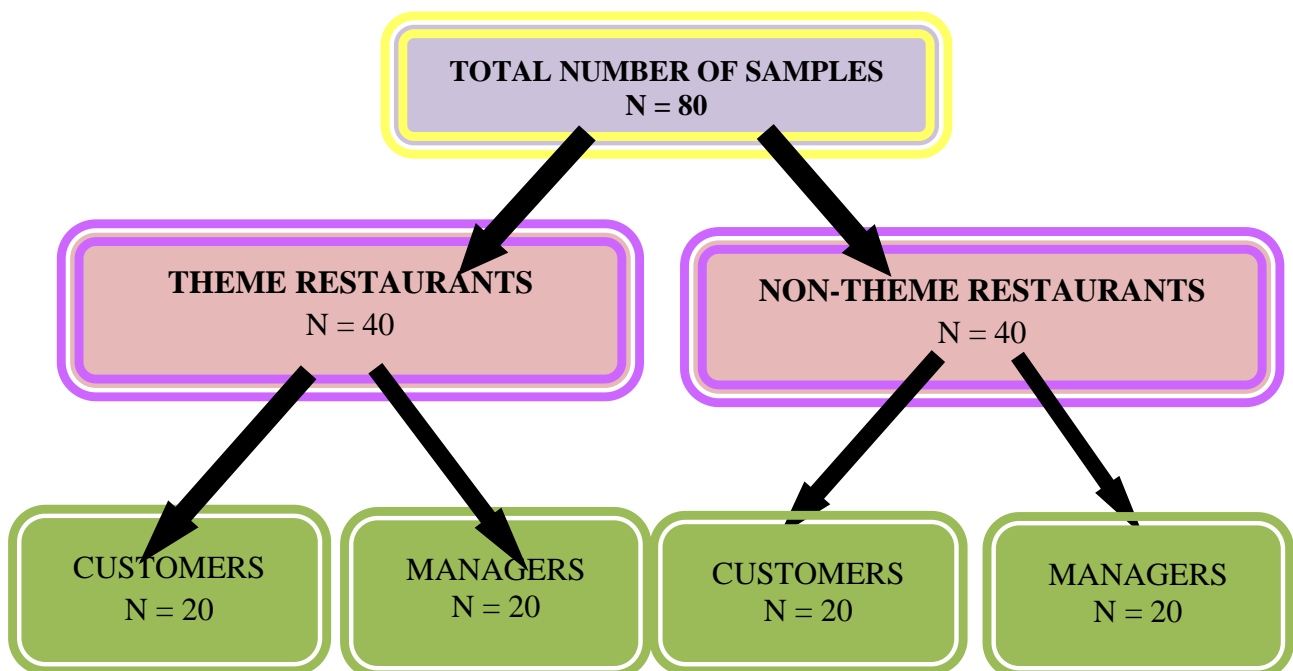
Figure -1 Diagrammatic representation for the Selection of Sample

Analysis of Data

The data collected from respondents were edited, coded, classified, tabulated, and analyzed using parametric statistical tests such as t-test, chi- square and correlation coefficient. The result was analyzed and presented under results and discussion.

Plan Layout for Theme Restaurant

The researcher selected "Friends" as the theme for the restaurant. While the concept of friendship is well-known across all age groups, a Friends-themed restaurant is a novel idea that aligns with modern trends. This theme is expected to create a welcoming and vibrant atmosphere for customers, especially near institutions and colleges. Consequently, the layout of the restaurant has been carefully planned and is presented below.

FINDINGS AND DISCUSSION

The study aimed to analyze the Comparative study on various moods provoked by Interiors of the Theme and Non-Theme Restaurants in Chennai city. The parametric statistics test analysis consists of t-tests, chi-square tests, and correlation coefficients, with detailed results discussed.

Findings of the Customer Survey

This Table-1 is about the details related to the customer preference to the restaurant.

Theme restaurants attract a significantly higher percentage of first-time visitors. This could be due to the unique or novel experiences they offer, which might appeal to customers seeking something new. A majority of 45 percent of the people had visited theme restaurants for the first time and 45 percent regularly visited non-theme restaurants.

Table – 1 Customer preference to the Restaurant

Customer Preference	Theme Restaurant		Non – Theme Restaurant		Total	
	N = 20	In Percent	N = 20	In Percent	N = 40	In Percent
Regular	5	25	9	45	14	35
First time	9	45	3	15	12	30
Occasional	4	20	5	25	9	22.5
Rare	2	10	3	15	5	12.5
Accompanied with						
Family	6	30	9	45	15	37.5
Friends	12	60	3	15	15	37.5
Colleagues	2	10	8	40	10	12.5
Members visited together						
1-3	4	20	3	15	7	17.5
4-7	12	60	10	50	22	55.0
8-11	4	20	3	15	7	17.5
Above 12	0	0	4	20	4	10

The respondents who visited the theme restaurant were accompanied by their friends by a majority of 60 percent and those who visited non-theme restaurant accompanied by their family of 45 percent. Theme restaurants are overwhelmingly preferred when dining with friends, likely due to the fun and engaging environment that appeals to social groups. A majority of 60 percent of the samples visited theme restaurants and 50 percent visited non-theme restaurants.

This analysis suggests that theme restaurants are more effective in attracting new customers and social groups, while non-theme restaurants have stronger appeal among regular patrons, families, and professional gatherings. Restaurant managers could use this information to tailor their marketing strategies and service offerings to better meet the needs of their target audiences.

Features of the Restaurant

Table - 2 presents the features of the restaurant. It is inferred that a significant difference at 1 percent level prevailed in theme restaurants with features such as theme, styles, lighting, wall finishes, floor finishes, furniture materials and additional features. The reason could be that each theme differs with all sorts of interior work. Hence hypothesis 1 was accepted.

Table -2 Features of the Restaurant

Features of the Restaurant	Mean	Std. Dev	Std. Error Mean	't' Value
Theme	12.38	5.77	.913	13.549**
Styles	1.43	.549	.087	16.402**
Lighting	1.70	.648	.103	16.580**
Wall Finishes	2.20	.823	.130	16.912**
Floor Finishes	1.15	.362	.057	20.113**
Furniture Materials	1.95	.846	.134	14.581**
Additional Features	1.68	1.248	.197	8.486**

** Denotes significant at one percent level

Various Moods Provoked by the Interiors as per Type of the Restaurant

Table 3 and Figure 2 below depicts the various moods elicited by the interiors, categorized by restaurant type.

Table – 3 Various Moods Provoked by the Interiors as per Type of the Restaurant

	Type of Restaurant	Mean	Std. Dev	Std. Error Mean	't' Value
Mood	Theme	3.15	.875	.196	6.363**
	Non-Theme	1.50	.761	.170	
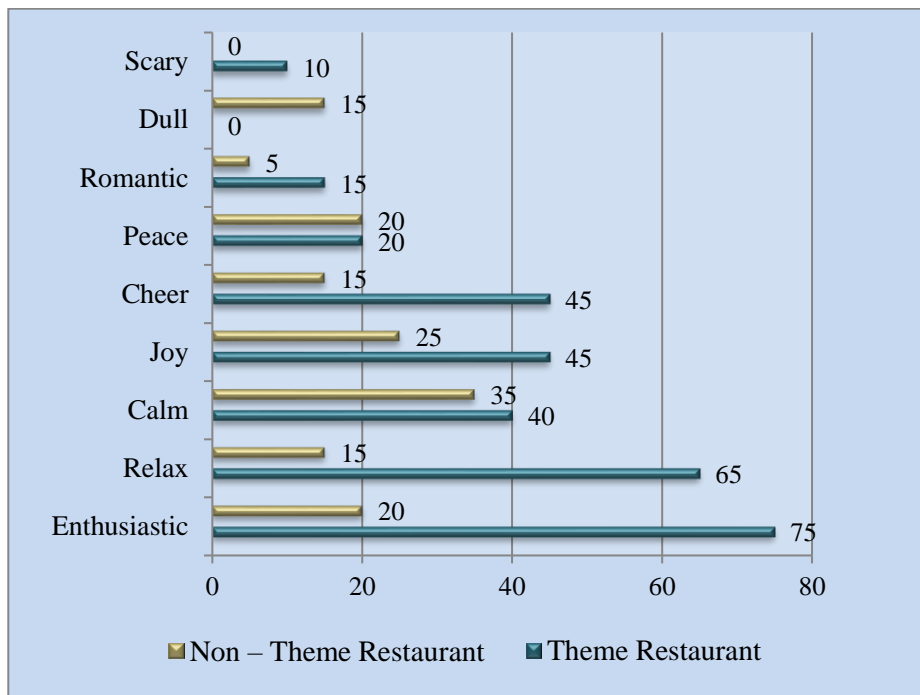
Figure -2 Various Moods Provoked by the Interiors

From this figure - 2 among all the mood provoked, a majority of 75 percent of the respondents who visited the theme restaurant felt very enthusiastic.

The t-value of 6.363** is highly significant (p < 0.01), meaning that the difference in mood scores between theme and non-theme restaurants is statistically significant. This large t-value reinforces that theme restaurants have a significantly greater positive impact on mood compared to non-theme restaurants. The theme of the restaurant improves mood to a great extent and makes the place enthusiastic, relaxed, calm, joyful, cheerful, peace-minded and so on. Hence hypothesis 2 was accepted.

Correlations Analysis on Location, Theme and Moods of the Restaurant

It can be deducted from the present study that location, theme and moods correlated with theme and non-theme restaurant interiors. There is a significant positive correlation between Location and Theme. The Pearson correlation coefficient of .412 indicates a moderate positive correlation between Location and Theme. This suggests that as the values for Location increase, the values for Theme also tend to increase. There is a significant negative correlation between Theme and Moods. This value indicates a moderate negative correlation between Theme and moods. As Theme scores increase, mood scores tend to decrease, and this relationship is stronger than the one found above. This analysis can be useful for understanding how these variables interact with each other. Hence hypothesis 3 was accepted.

Table – 4 Correlations between Location, Theme and Moods of the Restaurant

Correlation analysis		Location	Theme
THEME	Pearson Correlation	.412**	1
	Sig. (2-tailed)	.008	
	N	40	40
MOODS	Pearson Correlation	-.236	-.488**
	Sig. (2-tailed)	.142	.001
	N	40	40

*. Correlation is Significant at the 0.005 level (2-tailed)

**. Correlation is Significant at the 0.001 level (2-tailed)

Customer Satisfaction with Theme Restaurant Interior Experience

Table - 5 shows the data regarding the satisfaction obtained by the interiors of the restaurant.

Table - 5 Customer Satisfaction with Theme Restaurant Interior Experience

Interior of the Restaurant	Not Satisfied		Partially Satisfied		Satisfied		Chi-Square Value
	Theme	Non-Theme	Theme	Non-Theme	Theme	Non-Theme	
	N=20 In Percent	N=20 In Percent	N=20 In Percent	N=20 In Percent	N=20 In Percent	N=20 In Percent	
Entertainment	0	15	15	65	85	20	17.298**
Out of the World	0	50	25	40	75	10	20.633**
Accent Lighting	10	60	50	25	50	15	0.404NS
Furniture	0	5	30	25	70	70	1.091NS
Music	90	40	10	50	100	10	24.571**

**** Denotes 1 percent Significance Level   NS Denotes Not Significant**

From table 5 it is very clear that a majority of 85 percent of the respondents were fully satisfied with the entertainment of the theme restaurant. Theme restaurants were designed to provide customers with not only a meal, but entertaining experience (Weiss. R, 2004). There is a significant relationship between the customers' satisfaction with the interiors of the restaurant, namely entertainment, out of the world and music at the 1 percent level. There was no significant relationship between the two groups in lighting and furniture. Hence hypothesis 4 is partially accepted.

Across the board, the themed restaurant environment tends to result in higher satisfaction levels compared to the non-themed environment, particularly in areas like Entertainment, "Out of the World" aspects, and Music. This suggests that the atmosphere and thematic elements significantly enhance the overall dining experience. These aspects show mixed results, with dissatisfaction present in both groups. However, themed environments still tend to perform slightly

better, especially in lighting. The most dramatic difference is seen in music satisfaction, where the themed environment almost universally satisfies patrons, while the non-themed environment falls short. In conclusion, the themed environment significantly enhances customer satisfaction in multiple aspects of the restaurant experience, particularly in areas that contribute to the ambiance and uniqueness of the dining experience.

Plan Layout and Interiors of the Theme Restaurant

The plan layout and interiors are designed in such a way that it creates enthusiasm and acts as an entertainment spot for the youngsters. Among all the selected theme restaurants, the most used themes were forest, tradition, fantasy, travel and country style. Hence the theme with a new concept of "Friends" has been used. The majority of the age group who visited theme restaurants was around 15 to 25 years. As students have more knowledge about the current trend and are interested in visiting theme restaurants compared to other age groups, a new theme which would be highly preferred by the youngsters is used. The theme used for this restaurant is friends and so the name of it is given as "Friends Restaurant". This restaurant could be located in part of the city where there are more educational institutions, so that it would be easy for the students to visit.

The plan layout and interior wall elevation of the restaurant has been given in Plate. The proposed land area of the restaurant is 1330 sqft. In this, the total built area is 1150 sq.ft which comprises of the following:

- Dining area - 800 sq.ft
- Kitchen and Service area - 250 sq.ft
- Wash area – 100 sq.ft

Friends Theme Restaurant

Theme restaurants offer several unique benefits that can enhance customer experience and provide a competitive edge. Themed décor, music, and ambiance create a distinctive and immersive dining experience that leaves a lasting impression on customers. Themes often evoke emotions or nostalgia, such as a "Friends" or retro theme, fostering a deeper connection with customers. A well-executed theme sets the restaurant apart from competitors, making it easily recognizable and attractive to specific target audiences. Visually appealing themes encourage customers to take photos and share their experiences on social media, increasing the restaurant's online presence.

The goal is to recreate the warm, welcoming, and slightly quirky vibe of "Friends" while ensuring that each area of the restaurant feels comfortable and functional. The interiors should evoke nostalgia and joy, making the "Friends" theme an integral part of the dining experience, rather than just a backdrop.

In this wall elevation, different values of yellow color are used to paint the wall. This color brings cheerfulness to the interior space. Every week games and activities would be organized by event organizers of the restaurant. A wall mural depicting a tree with photo frames is given, in which the photos of the friends group who win in the events and activities conducted by the restaurant are fixed into. These photos can be changed weekly according to the winners of the activities. This creates enthusiasm and joy among the customers who visit here.

FLOOR PLAN
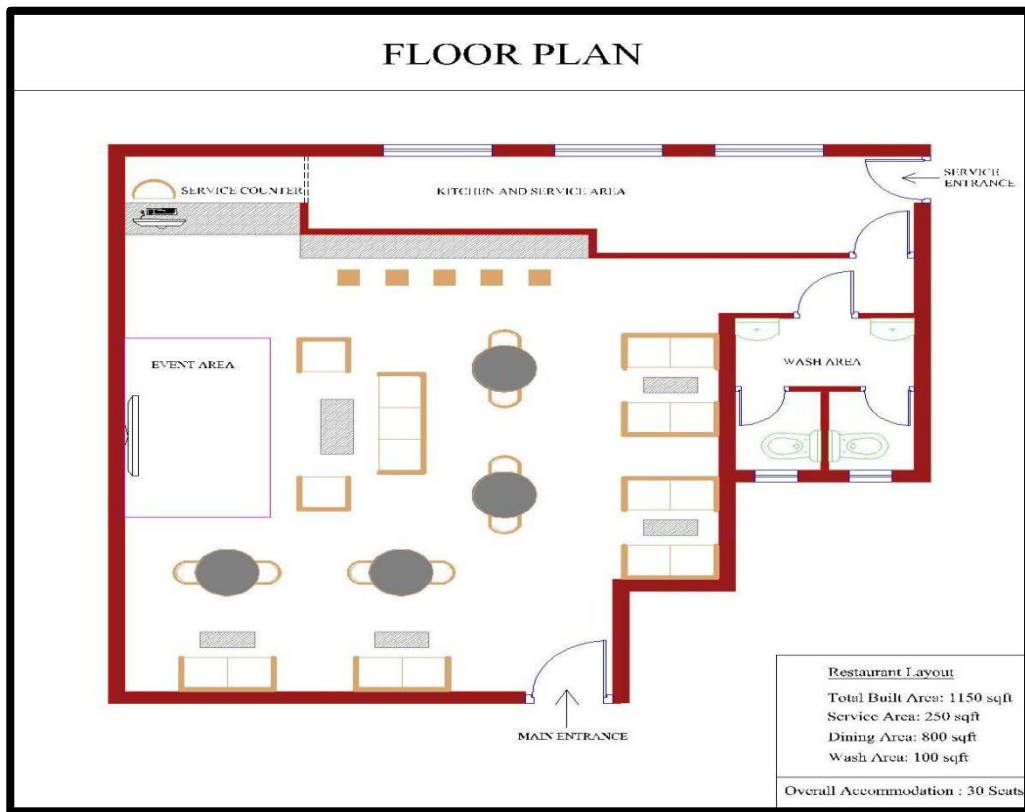
Plate -1
Wall Elevation -1

In this wall elevation, different values of turquoise blue have been used to paint the wall. This color brings peace and calmness to the interior space. A television is placed at the center of the wall in which movies, songs and series related to friendship are played to entertain the customers. A wall mural depicting a group of friends jumping together at the same time is given.
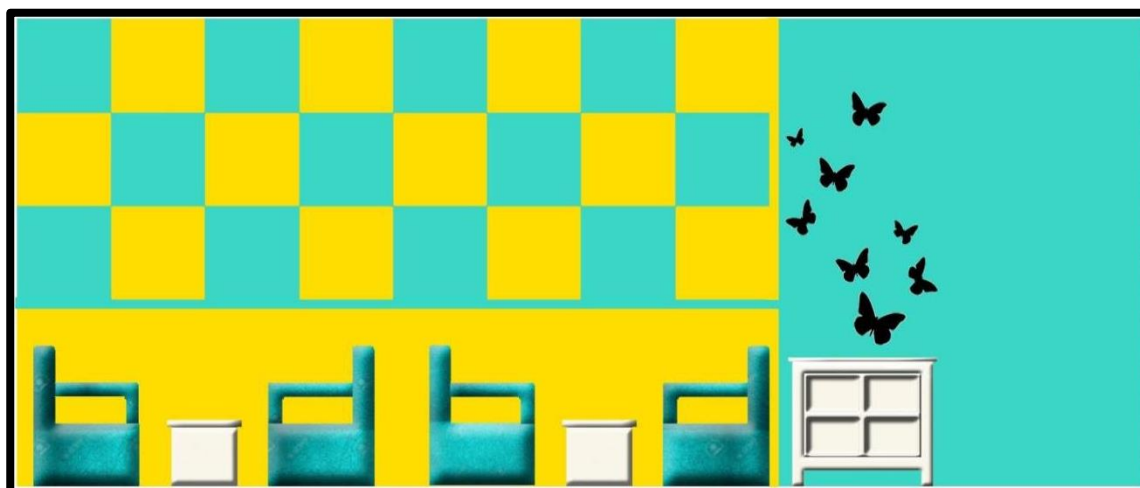
Plate -2
Wall Elevation - 2

In this wall elevation, a color combination of turquoise blue and yellow is used to create a theme in the wall color. A checked pattern of alternating colors is used in the wall. The furniture used also matched the wall color. This creates a harmony and rhythmic design. A wall mural depicting butterflies is shown.

Interiors of the Restaurant - This theme of restaurant concentrated their surface finishing, furniture and lighting as follows:

Wall and Floor Covering - A quirky color combination of yellow and turquoise blue paint is used for wall covering. Wall murals depicting different images related to the theme are also used. Customized laminated PVC sheets are used for flooring matching the wall colors.

Furniture - Cozy couches of customized colored leather finish are used to seat. Also, a metal bar stool across the counter is given. Acrylic top tables with wooden legs are given for the dining table.

Lighting - Decorative cove, track, spotlights and LED ceilings lights matching the wall colors are used.

SUMMARY AND CONCLUSION

The findings of this study offer several valuable implications for the restaurant industry. Enhanced Customer Experience their preference for themed restaurants, driven by their entertainment value, theme, and music, highlights the importance of creating engaging and immersive dining environments. Restaurant owners can leverage this insight to design spaces that cater to customer preferences, thereby enhancing overall satisfaction. Understanding the design choice in themed interiors provokes more enthusiastic and entertaining moods compared to non-themed settings can guide restaurateurs in their design decisions. Investing in thematic elements could differentiate a restaurant in a competitive market and attract a larger customer base. Innovative Concepts of new themes, such as the "Friends Theme," demonstrates the potential for innovative concepts to resonate with customers. Restaurateurs should consider developing unique themes that align with popular culture or customer interests to create memorable dining experiences. The study's findings can inform marketing strategies by emphasizing the aspects of themed restaurants that appeal to customers. Promoting the entertainment and ambiance of themed establishments can attract customers seeking a distinctive dining experience. The results provide practical design recommendations for designing restaurant interiors. Focus on creating an energetic and engaging

atmosphere through thematic elements, décor, and music to enhance the dining experience and foster positive customer moods. By applying these insights, restaurant owners and designers can better meet customer expectations and improve the overall dining experience.

Hence, concluded that theme restaurants are more admired by the respondents than non-theme restaurants because of entertainment, theme and music. The various moods provoked by the interiors differed significantly between the theme and non-theme restaurants. The interior ambience and atmosphere of the theme interiors are more enthusiastic and entertaining than the non-theme restaurants. A new concept has been introduced as "Friends Theme", in which all the customers like and enjoy the place very much.

Suggestions for Future Research:

1. Expanding the study to include restaurants in other cities or regions could provide a more comprehensive understanding of how cultural and regional differences influence the effectiveness of themed and non-themed interiors.
2. Investigating how different demographic factors affect preferences for themed versus non-themed interiors could offer more nuanced insights into customer behavior.
3. Assessing the economic impact of themed versus non-themed interiors, such as revenue generation and customer retention rates, could help determine the financial benefits of investing in themed designs.

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ANALYSIS ON USE OF DOORS AND WINDOWS IN THE SELECTED HOUSEHOLDS OF COIMBATORE CITY

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ABSTRACT

Doors and windows act as an integral component of architectural design, serving functional, aesthetic, and environmental purposes. Functionally, doors provide entry and exit points, ensuring privacy, security, and delineation of spaces within a structure. Windows, on the other hand, facilitate natural light, ventilation, and visual connections with the external environment. The study on doors and windows has been conducted in Gandhipuram, Saibaba colony and R.S.Puram of Coimbatore city with 100 households as a sample between December 2022 and May 2023. Purposive sampling method was used for this study, where high income families are chosen for the study. This study explains about the types of doors and windows, materials used in doors and windows, care, maintenance and cleaning methods followed by the households and the quality of doors and windows based on materials. The purposive sampling method was employed to select the households, targeting those with high income levels to access their choices and practices regarding doors and windows. This study revealed a range of materials used in doors and windows, from traditional wood to modern materials, reflecting the blend of functionality and aesthetics. The design, style, and functionality of doors and windows continue to evolve, influenced by cultural, technological and environmental considerations.

Key Words: Doors, Windows, Households, Maintenance, Quality

INTRODUCTION

Door and Windows plays a significant role in today's interiors and livelihood. A door is to serve as a physical barrier that frequently swings open or closes to provide access. Door is a movable part which act as an access to the room. It is a moveable (swinging) barrier fixed in a doorway via a building wall or partition to permit access to a building's interior or particular interior rooms, wherein the hinges are used to secure one side to the built-up wall while leaving the other side free (Wu, 2021).

Tipu Sultan is the ruler of Mysore Kingdom of Southern India of 18th-century. To guard his fort that located in the summit of a steep hill in the heart of the city commissioned the first Dindigul lock. (Thiagarajan, 2020). According to Tutton and Campbell (2020), doors have been an

essential part of human civilization for thousands of years. The history of doors can be traced back to ancient Egypt, where doors were made from stone and often decorated with intricate carvings and paintings. According to Kinayekar et al., (2022) Vastu Sastra evolved during Vedic times of India. It is not only a science, but is a bridge man and nature. Its main aim is to form a balance between the outside atmosphere.

The doors seem to be simple in structure and comprised of several components in it. The body of the door is essentially made of several components including door panel, door frame, hinges, lockset, door knob/lever, weather stripping and threshold (Mahajan, 2016). Window panel was made up of two parts sash and glazing. Now a days, the glazing was made up of glass (transparent, semi-transparent and opaque), but the sash and the frame were made of same material. The commonly used materials were wood, aluminium, fibreglass, glass, MDF, plywood, UPVC, steel, vinyl and composite (Hlover and Allen, 2022).

Today, doors come in a wide variety of styles, materials and functions. From traditional wooden doors to modern glass and steel designs, doors have evolved to meet the changing needs of society. They are not only functional but also a key design element in architecture and interior design, adding character and personality to buildings and spaces (Vicky, 2022).

In the dynamically changing world, the trend for doors and windows has also shifted from traditional wood, pine, plastic and metal to Un-plasticised Polyvinyl chloride (UPVC), anodized aluminium, black frames, steel finishes, bold entry doors, full height doors, glass, sliding and eco-friendly doors (Bansal, 2022).

Modern trends in doors focus on innovative materials and technologies. This includes prefabricated composite materials, patterned and tempered glass, hollow metal frames, and solar-powered options, offering a wide range of choices for architectural design and functionality. Thus the investigator has undertaken a study on **"Analysis on Use of Doors in the Selected Households of Coimbatore City"** in order to understand the types, materials and maintenance of doors.

OBJECTIVES OF THE STUDY

The following objectives were undertaken in the study-
- To analyze the types of doors and windows in the selected households.
- To identify the materials used in the doors and windows of selected households.
- To assess the maintenance and quality of doors and windows by the selected households.

METHODOLOGY

Household Survey → Sampling Medthod: Purposive Sampling → Sample Size: N=100 → Area of Sample:Saibaba Colony (50), Vadakovai (25), R.S.Puram (25) → Tools Used: Interview Schedule
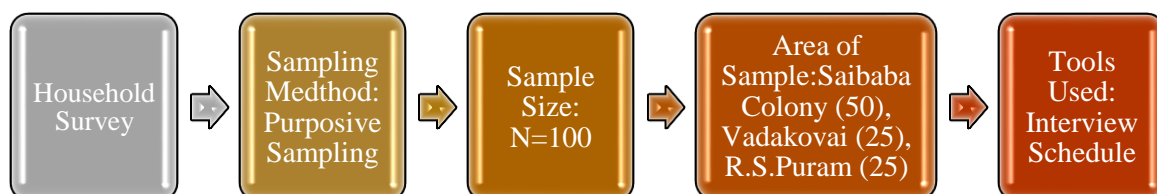
The quantitative research analysis was adopted for the study along with the purposive sampling method. The household survey focused on high-income families residing in Saibaba Colony, Vadakovai, and R.S. Puram, areas chosen for their prevalence of affluent residents and easy accessibility. A total of 100 households were surveyed, with 50 from Saibaba Colony and 25 each from Vadakovai and R.S. Puram. The purposive sampling method ensured that the selected households were owned by high-income families, had been constructed within the past two decades, and included both individual houses and apartments.

The data collection involved direct personal interviews and observations, using a pretested and finalized interview schedule. This schedule, which included both qualitative and quantitative questions, was designed to gather comprehensive information about doors and windows, including their design, materials, maintenance, cleaning methods and quality based on materials.

RESULTS AND DISCUSSION

The data received from the selected 100 households are presented below.

1. **Details of Doors and Windows Based on Types and Materials:**

The details on materials, types of doors and windows used for their construction are discussed in Table 1.

Table 1: Details of Doors and Windows Based on Types and Materials

Materials/Doors and Windows		Materials (Percentage)							
		Wood	Fibre glass	Glass	PVC	Steel	Galvanised Iron	MDF	Plywood
Types of Doors Percentage of Houses* (N=100)	**One Panel* (N=80)**	70	28.8	10	43.8	16.2	12.5	56.3	45
	Two Panel* (N=45)	100	-	15.6	57.8	24.4	31.1	24.4	13.3
	Sliding* (N=35)	68.6	100	37.1	40	-	-	-	-
	Bifold* (N=20)	30	40	-	-	-	-	85	65
	French* (N=40)	100	60	62.5	-	-	-	-	-
	Pocket* (N=15)	20	40	-	-	-	-	9	14
	Patio* (N=60)	38.3	96.7	-	-	-	-	13	8
Types of Windows Percentage of Houses* (N=100)	**Casement* (N=100)**	65	20	28	67	-	-	65	54
	Slider* (N=75)	40	64	60	40	-	-	17.3	9.3
	Bay* (N=35)	-	100	-	-	-	-	-	-
	Picture (N=15)	-	53.3	46.8	-	-	-	-	-
	Awning* (N=3)	-	100	-	-	-	-	-	-
	French* (N=40)	100	60	62.5	-	-	-	-	-
	Skylight (N=15)	-	33.3	66.7	-	-	-	-	-

*Multiple Responses

a) Details of Doors

The details of doors are discussed below based on its types and materials

i) Details of Doors Based on Types

Based on the study, the majority of households used one panel (80 per cent), patio (60 per cent), two panel (45 per cent) and french (40 per cent) doors, whereas the sliding (35 per cent), bifold (20 per cent) and pocket doors (15 per cent) were also noted in few households.

ii) Details of Doors Based on Materials:

Wood, PVC, MDF and Plywood were the materials used in maximum of the selected households. According to the surveyed households, a maximum of 100 per cent of them used wood as a major material in two panel and French doors, whereas 70 per cent and 68.6 per cent of them used wood in one panel and sliding doors respectively. Fibreglass was used sliding (100 per cent) and patio (96.7 per cent) doors in a majority of households. In the surveyed households, glass was used in 62.5 per cent of French doors and 37.1 per cent of sliding doors. PVC was used in two panel (57.8 per cent), one panel (43.8 per cent) and sliding (40 per cent) doors of selected households. Steel and Galvanised Iron were noted in minimum number of households. Two panel and one panel doors made of steel were seen in 24.4 per cent and 16.3 per cent of the households, where galvanised iron was also noted in those two types of doors of 31.1 per cent and 12.5 per cent of the households respectively. A maximum of 56.3 per cent and 45 per cent of the surveyed households used MDF and plywood in one panel doors, while 24.4 per cent and 13.3 per cent of them used MDF and plywood in two panel doors respectively.

b) Details of Windows

The details of windows are discussed below based on its types and materials

i. Details of Windows Based on Types:

Based on the survey, a maximum of 100 per cent, 75 per cent, 40 per cent and 35 per cent of the selected households used casement, slider, french and bay windows as a major component in their houses. A minimum of 15 per cent of them were using picture and skylight window, whereas only 3 per cent of them were using awning windows.

ii. Details of Windows Based on Materials:

The materials majorly used for windows were PVC, wood, MDF and plywood. A maximum of 100 per cent, 65 per cent and 40 per cent of the surveyed households were using wood for their French, casement and slider windows. As fibreglass and glass were similar in structure, they were noticed majorly in French (60 per cent and 62.5 per cent), picture (53.3 per cent and 46.77 per cent), slider (64 per cent and 60 per cent) and skylight (33.3 per cent and 66.7 per cent) windows of the selected households. A majority of 67 per cent and 40 per cent of the households were using PVC as a major material for their casement and slider windows. A maximum of 65 per cent and 54 per cent of the selected households were using MDF and plywood casement windows, whereas a minimum of 17.33 per cent and 9.33 per cent of them were using MDF and plywood slider windows respectively.

2. LEVEL OF MAINTENANCE AND CLEANING METHODS:

The details on level of maintenance and cleaning methods of materials used in doors and windows are discussed in the below Figures 1 and 2.
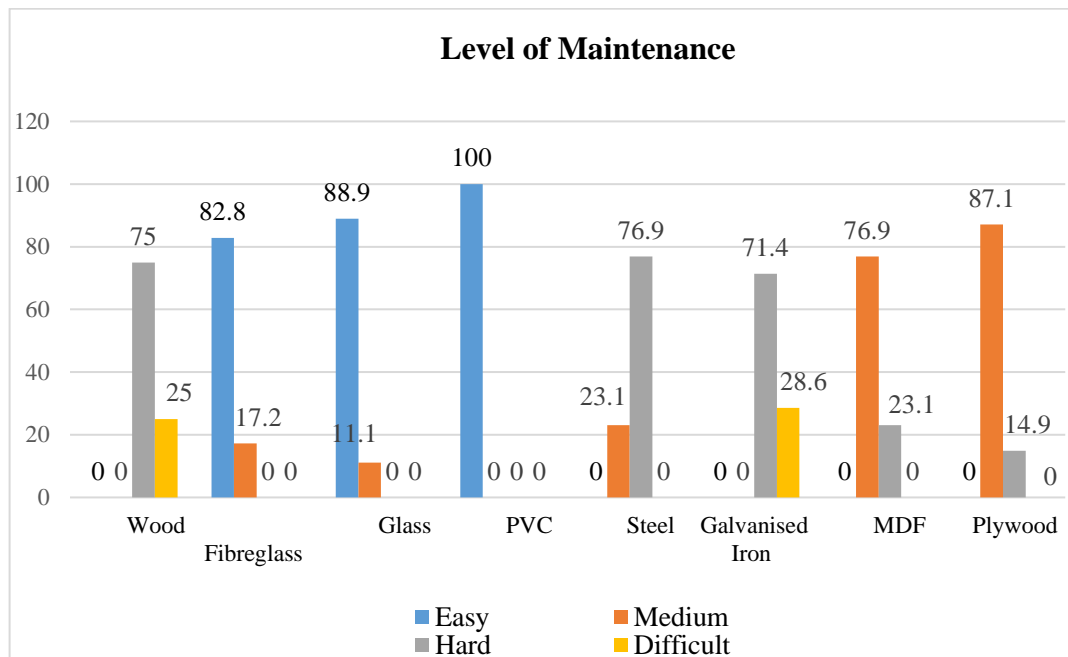
FIGURE 1: Details on Level of Maintenance of Materials used in Doors and Windows
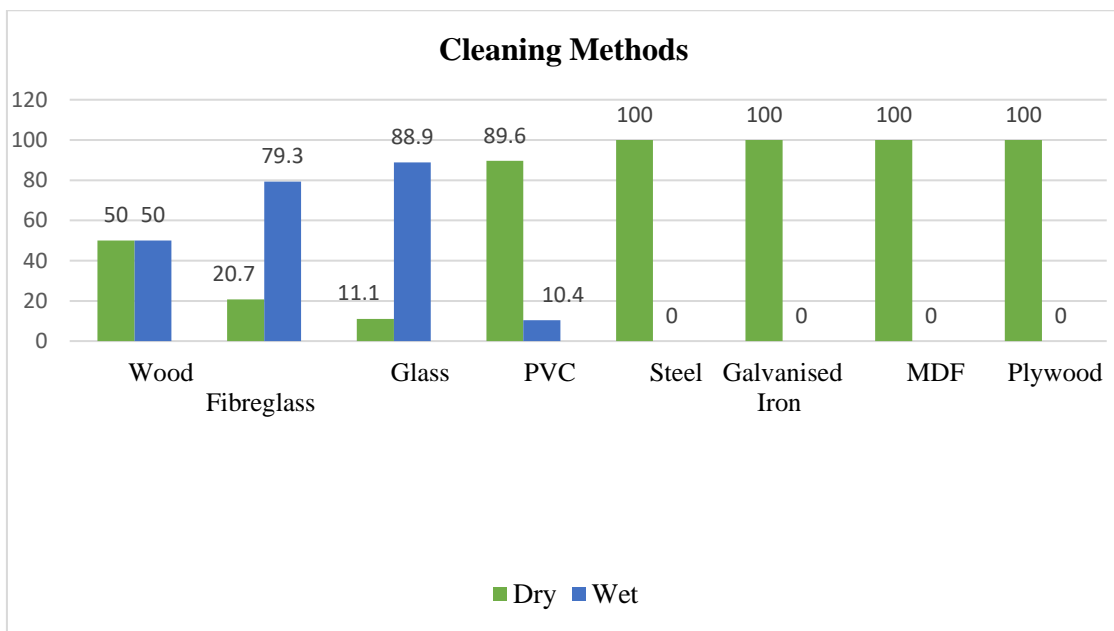
FIGURE 2: Details on Cleaning Methods of Materials used in Doors and Windows

These figures provide an overview of various building materials used in houses, categorising them by their level of maintenance required and the preferred cleaning methods. The data is divided into two section:

a. **Level of Maintenance:**

As per the survey, a maximum of 100 per cent, 88.9 per cent and 82.8 per cent of the households mentioned that PVC, glass and fibreglass were easy to maintain respectively. a majority of 97.1 per cent and 76.9 per cent of the households rated the maintenance of plywood as medium, whereas a minimum 23.1 per cent, 17.2 per cent and 11.1 per cent of them mentioned that the level of maintenance of steel, fibreglass and glass was also medium respectively.

Among the surveyed households, a maximum of 76.9 per cent, 75 per cent and 71.4 per cent of them rated hard maintenance for steel, wood and galvanised iron, where a minimum of them rated the same for MDF (23.1) and plywood (14.9). About 28.6 per cent and 25 per cent of the selected households expressed that the level of maintenance of galvanised iron and wood as difficult.

b. **Cleaning Methods:**

All the surveyed households (100 per cent) mentioned that the dry cleaning method was used in cleaning MDF, plywood, steel and galvanised iron doors and windows, whereas 89.6 per cent and of them mentioned that PVC was cleaned by dry cleaning method. Wood was cleaned using both wet and dry-cleaning methods, mentioned by 50 per cent of the households each. A maximum of 88.9 per cent and 79.3 per cent of the selected households expressed that glass and fibreglass were cleaned using wet cleaning method.

3. **Qualities of Doors and Windows Based on the Materials Used:**

The rating on durability, stain resistivity and fire resistivity of materials used for the doors and windows of the selected households were discussed in Table 2. These qualities differ based on the finishing and methods of construction of materials.

Table 2: Details on the Qualities of Doors and Windows Based on Materials

Materials Used	Percentage of Houses (N=100)								
	Durability			Stain Resistivity			Fire Resistivity		
	High	Moderate	Low	Good	Medium	Poor	Good	Medium	Poor
Wood (N=100)	82	18	-	78	22	-	90	10	-
Fibreglass (N=58)	55.2	44.8	-	100	-	-	69	31	-
Glass (N=45)	-	77.7	33.3	100	-	-	-	77.7	33.3
PVC (N=67)	-	74.6	25.4	-	52.2	47.8	-	74.6	25.4

Steel (N=13)	100	-	-	76.9	23.1	-	100	-	-
Galvanised Iron (N=14)	100	-	-	71.4	28.6	-	100	-	-
MDF (N=65)	53.8	46.2	-	53.8	46.2	-	53.8	46.2	-
Plywood (N=54)	63	37	-	63	37	-	33.3	77.7	-

- Wood was rated high in durability (82 per cent), stain resistivity (78 per cent) and fire resistivity (90 per cent) by the selected households, with a smaller percentage mentioned it as medium.
- A maximum of the selected households expressed that fibreglass was very effective in resisting stains (100 per cent), has good fire resistivity (69 per cent) and the durability (55.2 per cent).
- According to the selected households, the stain resistivity of the glass was good (100 per cent), whereas the durability and fire resistivity of glass were both medium (77.7 per cent) and poor (33.3 per cent).
- PVC was rated good (74.6 per cent) for its durability and fire resistivity, while also good (52.2 per cent) for stain resistivity by the selected households.
- Each 100 per cent of the selected households rated the durability and fire resistivity of steel and galvanised iron as good, whereas the stain resistivity was rated as good by 76.9 per cent and 71.4 per cent respectively.
- MDF was rated good (53.8 per cent) and medium (46.2 per cent) for its durability, stain resistivity and fire resistivity by the surveyed households.
- The fire resistivity of plywood was rated medium by 77.7 per cent and good by 33.3 per cent of households, whereas its durability and stain resistivity was rated as both good (63 per cent) and medium (37 per cent).

Wood

Aluminium

PVC	**Steel**	**MDF**	**Plywood**

Acrylic	**Galvanised Iron**	**Fibreglass**	**Glass**

Figure 3: Materials Used for Doors and Windows by the Selected Households

CONCLUSION

Among the surveyed households, majority of the households were using one panel, two panel, patio doors, casement, slider and french windows. Wood, PVC, MDF and plywood were the materials used for doors, where fibreglass, PVC and glass were the materials used for windows in majority of the households. Steel and galvanised iron were used in few households. In spite of their high maintenance, the use of steel and galvanised iron would increase in future, as they have high durability and increase the overall safety of the house. The households were satisfied with the quality and effect of the doors and windows used in the interiors of their houses. The study will provide valuable insights into the various types of materials, quality, and maintenance requirements, enabling more effective selection of doors and windows. An additional benefit of the study is that it will deepen the understanding of how various materials and designs influence the durability, energy efficiency, and aesthetic quality of doors and windows.

RECOMMENDATION

This study was conducted in urban area, but it can also be conducted in semi-urban or rural areas to study and analyse the evolution and growth of doors and windows, including the awareness of people on innovation of doors and windows.

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A COMPARATIVE ANALYSIS OF FAMILY COMFORT IN DIFFERENT APARTMENT TYPES

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ABSTRACT

In tackling the complex challenges stemming from population growth, escalating land prices, and urbanization in Tirupur, this study recognizes the surge in vertical housing structures as a pivotal response. The examination zeroes in on three prominent apartment types – 1BHK, 2BHK, and 3BHK – meticulously assessing not only the spatial dynamics but also the critical aspects of storage amenities and resident satisfaction with respect to comfort and privacy. Moreover, the research delves into the transformative potential of multi-functional, space-saving furniture as a proactive solution to optimize working space. By employing a robust methodology, including comprehensive surveys and interviews, the study aims to extract nuanced insights into the multifaceted challenges inherent in vertical living in Tirupur. Key focus areas include understanding how residents experience comfort and privacy. The study also explores the preference of the residents for multifunctional furniture. By synthesizing this data, the research aspires to provide recommendations for urban planning and housing development, with the overarching goal of significantly enhancing the overall comfort and privacy for the diverse community in Tirupur.
Keywords: Apartment Types, Comfort, Multi - Functional Furniture, Privacy.

INTRODUCTION

History shows a constant struggle of man in creating an ideal environment in the form of shelter and settlement. Shelter is the basic need of man along with food and water. Shelter is the form of hut provides protection from sun, rain and wind and also safety and privacy for family life (Shah, 2016). In our ancestor's era, where the population was not this large, the availability of land was not a problem, but today the scenario is somewhat different. Due to urbanization and commercialization the land of space itself isn't available (Gandotra, 2009).

The world now has well over 50% of human population living in urban situations and in some areas, over 80% living urban lives. Cities will continue to intensify regardless of health scarce, with existing low rise buildings increasingly replaced by medium density or high rise building. That's inevitable (Marriage, 2022). As builders seek to reduce apartment sizes to boost affordability, the average area of residential flats has shrunk 27 per cent over the past five years in seven major cities, but dimensions have fallen merely six per cent, according to Anarock (Hindu Business Line, 2019)

Apartment living has its advantages and disadvantages. An apartment's low cost, additional features, ease of maintenance, and sense of security are its most compelling selling points. Despite

the perks of living in an apartment, there are a few drawbacks, such as a lack of privacy, space and storage etc. Living in an apartment presents a notable drawback due to the constrained space in comparison to a house.

Apartments, particularly in urban settings, typically feature more compact dimensions, potentially posing challenges for larger families or individuals seeking generous space for diverse activities (https://usuyazike.com). Small-scale housing, perhaps more than larger housing, needs well-planned kitchen storage, including pantries, drawers, and interior cabinet storage devices. Recognizing how a kitchen is actually used for food preparation and beyond offers flexibility in designing small-scale housing adapted to different lifestyles (Anacker, 2018)

"Enhancing the aesthetic appeal of your home involves incorporating furniture with versatile functionalities, elevating the overall beauty of your living space. This approach eliminates the necessity for additional furniture unless desired, contributing to an open and spacious room ambiance. Furniture is the object that can be used to support the human activity. The allure of multifunctional furniture lies in its ability to introduce a sense of novelty to the space where it is integrated," suggests Yash Kela, an interior designer at Arrivae (Hindustan Times, 2022). Multi-Functional furniture acts as the Game Changer in Interior. This study examines the comfort, privacy in apartments and readiness of acceptance of multi-functional furniture by residents in various apartment types.

Living in confined spaces can have adverse effects on mental health. Affordable housing, while a crucial concern, may pose health risks and overcrowding issues that need careful consideration (Kilman, 2016). The importance of interior design is highlighted, as poor design choices can contribute to psychological stress in individuals (Nasser, 2013). The study assesses comfort, privacy and willingness to accept multi-functional Furniture among the residents of various apartment types.

OBJECTIVES OF THE STUDY

1. To evaluate the amount of comfort by residents in different apartment kinds, such as 1BHK, 2BHK, and 3BHK.
2. To examine the privacy experienced by the residents.
3. To evaluate the inhabitants' willingness to embrace multi-functional furniture.

METHODOLOGY

The methodology employed for the study on comfort and privacy experienced by residents in different apartments and preference for multifunctional furniture involved a conduct of household survey in various residential complexes across Tirupur. The sample size comprised of 120 apartment residents, with 40 individuals representing each category of 1BHK, 2BHK, and 3BHK apartments located in Tirupur.

In Tirupur district, the population reportedly exceeds 1 million, with an estimated half comprising a transient or floating population. This demographic trend underscores a substantial demand for affordable housing options in the area. Vice President Paul Sukumaran of Prime Conclave has confirmed the complete sale of all 216 flats in the initial phase of their project. Furthermore, the company is actively progressing with their second venture, which encompasses 72 flats. Notably, he has indicated that approximately 30 flats from this subsequent project have

already been reserved. The main Areas like Avinashi Road, Mangalam Road, and College Road Apartments were considered. (www.economictimes.indiatimes.com/)

Purposive sampling was selected to ensure a targeted participant. According to Sultan (2014), purposive sampling is employed by selecting individuals or elements that are considered representative of the broader population based on specific characteristics relevant to the investigation.

The research utilized a combination of interview and survey method with questionnaire as research tools to gather comprehensive insights from residents. A questionnaire comprises a series of inquiries systematically arranged on a document or collection of documents, either printed or typed, in a predetermined sequence as pointed out by Kothari, (2019). The Details pertaining to comfort levels, privacy encountered, and the readiness to accept multi-functional furniture was systematically extracted through the survey conducted using an interview schedule and questionnaire. Residents are asked about their comfort levels with existing furniture through questionnaires and interviews. Data is collected on common discomforts and preferences. Comfort and Privacy levels were measured using a Likert scale from 1 to 5, where: 1 = "Not Satisfied", 2 = "Moderately Satisfied", 3 = "Satisfied", 4 = "Very Satisfied", 5 = "Highly Satisfied". The Multi-functional furniture acts a solution for discomfort experienced in small spaces, The willingness to adopt and the type of Multi- functional furniture expected by the residents are collected in the questionnaire.

RESULTS AND DISCUSSION

The findings of the study of house hold survey on "**comfort and privacy experienced by families residing in different types of apartments** are analyzed and presented below. The household survey was administered to the inhabitants of 1BHK, 2BHK, and 3BHK and the findings are reported in the following section. The general comforts experienced by the residents of different apartments are represented in the Table below.

Table 1 General comfort experienced by the residents of various apartments

Apartment Variant	n=120	Mean	Std. Deviation	Std. Error Mean
One BHK	40	2.38	1.234	0.195
Two BHK	40	2.15	1.21	0.191
Three BHK	40	2.73	1.281	0.203

The difference in mean comfort levels across apartment types indicates that larger apartments, like 3BHKs, are linked to a higher sense of comfort. Comfort levels were measured using a Likert scale from 1 to 5, where: 1 = "Not Satisfied" to 5 = "Highly Satisfied". **3BHK apartments** have the highest mean comfort level of **2.73**, falling between "Moderately Satisfied" and "Satisfied," suggesting that residents generally feel more comfortable. **1BHK apartments** have a mean of **2.38**, which is closer to "Moderately Satisfied," indicating a slightly higher satisfaction than "Not Satisfied."**2BHK apartments** have the lowest mean of **2.15**, also in the "Moderately Satisfied" category but leaning toward the lower end of the scale, showing comparatively lower satisfaction. The difference in mean comfort levels between 3BHK and 2BHK suggests a potential association between apartment size and residents' perceived comfort.

The Areas in the apartment that provide less comfort to the residents are discussed in the following table.

Table – 2 The rooms that provide the lowest level of comfort of various apartments as perceived by the residents (n=120)

Area	1BHK			2BHK			3BHK		
	Frequency	Percent	Valid Percent	Frequency	Percent	Valid Percent	Frequency	Percent	Valid Percent
Living Room	7	17.5	17.5	7	17.5	17.5	10	25.0	25.0
Kitchen	21	52.5	52.5	25	62.5	62.5	17	42.5	42.5
Bedroom	10	25.0	25.0	6	15.0	15.0	5	12.5	12.5
No Stress	2	5.0	5.0	2	5.0	5.0	8	20.0	20.0

In 1 BHK apartment, the kitchen appears to be the area where residents feel the least comfort, with over half of the respondents (52.5%) indicating discomfort in this space. The bedroom follows, with a quarter of respondents (25.0%) reporting discomfort. The living room ranks third in terms of discomfort, with 17.5% of respondents feeling less comfort in this area. The kitchen is the area where residents in the 2BHK apartment feel the least comfort, with a significant majority (62.5%) indicating discomfort in this space. The living room follows, with 17.5% of respondents feeling less comfortable. The bedroom ranks third in terms of discomfort, with 15.0% of respondents reporting discomfort. According to the data, residents of the 3BHK apartment expressed varying levels of discomfort in different areas of their living space. The majority of respondents, constituting 42.5%, reported feeling less comfort in the kitchen, followed by 25% in the living room and 12.5% in the bedroom. Notably, 20% of respondents indicated experiencing no discomfort in any specific area.

According to the respondents, having a limited workspace at a prominent location stresses them out a lot, particularly during the day's peak hours. Kitchen being the prime workspace in a household, the investigator focused inquiry on the factors contributing to stress resulting from limited space in the kitchen.

The factors contributing to stress in kitchen of various apartments are represented in the figure given below

FIGURE 1 Factors contributing to stress in kitchen of various apartments
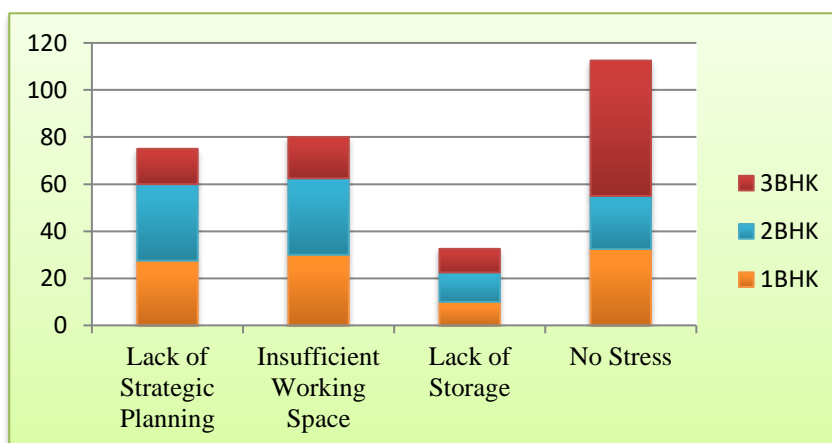
The data reveals that stress in a 1-bedroom apartment kitchen is predominantly attributed to issues such as lack of storage (27.5%) and insufficient working space (30.0%). Additionally, 10.0% of respondents cited a lack of proper planning as a stress factor. Assuming the missing data signifies respondents with no stress, it suggests that 32.5% of participants reported no stress in their kitchen comparatively. Highlighting prominent stressors in 2-bedroom kitchens, where 32.5% of respondents identifying Lack of Storage and an equal percentage pointing to Lack of Working Space. Lack of strategic planning was indicated by 12.5% of participants, underscoring its significance as a stress factor. Notably, 22.5% of respondents reported experiencing no stress in the kitchen.

In the context of 3-bedroom kitchens, the survey findings indicate that Lack of Storage was reported as a stressor by 15% of participants, while Lack of Working Space was identified by 17.5%. Lack of Strategic Planning emerged as a concern for 10% of respondents. Notably, a substantial 57.5% reported experiencing no stress in their 3- bedroom kitchens.

The privacy encountered by the residents of various apartments is discussed in the below table,

Table 3 Privacy encountered by the residents of various apartments

Apartment Type	n=120	Subset for alpha = 0.05
		1
One BHK	40	1.98
Two BHK	40	2.13
Three BHK	40	2.68
Sig.		0.055

The difference in mean privacy levels across apartment types suggests that larger apartments, like 3BHKs, offer better privacy. Privacy levels were measured using a Likert scale from 1 to 5, where: 1 = "Not Satisfied" to 5 = "Highly Satisfied". 3BHK apartments have the highest mean privacy level of **2.68**, falling between "Moderately Satisfied" and "Satisfied," indicating that residents experience better privacy in larger apartments.1BHK apartments have a mean of **1.98**, which is closer to "Moderately Satisfied," reflecting a lower sense of privacy compared to 3BHK apartments.2BHK apartments have a mean of **2.13**, still in the "Moderately Satisfied" range but leaning closer to the lower end of the scale, suggesting a moderate level of privacy but with some concerns. The difference in mean privacy levels between 3BHK and 2BHK apartments suggests a potential link between apartment size and the perceived level of privacy, with larger apartments generally providing better privacy.

The Counter Space availability in various apartment are given in Table 4 below,

Table 4 Provision of counter space in the kitchen of various types of apartments

Counter Space Adequacy	1BHK		2BHK		3BHK	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Adequate	11	27.5	8	20	24	60
Inadequate	29	72.5	32	80	16	40
Total n=120	40	100	40	100	40	100

Dissatisfaction with counter space is highest in 2BHK units, with 80.0% of respondents feeling that the counter space is not adequate. In 1BHK units, 12.5% of respondents also expressed their dissatisfaction with the counter space. Conversely, a majority of respondents in 3BHK units (60.0%) found the counter space to be adequate. The data suggests a trend where dissatisfaction with counter space decreases as the size of the housing unit increases especially among 2BHK and 3BHK apartments. This comparative interpretation accurately reflects the varying levels of satisfaction with counter space across different types of housing units.

The association of counter space and electronic appliance space adequacy is dealt in below table

Table 5 Adequacy of counter space and space for electronic appliances in various types of apartment (n=120)

	Counter Space Adequacy	Space For Electronic Appliance 1bhk	Counter Space Adequacy	Space For Electronic Appliance 2bhk	Counter Space Adequacy	Space For Electronic Appliance 3bhk
Counter Space Adequacy	1	0.049	1	0.48	1	0.047
		0.764		0.002		0.776
	40	40	40	40	40	40
Space For Electronic Appliance n=120	0.049	1	0.48	1	0.047	1
	0.764		0.002		0.776	

The strength and significance of the correlation between counter space adequacy and space for electronic appliances vary across different types of apartments. While there is a significant positive correlation in 2BHK apartments, no significant correlation is observed in 1BHK and 3BHK apartments. In one-bedroom apartment, there are typically fewer occupants compared to other apartment types. Therefore, the placement of electronic appliances on counter space is not a significant issue. However, in a two-bedroom apartment, the need for working space is increased due to potentially more occupants, necessitating more space for equipment. On the

other hand, three-bedroom apartments generally have enough counter space to accommodate the equipment needs of the occupants. The insufficiency of counter and storage space necessitates the provision of multi-functional furniture in the kitchen of two two-bedroom flats. This measure aims to enhance both storage capacity and work area, therefore alleviating the stress experienced by women working in the kitchen.

The readiness in accepting multi-functional furniture by the residents of various apartments are discussed in the below Table 6.

Table 6 Willingness to embrace Multi – Functional furniture by the residents of various apartments.

Response	Frequency (1BHK)	Percent (1BHK)	Frequency (2BHK)	Percent (2BHK)	Frequency (3BHK)	Percent (3BHK)
Yes	13	32.50%	27	67.50%	24	60.00%
No	27	67.50%	13	32.50%	16	40.00%
Total	40	100.00%	40	100.00%	40	100.00%

The data highlights a clear association between apartment size and willingness to accept multifunctional designs. Among the three categories, 2BHK residents are the most accepting, with 67.5% expressing willingness to adopt such innovations. This indicates that 2BHK units strike an optimal balance between spatial constraints and the perceived benefits of multifunctional designs. While 3BHK residents also show significant receptiveness (60%), 1BHK residents are notably more hesitant, with only 32.5% willing to accept these designs. This suggests that the practicality and relevance of multifunctional designs may depend on apartment size, with smaller units posing greater challenges to integration and adoption.

Table 7 Comfort based readiness in acceptance of multi-functional furniture in 2bhk

Acceptance	Mean of Comfort	n=40	Std. Deviation
Yes	1.81	16	.981
No	2.37	24	1.313
Total	2.15	40	1.210

Respondents who are ready to accept multi-functional designed furniture provided a mean comfort rating of 1.81. Those who are not ready to accept multi-functional designed furniture gave a higher mean comfort rating of 2.37.The overall mean for the entire 2BHK is 2.15. This suggests that those who are open to multi-functional design in their 2BHK units tend to have a lower mean comfort rating, while those who are not ready to accept such designs rate their comfort slightly higher on average.

HYPOTHESIS

Null Hypothesis (H0): None of the listed features (number of people, counter space area, privacy, less storage area, individual dining space) significantly affect comfort in the 2BHK apartment.

Alternative Hypothesis (H1): At least one of the listed features (number of people, counter space area, privacy, less storage area, individual dining space) significantly affects comfort in the 2BHK apartment.

TABLE 8 Comfort association with features of 2bhk apartment

No.:of people residing and specific features of the apartment	Sum of Squares	Df	Mean Square	F	Sig.
No of people	13.209	4	3.302	22.374	.000
	5.166	35	.148		
	18.375	39			
Counter Space Area	.493	4	.123	.730	.578
	5.907	35	.169		
	6.400	39			
Privacy	59.942	4	14.986	81.533	.000
	6.433	35	.184		
	66.375	39			
Storage Area	1.096	4	.274	.333	.854
	28.804	35	.823		
	29.900	39			
Individual Dining Space	.653	4	.163	.704	.595
	8.122	35	.232		
	8.775	39			

No: of People:

The F-ratio is 22.374 with a significance level (Sig.) of .000. This indicates that the number of people significantly affects comfort in the 2BHK apartment. Since the significance level is less than the conventional threshold of 0.05, the null hypothesis (H0) is rejected, and the alternative hypothesis (H1) is accepted that at least one of the listed features significantly affects comfort.

Counter Space Area:

The F-ratio is 0.730 with a significance level (Sig.) of .578.This suggests that the counter space area does not significantly affect comfort in the 2BHK apartment. With a high p-value (greater than 0.05), the null hypothesis (H0) cannot be rejected.

Privacy:

The F-ratio is 81.533 with a significance level (Sig.) of .000. Privacy significantly affects comfort in the 2BHK apartment. The low p-value indicates that the null hypothesis (H0) is rejected.

Less Storage Area:

The F-ratio is 0.333 with a significance level (Sig.) of .854. Less storage area does not significantly affect comfort in the 2BHK apartment. The high p-value suggests that the null hypothesis (H0) cannot be rejected.

Individual Dining Space:

The F-ratio is 0.704 with a significance level (Sig.) of .595. Individual dining space does not significantly affect comfort in the 2BHK apartment. With a high p-value, the null hypothesis (H0) cannot be rejected.

The number of people and privacy significantly affect comfort in the 2BHK apartment, while counter space area, less storage area, and individual dining space do not have a significant impact on the comfort experienced by the residents.

CONCLUSION

The analysis of living experiences in 1-bedroom (1BHK) and 2-bedroom (2BHK) apartments reveals notable challenges, particularly in areas such as comfort, privacy, electronic counter space, stress in the kitchen, and the absence of dedicated dining space. In 1BHK apartments, the fewer number of occupants seems to contribute positively to managing these issues. However, the situation differs in 2BHK apartments, where the larger number of people does not necessarily alleviate the identified challenges. This suggests that shared spaces in 2BHK setups might not be sufficient to address the issues mentioned. Conversely, residents in 3-bedroom (3BHK) apartments appear to enjoy a comparatively better living experience. The larger space and additional rooms likely contribute to improved comfort, increased privacy, and the availability of dedicated areas for dining.

To address the challenges in 2BHK apartments, the introduction of multi-functional furniture is suggested. This strategic approach aims to optimize the use of limited space, potentially enhancing the standard of living for respondents in 2BHK setups. This solution could possibly mitigate issues related to comfort, privacy, and functional spaces in 2BHK apartments, providing a more satisfactory living experience. Considering the constraints of limited space in 1BHK apartments and the already comfortable living conditions in 3BHK residences, introducing new furniture or making significant changes may not be practical.

However, the implementation of multi-functional and space-saving furniture appears to be a well-suited solution for residents in 2BHK apartments. In 2BHK setups, where a larger number of occupants may not adequately address comfort and spatial issues, the adoption of innovative furniture designs can offer a practical and effective resolution. Multi-functional furniture, designed to maximize space utilization and serve various purposes, has the potential to specifically address the challenges faced by residents in 2BHK apartments. This approach aims not only to provide practical solutions but also to elevate the overall living standards for respondents in these specific living spaces.

SUGGESTION FOR FUTURE RESEARCH

- Comparative evaluation of the effects of multifunctional furniture's impact across 1bhk, 2bhk, and 3bhk apartments.

- Designing multifunctional furniture to address spatial challenges in various apartments.
- Assessing the level of satisfaction of residents of 1bhk, 2bhk, and 3bhk units with space optimization solutions.
- Adaptability of multifunctional furniture across different apartment sizes and occupant needs.

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EXPLORING STRESS MANAGEMENT STRATEGIES AMONG MOTHERS OF VISUALLY IMPAIRED CHILDREN

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ABSTRACT

Raising children with visual impairment (VI) presents unique challenges that significantly impact the emotional, physical, and psychological well-being of mothers. This study investigates the stress among 150 mothers of children with visual impairment using structured interviews and surveys, focusing on their socio-economic backgrounds, stressors, support systems, and the effectiveness of various coping mechanisms. Findings reveal that the primary sources of stress include concerns over the child's health, emotional demands, financial pressures, and limited support. Family and friends are the most crucial support sources, while professional services are underutilized. Intervention on stress management strategies was implemented among the selected 50 mothers, on problem-focused strategies, emotion-focused strategies, positive thinking strategies and decision-making strategies. These strategies involved self-care, establishing routines and seeking emotional support which showed significant improvement in stress management whereas professional help and task delegation are seen as less effective. The study emphasizes the need for tailored support systems to enhance maternal resilience and offers insights into practical approaches to improve their quality of life.

Keywords: Visual Impairment, Strategy, Emotional well-being, Self-care, Intervention, Stress Management.

INTRODUCTION

Mothers of children with visual impairment (VI) face unique and multifaceted challenges that significantly impact their emotional, physical and mental well-being. These mothers often experience heightened stress due to the demands of caregiving, which encompass managing their child's health, developmental needs and ensuring their social integration. The care giving roles extends beyond typical parenting responsibilities, involving additional tasks such as navigating special education systems, seeking medical and therapeutic interventions and addressing the social and emotional needs of their visually impaired children (Gupta et al., 2012).

The stress experienced by these mothers is profound, emotional stress often arises from concerns about their child's future, feelings of guilt or helplessness and the emotional toll of continuous caregiving journey. Financial stress is compounded by the cost of specialised care and resources, while physical stress results from the relentless nature of their caregiving roles. The

availability and utilization of support systems which are critical in mitigating these stressors are frequently influenced by socio-economic factors, awareness and access to resources (Turner, 1993).

"Coping strategies are vital in managing the stress of caregiving. These strategies ranges from problem-focused approaches such as time management and realistic goal setting to emotional-focused techniques, including emotional regulations and seeking social support. Positive thinking and decision making strategies also enhance resilience and improve overall well-being" (Baker et al., 2003). According to Marshal et al., (2012), "Mothers who engage in self-care and seek social support report better mental health outcomes and increased resilience, enabling them to provide the necessary support and care for their children while maintaining their own health and well-being".

The study aims to explore the socio-economic background of mothers of children with visual impairment, identify key stressors, evaluate the effectiveness of various support systems and assess the impact of stress management strategies. Key strategies to reduce stress include building support network, practicing self-care, establishing routines and accessing resources.

By examining these aspects, the study seeks to provide insights into effective interventions that can improve the physical and mental well-being for these mothers and their families fostering a supportive environment for the growth and development of visually impaired children.

OBJECTIVES OF THE STUDY

1. To find out the socio-economic background of the selected samples.
2. To identify the main stressors experienced by mothers of visually challenged children.
3. To evaluate the support system from family, friends, support groups and professionals.
4. To investigate the stress management strategies employed by these mothers.

Hypothesis:

Ho1: There is no significant difference in problem focused strategy, emotional focused strategies, positive thinking strategies and decision-making strategies among mothers of visually challenged children before and after the intervention program. The hypothesis was tested and the null hypothesis was not accepted, indicating a significant improvement in the mothers' stress management strategies after the intervention.

METHODOLOGY OF THE STUDY

Research Design:

The study employs a cross-sectional survey designed to investigate stress management among mothers of children with visual impairment. The research aims to identify the sources of stress, evaluate the effectiveness of various stress management strategies and explore the role of support systems.

Sampling Design:

For the present study, a purposive sampling technique was adopted, selecting participants from various age groups, educational backgrounds and employment statuses. Mothers of children with visual impairment (VI) residing in Chennai city were purposely selected for the study. The study includes a sample of 150 mothers of children with visual impairment for survey and among them, 50 mothers of children with VI were chosen from Little Flower Convent School for the Blind and St. Louis School for Deaf and the Blind, Chennai, were identified to participate in intervention program on stress management strategies. The aim was to study the effectiveness of the program in managing their stress. Data collection was conducted with the maternal consent. These 50 mothers were selected based on their willingness to participate in the intervention program and

the support from the schools to provide their premises for the sessions. Accessibility to the investigator, familiarity could be exercised on the mothers of children with VI made the researcher easy for conducting the programme.

The intervention plan was implemented over a three-month period, with structured sessions conducted bi-weekly. Each session lasted approximately two hours and included group discussions, individual counselling and practical exercises tailored to the mothers' specific needs. Follow-up support was provided through weekly phone calls to ensure continuous engagement and reinforcement of the strategies introduced during the sessions. The intervention was conducted at two locations: Sri Kanyaka Parameswari Arts & Science College for Women, Chennai, and St. Louis School for the Deaf and the Blind, providing a comprehensive support structure for the participants.

Tools Used for the Study and Analysis of Data:

The primary tool for data collection was a structured questionnaire, developed based on existing literature and validated through a pilot study with a small sample of 10 participants. The structured questionnaire with details pertaining towards sources of stress, role of family, friends, support groups, coping strategies and its effectiveness was used to collect the data. Data were analysed using percentage and 't' test to compare stress management strategies before and after the intervention. The results are presented below.

RESULTS AND DISCUSSION

Results of the study were analysed and discussed under the following headings
- I. Socio-economic background of the families
- II. Sources of stress
- III. Role of support systems
- IV. Stress management strategies (before and after intervention program)
- V. Impact of intervention programme

I.   Socio-economic background of the families:

This aspect includes the type of family, number of family members, age, educational level, occupation of family members and family income and is depicted in Table 1.

Table 1: Socio-economic background of the families (in frequency and percent)

S.No	Particulars	Frequency (N=150)	Percentage
1	**Age of the mothers of Visually impaired children**		
	21 – 30 years	40	26.7
	31 – 40 years	60	40.0
	41 – 50 years	50	33.3
2	**Educational Level**		
	High School	50	33.3
	Undergraduate	70	46.7
	Postgraduate	30	20.0
3	**Employment Status of the mothers**		
	Employed	80	53.3
	Unemployed	70	46.7

4	Family Income (Annual) (As per Economic Survey, 2019-20)		
	Low Income (Below Rs 70,069)	45	30.0
	Middle Income (Rs 70,137 to Rs 8,45,955)	75	50.0
	High Income (Above Rs 8,46,023)	30	20.0
5	**Marital Status**		
	Married	100	66.7
	Single	20	13.3
	Divorced/Widow	30	20.0

The study revealed that a significant proportion (40 per cent) of the mothers were aged between 31 to 40 years and were predominantly undergraduates (46.7 per cent) with a middle-income background (50 per cent). Regarding employment status of the mother, more than half (53.3 per cent) were employed and living with their husband (66.7 per cent).

II.   **Sources of Stress for mothers of children with visual impairment:**
Table 2 summarizes the multifaceted stressors faced by mothers of children with VI with physical, emotional, financial and support-related challenges.

Table 2: Sources of Stress of selected respondents

S.No	*Stress Factor	Frequency (N=150)	Percentage
1	**Physical factors**		
	Lack of strength to handle all jobs	143	95.3
	Sleep deprivation	140	93.3
	Health issues	130	86.7
	Increased physical demands	121	80.7
2	**Emotional factors**		
	Fear of future	141	94.0
	VC Child's tantrums	135	90.0
	Neglected feeling	120	80.0
	Emotional distress of the child	94	62.7
	Guilt and self-blame	56	37.3
	Single parenting	50	33.3
3	**Financial factors**		
	High cost of special services	112	74.7
	No financial support from family	100	66.7
	Lack of dual income	100	66.7
	Poor salary	80	53.3
	Unemployment/ Inability to work	70	46.7
4	**Lack of Support**		
	For household chores	139	92.7
	Social isolation	121	80.7
	Broken family	111	74.7

	Moral support in child rearing	90	60.0
5	**Child's Health and Development**		
	Child's health issues	150	100.0
	Child's development issues	150	100.0
	Behavioural challenges	120	80.0

* multiple responses

From Table 2, it was noted that all respondents' stress was due to their child's health and developmental issues, highlighting the importance of their children's well-being in their lives. Additionally, behavioural challenges related to child's health and development contribute to stress for 80 per cent of respondents. Baker et al. (2003) studied that "managing these challenges requires significant emotional and physical resources, intensifying the overall stress experienced by parents, especially mothers which demands the nature of addressing behavioural issues in children with disabilities."

Regarding physical factors, majority of the mothers reported, lack of strength to handle all jobs (95.3 per cent) as a major source of stress followed by sleep deprivation (93.3 per cent), health issues (86.7 per cent) and caring for a child often increased physical demands (80.7 per cent).

In terms of emotional factors, 94 per cent of the mothers reported fear of their child's future followed by child's tantrums (90 per cent), neglected feelings (80 per cent), emotional distress of the child (62.7 percent), guilt and self-blame (37.3 per cent) and single parenting (33.3 per cent). Thurston (2011) highlighted that "single mother face significant stress due to the dual burden of care giving and financial support. These mothers frequently internalize guilt and self-blame for their child's condition and fear of the future regarding their child's independence and well-being". Emerson et al. (2006) found that "managing behavioural issues such as tantrums adds substantial stress", while Sloper and Turner, (1993) noted that "emotional neglect and lack of support further exacerbate this burden."

Regarding financial factors, high cost of special services is the most prominent financial stressor, affecting 74.7 per cent of respondents followed by no financial support from family and lack of dual income, both affecting 66.7 per cent each respectively, poor salary (53.3 per cent) and unemployment/inability to work (46.7 per cent) respectively. These issues reflect the economic vulnerabilities faced by single-income families highlighting the intersection of economic instability and care giving responsibilities, consistent with findings by Brandon (2007).

Lack of support is another significant stressor, with household chores being the highest, affecting 92.7 per cent of respondents followed by social isolation (80.7 per cent), broken family structures (74.7 per cent) and lack of moral support in child-rearing (60 per cent). The findings highlight the intense physical and time demands placed on parents, exacerbated by insufficient external support as noted by Firkowska and Mankiewicz, (2002).

III.   Role of Support Systems.

Table 3 highlights the pivotal role of various support systems in alleviating stress for mothers of children with visual impairment (VI).

Table - 3: Role of Support System (In frequency and percent)

*Support System	Number of respondents N = 150	Percentage of respondents
Family Support	100	66.7
Friends	80	53.3
Support Groups	70	46.7
Professional Services	60	40.0

* multiple responses

Table-3 exhibits that the most significant source of support comes from family, with 66.7 per cent of mothers reporting it as vital. This underscores the importance of familial bonds and the emotional and practical assistance they provide. Following this, 53.3 per cent of mothers highlight the value of social connections and peer support from friends in managing stress. The mothers reported that support groups (46.7 per cent) offer shared experiences and emotional solidarity. It was also noted that professional services are less frequently utilized, possibly due to lack of awareness about available guidance.

IV.   Stress Management Strategies (Before and After Intervention Program)

Table 4 exhibits the changes in stress management strategies employed by 50 mothers of children with visual impairment before and after intervention program. The strategies are categorized into four key areas: problem-focused, emotion-focused, positive-focused and decision-making. Each category reflects that mothers have improved their coping mechanism to manage stress more effectively. The data shows the impact of the intervention in enhancing these strategies leading to better emotional and mental well-being.

Table 4: Stress Management strategies (In Percent)

Stress Management strategies		Percentage of respondents	
		Before (N=50)	After (N=50)
Problem-focused strategies	Select commitments very carefully	94	98
	Being realistic about time frames	70	98
	Believing that suicide is not the solution and facing problems directly	12	78
	Taking time off/short break with regard to the life changes	16	72
	Preparing a list of daily activities	0	58
Emotion-focused strategies	Engage directly in things that matter	0	80
	Prioritize children and own needs	18	73
	Conquer fear about my child's future	12	69
	Manage anger and anxiety	4	68

	Pretend and balance the problem	39	58
	Accept that I don't have to accomplish everything	10	57
Positive thinking strategies	Involved all activities	7	79
	Increases happiness and self confidence	17	78
	Enhanced optimism about overcoming challenges	20	72
	Good sleep during night time	18	69
	Improved Mental Strength in facing society	0	68
	Positive attitude towards negative thoughts	7	64
Decision making strategies	Everyday Talking and spending time with children	45	84
	Allocating Responsibilities	0	61
	Having Meals with family members together	12	60

Table 4 reveals notable improvement in problem-focused strategies among the mothers of children with visual impairment after the intervention program. Specifically, the percentage of mothers who selected commitments carefully increased from 94 per cent to 98 per cent followed by being realistic about time frames (from 70 to 98 per cent), believing that suicide is not the solution and facing problems directly (from 12 to 78 per cent), taking time off/short break with regard to the life changes (from 16 to 72 per cent) and preparing a list of daily activities (from 0 to 58 per cent). Overall, the intervention effectively enhanced the mothers' ability to manage stress and to face problems directly.

In terms of emotion- focused strategies for mothers of children with visual impairment before and after the programme, it was noted that engaging themselves directly in things that matter (from 0 to 80 per cent) followed by prioritizing child's and own needs over non-essential tasks (from 18 to 73 per cent), fear about child's future (from 12 to 69 per cent), pretend and balance the problem (39 to 58 per cent) and accept that I don't have to accomplish everything (from 10 to 57 per cent).

Regarding positive thinking strategies for mothers of children with visual impairment before and after the programme it was noted that increases happiness and self-confidence (from 17 to 78 per cent) followed by enhanced optimism about overcoming challenges (from 20 to 72 per cent), good sleep during night time (from 18 to 69 per cent), improve mental strength in facing society (0 to 68 percent) and positive attitude towards negative thoughts (7 to 64 per cent).

Regarding decision making strategies for mothers of children with visual impairment before and after the programme, it was noted that everyday talking and spending time with children (from 45 to 84 per cent) followed by allocating responsibilities (from 0 to 61 per cent) and having meals with family members together (from 12 to 60 per cent) were followed by the mothers.

Overall, the study proves that with proper interventions focusing on different aspects of stress management - problem-focused, emotion-focused, positive thinking and decision-making strategies mothers of children with visual impairment can significantly improve their ability to cope with stress. This highlights the need for tailored support systems and targeted interventions to

enhance maternal resilience, well-being and the overall quality of life for these mothers and their families.

5. Impact of intervention programme acquired by the selected mothers of children with visual impairment T test (before and after)

The impact of intervention programs for mothers of children with visual impairment was analyzed through a t-test comparing pre-intervention and post- intervention scores across various strategies is presented in Table 5.

Table 5 Impact of intervention program acquired by the selected mothers

Impact of intervention Programme		Mean	N	Std. Deviation	Std. Error Mean	df	t	Sig. (2-tailed)
Problem-focused strategies	Before	0.64	50	0.72	0.10	49	-52.518	0.000
	After	6.00	50	0.00	0.00			
Emotion-focused strategies	Before	1.10	50	0.89	0.13	49	47.066	0.000
	After	7.00	50	0.00	0.00			
Positive Thinking strategies	Before	0.38	50	0.57	0.08	49	157.249	0.000
	After	13.00	50	0.00	0.00			
Decision making strategies	Before	0.12	50	0.44	0.06	49	128.037	0.000
	After	8.00	50	0.00	0.00			

The 't' value found from the analysis of the mean score of before and after stress management programme among the mothers of children with visual impairment is -52.515 for problem-focused strategies, 47.066 for emotion-focused strategies, 152.249 for positive thinking strategies and 128.037 for decision making strategies. It was also revealed that "p" value or significant value is 0.000 ($p < 0.05$) indicates that the intervention program had a significant impact on the use of problem-focused strategies, emotion-focused strategies, positive thinking strategies and decision-making strategies among the selected mothers of children with VI. There exists a significant difference between the mean scores of before and after intervention programme at 5 per cent level of significance rejecting the null hypothesis. Hence the null hypothesis **Ho1: "There is no significant difference in problem-focused strategy, emotion-focused strategies, positive-thinking strategies and decision-making strategies among mothers of children with visual impairment before and after the intervention program" is not accepted**, indicating that the intervention program significantly improved the mothers' stress management by following the above strategies leading to improved mental health and overall well-being.

CONCLUSION

The study concludes that mothers of children with visual impairment (VI) face significant stress from various sources, including their child's health, physical and emotional demands, financial pressures and lack of support. Predominantly, these mothers are aged between 31 to 40 years, hold undergraduate degrees and come from middle-income backgrounds. Employment and marital status further influence their stress levels, with most mothers employed and living with their husbands. Child health issues and developmental challenges are primary stressors, requiring considerable emotional and physical resources. Physical factors such as lack of strength, sleep deprivation, and

health issues further compound their stress, necessitating comprehensive physical coping strategies. Emotional factors, including fear of the child's future, child's tantrums, neglected feelings, and guilt, significantly impact these mothers. Financial pressures from high costs of special services, loss of dual income, and poor salary further strain these families. Lack of support, both practical and emotional, is a critical issue. Building a support network, utilizing respite care, and advocating for services are crucial strategies to alleviate this stress. Child health and development-focused strategies, such as early intervention programs and professional collaboration, are universally adopted and highly effective, emphasizing the importance of these interventions in improving developmental outcomes. Overall, the study highlights the transformative potential of intervention programs aimed at reducing stress among mothers of children with visual impairment. The significant improvement observed in stress management strategies suggest that such programs can empower mothers, leading to improved emotional resilience and a better quality of life for both the caregivers and their children. Comprehensive support systems and targeted intervention strategies can significantly ease the burdens of caregiving, fostering a more supportive and nurturing environment for families of children with visual impairment.

FURTHER STUDY

It would be more helpful to study the role of support systems, including family, friends, support groups and professional services, in alleviating stress for parents of visually challenged children. It explores how different support systems contribute to parental coping and well-being.

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EXTENT OF KNOWLEDGE OF THE INTERIOR DESIGN STUDENTS REGARDING USE OF RESIN ART IN INTERIOR DECORATION

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ABSTRACT

In India's vast craft and design sector, resin art is quickly becoming a more lucrative niche. Customers of today are more discerning and well-informed when making purchases. Through the online platform, they may compare products based on a range of criteria, including cost, quality and environmental friendliness. The incorporation of artistic and personal expression into common place goods has gained considerable appeal. While many other types of art have contributed to the success of the interior design industry, one type of art that has recently gained prominence is resin art. However, simply understanding the art form is insufficient. To use art in their daily lives and to fill the gaps in their knowledge, people should also possess the necessary information about it. Very few individuals are knowledgeable about resin art and its different approaches. People should be made aware of various techniques so they can apply them in various contexts. Therefore, the purpose of this study is to evaluate the interior students' understanding of resin art and to provide a workshop to impart knowledge to them about resin art and its various techniques. Through purposive sampling techniques, 80 interior designing students were selected from Department of Family and Community Resource Management, Faculty of Family and Community Sciences, The Maharaja Sayajirao University of Baroda, Vadodara. It was seen that two-third (60 per cent) of respondents had moderate knowledge regarding resin art. A workshop was held for the students and an expert was called in order to impart knowledge to them about resin art and its many techniques. The expert also gave them ways of using the resin art in interior spaces.

Keywords: Resin Art, Interior Décor, Decorative Accessories

INTRODUCTION

India's resin art is making a name for itself in the world of handicrafts, where creative artisans and a rich history have made the country famous. Resin is growing in popularity in interior design because it offers stylish and distinctive ways to make your house better. It's an exciting material for many design applications because of its durability and versatility. Goods like wall art, coasters, and table tops with detailed designs are becoming more and more popular, especially in urban areas where interior design is valued highly. These goods appeal to a broad market by fusing traditional Indian characteristics with contemporary style.

Volk et al. (2022) state that because epoxy resin was used to adhere products or preserve antiques, it was patented as a separate product when it was first discovered in the 1930s. It lost some of its

original form and texture due to a chemical reaction, but it has since become more well-known as a kind of art. Epoxy resin has been completely evolving through the tarnish of time and through this an incentive of interior designing is also sought by designers as a perfect opportunity. Architects and designers, globally, are inculcating art forms which are fashionable, elegant and even exquisite to look at (Mulligan et al. 2022). As a result of this heavily growing industry and expansion of the business in the market place, the resin has now been added to the must-have list for Architects and interior designers all across the globe. According to Mendes-Felipe et al. (2019), the resin industries are seeing growth in tandem with the number of professionals operating within them. They continue to present a commendable prospect for business expansion. Over time, epoxy resin has completely changed, and now interior designers are looking for this as the best opportunity. Designers and architects are bringing elegant, refined, and even amazing art forms to people all across the world (Mulligan et al. 2022). In addition to addressing the substance's inherent beauty and aesthetics, it also appears to have negative advantages in the business sector. There are about twelve different kinds of resins, and each has unique qualities and uses. Resin art serves a practical purpose by supporting the expansion and advancement of smaller initiatives while taking large-scale production into account. It is anticipated that the construction industry would grow more rapidly due to the changing lifestyles and ongoing global population expansion, which will increase demand for paints and coatings. The company's expansion into new markets and the industry's quick growth have made resin an indispensable tool for architects and interior designers worldwide (Saadi et. Al., 2023).

Resin is non-toxic, durable, lustrous and waterproof once it has dried, but handling it can be dangerous, therefore wearing safety equipment while working with resin is must. It is completely clear on its alone, but when combined with paints or poured over other materials, it can produce an amazing range of crafts and artwork. When we talk about resin in crafts, we usually mean synthetic resin, which can be casting resin or epoxy resin. A chemical substance called synthetic resin is composed of two parts: part A is the resin and part B is a hardener. When combined, the two liquid components harden, a process that can take anywhere from 24 to 72 hours to complete. Resin is growing in popularity in interior design, offering innovative and stylish ways to enhance your residence. It's an exciting material for numerous design applications because of its reliability and flexibility. Amazing creations may be made using resin on a variety of materials, including Jewelry, Canvas, Metal and Wood. Because of this adaptability, artists can explore a wide range of methods and aesthetics, expanding their creative horizons. Artists draw attention from all over the world when they post their captivating works online. These artworks' striking hues, glossy surfaces and distinctive textures are all quite alluring. Additionally, both the artists and the audience might experience a sense of calm and awareness when creating with resin art. The actual procedure itself calls for accuracy and patience as layers are added one at a time to produce the desired results. There are countless opportunities for customization and self-expression with resin art. Therefore, the beginners are encouraged to practice and eventually master the straightforward methods used to produce amazing resin art by making resin art. Epoxy resin offers countless creative possibilities due to its unique properties and compatibility with a wide range of materials.

Small products that demonstrate the use of Resin art

Wei et al. (2020) anticipate that the global epoxy resin market will reach USD 10,620.5 million by the end of 2023, growing at a CARG of 5.24%. The needs of the automotive and transportation industries, as well as the construction industry's constant and deliberate growth, are the most significant and influential aspects contributing to the favorable success of the growing use of epoxy-based composites. Epoxy resin-based coatings are employed in the construction of domestic

equipment and many other everyday useful things. The practical substance, which may be used for food storage, tank lining, seal coats, waterproofing, and ornamental finishes, has the ability to help firms grow into more expansive industries.

- **Wooden resin art**: The durable, long-lasting medium for wooden resin art is created when epoxy resin hardens. This has become well known through the application of resin art to transform common, boring wooden furniture into unique pieces of art. In 2019, Kumari et al.
- **Picture art:** Because resin works well with a variety of dried inks, it is often used as a protective coating for photographs. In addition, this prevents UV light from destroying the pigments, safeguarding priceless memories of loved ones.
- **Ornaments and jewelry**: Tinier silicone molds can be used to create delicate resin ornaments or jewelry. Because personalized resin works often incorporate natural elements such as flowers, shells, precious stones, or any preserved thing, they make excellent gifts for friends, family, or coworkers (Wei et al. 2020).
- **Crockery:** Resin art could liven up any gathering because it can be used as dishware. Resin can be washed with warm, soapy water, despite not being dishwasher safe. It is possible to create stunning plates, vases, and cups with molds that will wow and stick in anyone's memory.
- In 2015, **painting and coatings** secured the second position, with a 34.0% market share of the global epoxy resin market. Composites are also anticipated future growth due to the increase in demand for lightweight, high-strength products from the aerospace, automotive, and defense industries (Kumari et al. 2019).

Resin art is one form of art that has recently acquired popularity, however many other forms of art have also contributed to the growth of the interior design sector. But comprehending the art form alone is not enough. People should be knowledgeable about art in order to apply it in their daily lives and to fill in any knowledge gaps. Very few people are familiar with the many techniques used in resin art. It is important to teach people several approaches so they can use them in different situations. Thus, the main aim of this study was to evaluate the knowledge that interior design students have about resin art and to conduct a workshop where they may learn about the various techniques of resin art and how to use them in different interiors in the near future.

OBJECTIVES

1. To assess the extent of knowledge of the Interior Design students regarding use of Resin art in Interior Decoration.
2. To enhance the knowledge of the students by conducting workshop on resin art.

Delimitations of the study:
1. The study was limited to the Interior Design Students only.
2. The study was limited to the Students of Department of Family and Community Resource Management, Faculty of Family and Community Sciences, The Maharaja Sayajirao University of Baroda, Vadodara.

METHODOLOGY

For the present study, the purposive sampling technique was used to select the respondents from the B.Sc. ID HPP and Post Graduate Diploma in Hotel Interiors students of Department of Family

and Community Resource Management, Faculty of Family and community Sciences, The Maharaja Sayajirao University of Baroda, Vadodara District, Gujarat State.This study was limited to 80 students pursuing Interior Designing as a field of study. The major focus of the workshop was to train the students in Resin Art, its method and functions for accessory making and other aesthetic items. Questionnaire was used as a tool for collecting data. It was divided into two sections wherein section I comprised of Background Information of the respondents and their family such as type of family, number of family members, income of the family occupation of the parent, year of study. Section II covered information regarding the extent of knowledge of the respondents regarding Resin art. The scale comprised of 25 statements and was assessed through a summated rating scalewhere the respondents were asked about the extent of knowledge about resin art to "Aware", "Undecided" and "Unaware" which were scored 3 through 1 respectively to these responses. High scores reflected high extent knowledge of the respondents regarding Resin art. The reliability of the scale was computed via spearman-Brown correction which was computed as 0.79.

FINDINGS AND DISCUSSIONS

Section I-Demographic Profile of the respondent

It was found that the majority 93.37 per cent of them belonged to the 18 to 20 years age group. The results revealed that a few respondents 43.37 per cent belonged to a joint family, whereas the majority of respondents 56.67 per cent belonged to a nuclear family. It was found that 40 per cent of the respondents belonged to a small size of the family. 30 per cent of the respondents belonged to the medium size and large size of family members comprising of 10-12 members. The majority (93.33 per cent) of the respondent's family monthly income was between ₹50,001 – ₹1,00,000.

Section II – Knowledge of respondents regarding resin art

This section contained 25 statements and was assessed through a summated rating scalewhere the respondents were asked about the knowledge regarding resin art to "Aware", "Undecided" and "Unaware" which were scored 3 through 1 respectively to these responses. As a result, it can be inferred that 82.5 per cent of respondents were unaware that to perform resin art weighing scale and heat gun are the most important equipment. Moreover, 77.5 per cent of respondents were unaware that applying a layer of sealer or primer on surfaces like wood, is must to prevent forming of air bubbles while the resin cures. Likewise, 68.75 per cent of respondents were again unaware that resin is mixture of two components: Resin and Hardener and that the very first step while performing resin art is by cleaning and sanding the surface where one will be working on. so, we can say that many of the respondents were lacking knowledge regarding Basics of Resin art and were not so aware about it.

Table 1: Knowledge of Respondents regarding Resin Art

Sr. No.	Knowledge Regarding Resin Art	Respondents (n=80)					
		Aware		Undecided		Unaware	
		f	%	f	%	f	%

1	Resin material is a kind of liquid plastic that can solidify when exposed to air.	17	21.25	13	16.25	51	63.75
2	Resin refers to the mixture of natural and synthetic compounds that share their physical and chemical properties.	31	38.75	12	15	38	47.5
3	Earlier, "Amber", naturally occurring resin produced by trees, has been utilized to create ornamental objects.	12	15	28	35	41	51.25
4	Modern resin is produced artificially and utilized for identical purposes.	18	22.5	27	33.75	36	45
5	Resin can be mixed with paint or inks to create colorful patterns and designs.	28	35	19	23.75	34	42.5
6	Resin is a clear Liquid made up of two parts: Resin and Hardener which needs to be mixed in correct proportion.	15	18.75	10	12.5	55	**68.75**
7	The process of resin art takes 24 to 72 hours to dry and become a functional product.	8	10	15	18.75	58	72.5
8	Resin art can be made in moulds as well as on various surfaces without any restrictions.	36	45	16	20	28	35
9	UV Resin is only type of resin which has only one component and dries quickly under UV light.	33	38.75	16	20	31	41.25
10	Resin is material which is heat resistant and can be used to make various decorative and functional products.	24	53.25	12	15	45	30
11	There are 12 types of resins and each is attributed to different properties and applications.	19	23.75	11	13.75	50	62.5
12	Resin art can be performed on various surfaced like wood, metal, ceramics and fabric.	22	27.5	10	12.5	48	60

13	Epoxy resin hardens to create a sturdy, long-lasting medium for wooden resin art.	22	27.5	10	12.5	48	60
14	Resin is also utilized as a protective covering for photographs due to its compatibility with numerous dried inks.	11	13.75	14	17.5	56	70
15	The most important equipment in resin art is weighing scale and heat gun.	5	6.25	9	11.25	66	**82.5**
16	The very first step while performing resin art is by cleaning and sanding the surface where one will be working on.	15	18.75	10	12.5	55	**68.75**
17	Applying a layer of sealer or primer on surfaces like wood, is must to prevent forming of air bubbles while the resin cures.	11	13.75	7	8.75	62	**77.5**
18	For optimal mixing, the solution must be mixed slowly; too quickly can result in bubbles, while too slowly can cause color to clump.	11	13.75	9	11.25	61	76.25
19	Resin art can be used to preserve memories or things which are close to one's heart.	14	17.5	17	21.25	50	62.5
20	Resin art offers long-lasting results, as the hardened resin protects and preserves the artwork for many years.	15	18.75	10	12.5	56	70
21	Among the diverse range of products, resin jewelry is the most unique product trending right now.	10	12.5	12	15	59	73.75
22	Epoxy resin is being used by interior designers and architects to create stunning interiors that are not only inventive but also fashionable and elegant.	13	16.25	14	17.5	54	67.5
23	The most trending designs for making resin products is Ocean Effect and Dried Flowers Preservation.	9	11.25	18	22.5	54	67.5

| 24 | Resin art is fully customizable in colors and patterns to capture. | 13 | 16.25 | 12 | 15 | 53 | 70 |
| 25 | To promote sustainable living, businesses are offering non-toxic and ecologically friendly resins. | 13 | 16.25 | 12 | 15 | 53 | 70 |

Section III- Extent of knowledge of the respondents regarding Resin Art

As a result, it was observed that less than two-third of respondents (62.66 per cent) had knowledge regarding resin art to a "Low Extent" and 37.33 per cent of the respondents had moderate extent of knowledge regarding resin art. The findings also revealed that 5.33 per cent of respondents had High extent of knowledge regarding Resin art. Thus, the researcher sought to conduct a detailed workshop with an expert to impart knowledge among the respondents towards the same.
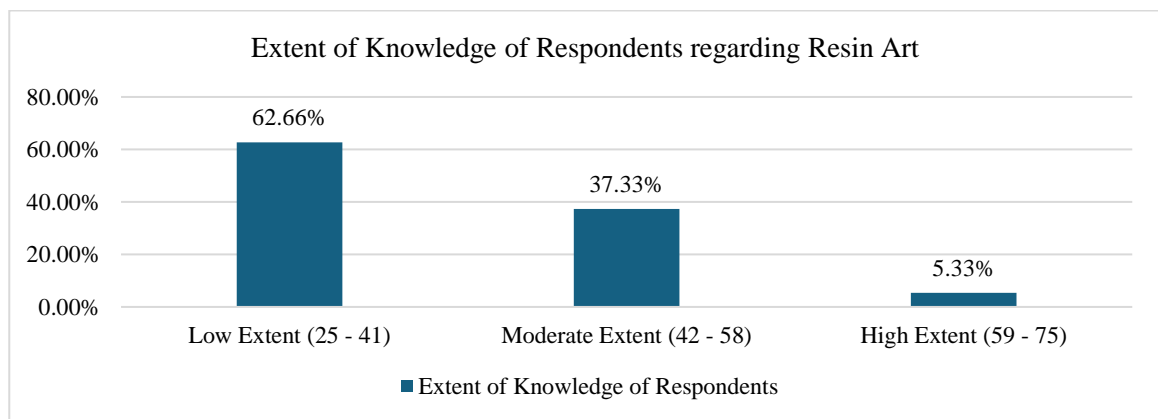
Fig.1. Extent of Knowledge of Respondents Regarding Resin Art

Section II - Workshop on Resin Art
The major objective of this study was knowledge that interior design students have about resin art. Section II showcases that students were not fully aware about various techniques of Resin Art; therefore, a workshop was conducted where students were given knowledge regarding resin art and its various techniques by an expert. This section contains information regarding the workshop conducted.

The Workshop was conducted by researcher in Department of Family and Community Resource Management, Faculty of Family and community Sciences, The Maharaja Sayajirao University of Baroda, Vadodara. In Total, 80 Interior Design Students participated in the workshop. An expert in resin art was invited to conduct a workshop. In the workshop, the expert introduced the students with colour theories, compositions, designs and basic techniques for resin art. Students made two different Accessories: A Coaster and a Mirror during the workshop. These accessories can be considered as a part of Interior Decoration. Apart from this, the expert also informed the students about the application of resin art in interiors in their projects in future. This workshop not only increased their knowledge regarding different techniques but also encouraged them to try something new with their own creativity and explore the mediums to create more interesting artistic pieces for different interior spaces.

Fig.1. Expert Conducting the session

Fig 2. Products made by Students

CONCLUSION

Resin art is a versatile as well as creative form of art. It has gained significant popularity in recent years. It has evolved from being a niche art with few people creating things to a professional art form created by artists and enthusiasts worldwide. Many modern artists are taking up resin art as their full-time profession, trying to explore new techniques, methods and tools. Galleries and art institutions are increasingly recognising the value resin art. Artists working with resin are genuinely taken seriously by the industry since the resin art created its own market for preserving the memories lifelong. The success of the resin artist also depends on the skills, vision, execution and experience of the artist. Application of resin is wide and thus; it has great potential. Thus, definitely if an artist is persistent towards creating new artworks, it has a deeper scope for the artist to grow. Resin art provides artists with a limitless canvas and distinctive qualities that let them produce breath taking works of art that enthral spectators. Artists are able to create amazing outcomes by experimenting with numerous styles and techniques utilizing a variety of tools and materials like colours, epoxy glue, moulds and diverse processes. Resin art challenges boundaries and inspires creativity, whether its realistic landscapes enclosed in glass-like surfaces or abstract designs with vivid colours. Encouraging such art which can promote more creativity in individual should give importance and should be made aware to everyone. Best way to promote such artwork is application of these artworks in interior design.

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BEAUTY PARLOUR FOR WOMEN: ASSESSMENT OF CUSTOMER'S EXPECTATIONS, PERCEPTION AND SATISFACTION FOR SERVICE QUALITY

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ABSTRACT

Beauty is a crucial aspect of life, impacting various aspects such as, social opportunities, occupation, relationship, wedding and sexual behaviour. The beauty care industry has grown due to the growing number of beauty-conscious women and their demand for various services. Service quality is a demanding yet unavoidable need for customers, as positive customer perceptions strengthen their relationship with the organization. Beauty parlours have faced competition from abroad companies and franchises. To achieve high levels of customer satisfaction, local beauty parlours must persistently study their customers, identify their needs, satisfy them, and focus on delivering superior service quality. The SERVQUAL model, developed in the mid-1980s, is an effective tool for measuring service quality in the service sector. A descriptive method was used to select 120 respondents with one year of experience in a selected beauty parlour. Data collection was done using questionnaires with the lowest score scored at -2.17 on the satisfaction scale. The study revealed that majority of the customers were moderately dissatisfied with the service quality at the selected beauty parlours, indicating the need for improvements in service quality of selected beauty parlour. Among the selected 10 beauty parlours, no 7 scored lowest on the satisfaction scale, indicating the need for redesign. A booklet was prepared on various attributes of service quality related to beauty parlours for women to enhance personnel's awareness. By focusing on delivering superior service quality and creating a comfortable and safe atmosphere, beauty parlours can thrive in today's competitive business environment.

Keywords: beauty parlour, expectation, perception, satisfaction, service quality

INTRODUCTION

The Indian beauty industry is thriving due to increased demand from beauty-conscious individuals, leading to the emergence of unisex salons. However, ensuring quality service is crucial for the success of any beauty service provider. Positive perceptions lead to favourable customer behaviour, while negative assessments can lead to unfavourable outcomes.

Customer satisfaction is essential for identifying issues and developing standards. The SERVQUAL and RATER models are appropriate tool for measuring service quality. Domestic beauty parlours should focus on meeting or exceeding customer expectations to deliver superior service. The Indian beauty industry faces challenges like lack of space, inappropriate interior design, un-skilled

employees, and obsolete equipment. A study will help industry experts prioritize improvement areas for growth, support women entrepreneurs, commercial space designers, and interior decorators, and strengthen knowledge and curriculum for academic institutes offering personal grooming, beauty care therapy, and beauty parlour management courses. The study will provide feedback to the beauty parlours considered as sample, as they can utilize the suggestions/ improved designs develop by investigator.

The present study is designed to find out the Expectation, perception and Customer Satisfaction regarding service quality of selected beauty parlours for women of Vadodara city.

The beauty industry in India is experiencing a boom due to increased product awareness, urban elite population, and working women. Douglas (2010) highlights the significance of cosmetics for women's confidence. The Indian beauty industry is facing a challenging competition from international and national brands, with local beauty parlors upgrading their services to meet the latest trends. The industry is now valued by both men and women, accounting for 32% of the global market. Customer satisfaction is crucial for service businesses to thrive in a competitive market. It's a socially constructed response to the relationship between a customer, product, and provider. Understanding and influencing this satisfaction is vital for service providers to sustain growth and market share. Fitzsimmons (2001) explains that the creation of customer satisfaction for a service can be established through a comparison between service perceptions and service expectation. Alike, Lin (2003) also defines Customer satisfaction is a critical factor that is revealed by evaluating the perceived performance of a company, showing whether it meets or exceeds expectations. Giese & Cote, (2000) expresses that Customer satisfaction is a crucial aspect of service, influencing the overall purchase experience, resulting in increased customer loyalty and higher retention rates for organizations that consistently provide excellent service (Wicks & Roethlein, 2009). Parasuraman et al. (1994) developed the conceptual model HOTELZOT measures the zone of tolerance in hotel service by incorporating desired and adequate expectations, with desired expectations remaining stable over time and adequate expectations varying over time. The zone of tolerance can be defined as "the extent to which customers recognize and are willing to accept heterogeneity". Blesic and Deri (2012), studied service quality in spa Hotels. The study analysed service quality attributes in spa hotels, focusing on seven dimensions: assurance, food and benefits, empathy, entertainment, recreation facilities, wellness, responsiveness, and reliability. Agbor (2011) carried out a study on relationship between Customer Satisfaction (CS) and Service Quality (SQ) of three Service sectors in Umea. The study explores the correlation between service quality (CS) and customer satisfaction (SQ) in service sectors, finding that responsiveness, empathy, and reliability significantly influence service quality.

OBJECTIVES

1. To study the expectations, perception, and satisfaction of customers regarding service quality of selected beauty parlours for women of Vadodara city.
2. To develop informative guidelines for service quality of beauty parlours for women.

DELIMITATION

1. The present study was limited to selected beauty parlours for women of Vadodara city.

2. The study was limited to those customers who had experience the services of selected local women beauty parlour for minimum past 1 year.

HYPOTHESES

The present study made the following assumption:

1. There exist association between personal, family, and situational variables and expectation and perception of the customers related to service quality of beauty parlour.
2. There exists a variation in customers' expectations and perception related to service quality of beauty parlour with education, occupation of the customers.

METHODOLOGY

The present study was conducted to investigate customers' expectation perception and satisfaction of service quality of women Beauty Parlor. For the present study, descriptive method was selected as the research design. A descriptive study defines and interprets "what is". It was concerned with conditions or associations that exist, opinions that are held, process that are going on effects that are evident, or trends that are developing, although it is often considered past events and influence as they relate to current conditions (Best and Kahn, 2006). The present study aimed to investigate customer expectation perception and satisfaction of service quality of women's beauty parlors in Vadodara, India. It used a multistage sampling technique to select individually owned beauty parlours. A structured questionnaire was used to collect data on background information, customer expectation, perception and satisfaction level. The questionnaire was validated by experts of family and community resource management and beauty industry. The data was analyzed using descriptive statistics and a consensus of 80% was taken as the final tool. The study was conducted in Vadodara, Gujarat, involving 10 beauty parlors selected based on the researcher's selection criteria and owner's willingness to cooperate. A sample of 120 customers experienced their services for at least one year and seven visits were considered for the present study.

FINDINGS AND DISCUSSION

The study surveyed customers aged 15 to 45 years, with a mean age of 26.64 years. The majority were aged between 25 to 34 years, with 17.7% aged between 35 and 45 years. The majority were qualified at higher secondary and postgraduate levels, with nearly half having completed their graduation. The individuals (respondents) were classified as employed, self-employed, and unemployed. Half were unemployed, while 33.3% were employed, and 33.3% were doing service. The data showed that 40% of respondents had personal income ranging from ₹5000 to ₹35000, while only 3.3% had income above ₹45001. Family revenue was categorized into six categories, with a range of ₹15000 to ₹55000, ₹55000 to ₹75000, and ₹115001. Only 8.3% had income above ₹115001. The data highlights the diverse income distribution among customers.

Customers assess service quality by comparing their expectations with their perceived experiences. If expectations are met, they perceive high-quality service, leading to repeat purchases and loyalty. Conversely, if expectations are not met, customers may complain, suffer silently, or switch providers. Therefore, identifying gaps between expectations and perceptions is essential for effective service deliverance. The SERVQUAL formula was used to calculate customer satisfaction scores by calculating the group weighted mean of each sub-aspect of service quality customers' perception and

expectations scales. Subtracting the sub-aspects weighted mean of perception and expectation, a range of scores was obtained, as presented in the text.

Table 1: CUSTOMERS' SATISFACTION SCALE

Highly Dissatisfied	Moderately Dissatisfied	Satisfied	Moderately Satisfied	Highly Satisfied
-2.0	-1.0	0	1.0	2.0
-1.01 to - 2.00	-0.01 to -1.00	0	0.01 to 1.00	1.01 to 2.00

Customers were moderately dissatisfied with service quality in five sub-aspects: reliability, assurance, tangibility, empathy, and responsiveness. Ventilation facilities were highly dissatisfactory, gaining the highest negative scores on the satisfaction scale (P-E). The reception area services scored between -1.01 to -2.00, indicating a lack of courteous and good conduct among the employees of the beauty parlour.

Customers were moderately satisfied with facial, body massage, and hair treatment services, with scores ranging from 0.01 to 1.00 on the satisfaction scale, indicating their contentment with the services delivered by the beauty parlour.

Table 2: Overall Customers' Satisfaction for Service Quality

		Expectations Wt. Mean Scores (E)	Perception Wt. Mean Scores (P)	Satisfaction Scores (P-E)	Description
Service Quality Aspect					
1	Reliability	2.93	2.79	-0.14	Moderately Dis-satisfied
2	Assurance	2.93	2.72	-0.21	Moderately Dis-satisfied
3	Tangibility	2.81	2.41	-0.4	Moderately Dis-satisfied
4	Empathy	2.95	2.73	-0.22	Moderately Dis-satisfied
5	Responsiveness	2.96	2.74	-0.22	Moderately Dis-satisfied

The study aimed to determine the satisfaction levels of ten beauty parlours based on their service quality. The mean difference score (P-E) was used to identify the parlours with the lowest satisfaction scores. The seven parlours with the lowest satisfaction scores were selected for redesigning, providing detailed information about the parlours observed for redesigning purposes.

Table 3: Mean difference Score in Satisfaction level
(Service Quality Aspects)

Number of Beauty Parlour	Mean difference Score in P – E Satisfaction level (Service Quality Aspects) (Range: 1-3)
1.	-0.10

2.	-0.27
3.	-0.20
4.	-0.10
5.	0
6.	0.16
7.	0.12
8.	0.23
9.	-0.05
10.	-0.12

Beauty care services require expertise, training, and competitive pricing for success. Local beauty parlours compete with foreign firms by understanding customer needs and delivering superior service quality. Technological advancement and evolving preferences drive customer satisfaction. The SERVQUAL model, developed in the mid-1980s, is a useful measure of service quality and customer satisfaction. It represents the discrepancy between customer expectations and perceptions of the service received. The simplified RATER model allows quantification of customer service experiences. Nyeck, Morales, Ladhari, and Pons (2002) stated the SERVQUAL measuring tool "appears to remain the most complete attempt to conceptualize and measure service quality". Thus, It is appropriate to measure expectations, perception, and satisfaction of female customers regarding service quality of beauty parlours in Vadodara city. To determine the relationship between the selected personal, family, and situational variables of customers and expectations and perception of customers related to service quality of beauty parlour following the hypothesis, the following hypothesis was formulated.

HO_1: There exists no association between personal, family, and situational variables and expectation and perception of the customers related to service quality of beauty parlour.

Table 4: The relationship between expectations and perception for service quality of beauty parlour and selected personal, family and situational variables of customers.

Selected Variable	df.	Calculated r- value (E)	Significance	Calculated r- value (P)	Level of Significance
1) Age	119	-0.160	NS	-0.077	NS
2) Personal Income	119	-0.151	NS	-0.220	0.05*
3) Family Income	119	-0.079	NS	-0.001	NS
4) Sources of information.	119	-087	NS	-013	NS
5) Use of parlour	119	-0.162	NS	0.057	NS
6) Perception	119	0.181	0.05	-	-
7) Expectation	119	-	-	-181	0.05*

Correlation is significant at the 0.05 level (E=Expectations & P=Perceptions)

Coefficient of Correlation were computed to test this hypothesis. It was found that age, personal and family monthly income, sources of information and use of parlour had a no significant positive relationship with customers' expectations for service quality of beauty parlour. Similarly, age, family monthly income, sources of information and use of parlour had a no significant positive

relationship with customers' perception or service quality of beauty parlour. However, personal income and expectations of the customers was found to have significant relationship with perception at 0.05. Level. Hence, the null hypothesis was partially accepted in these cases. (Table 54). Hence it can be concluded that personal income and customers' expectation had relationship with customers' perception for service quality of beauty parlour.

HO_2: There exists no variation in customers' expectations and perception related to service quality of beauty parlour with education, occupation of the customers.

Table 5: Analysis of variance for variations between expectations and perception for service quality of beauty parlour and selected personal, family and situational variables

	Source of Variation	Sum of Squares	df.	Mean Square	F-ratio	Sig.	Level of Significance
Expectation for Service Quality							
Education	Between Groups	222.499	9	24.722	.692	.715	NS
	Within Groups	3931.092	110	35.737			
Occupation	Between Groups	9.650	9	1.072	.795	.621	NS
	Within Groups	148.275	110	1.348			
Perception for Service Quality							
Education	Between Groups	617.877	17	36.346	1.049	.414	NS
	Within Groups	3535.714	102	34.664			
Occupation	Between Groups	28.743	17	1.691	1.335	.187	NS
	Within Groups	129.182	102	1.266			
	Within Groups	131.410	100	1.314			

Analysis of variance (ANOVA) was computed to show the difference in customers' expectation and perception for service quality of beauty parlour with Education and Occupation of Customers. The computed F-ration for selected variables namely education and occupation was found to be not significant with expectation and perception of customers for service quality and interiors. Thus null hypothesis was accepted.

CONCLUSION

For the present research, those beauty parlours were selected which were entirely for women and were located in Vadodara city, India. Furthermore, it was considered that, the selected beauty parlour were individually owned and were not a chain or franchise of any national or international brand.
For the present study, structured questionnaire was used for data collection. The questionnaire comprised of a modified SERVQUAL measurement scale to collect data on customer expectations, perception, and satisfaction. The collected data showed that, the respondents had medium expectations for service quality, empathy, and employee responsiveness, high for massage, waxing, and hair treatment services. Almost all respondents had medium to good perception for reliability and assurance of services.

Regarding aspects of service quality, the data revealed that cent percent of the respondents had medium level of expectations for reliability of service quality and assurance of beauty parlour services. whereas nearly all respondents had medium level of the expectation for tangibles empathy. While almost all the respondents had high level expectation for responsiveness of the employees of the beauty parlour.

Customers' perception for aspects of service quality:

It was found that nearly all the respondents had a medium extent of perception for reliability and assurance of the services. Whereas almost all the respondents had good to very good perception for tangibles, doors, ceiling, lighting, waxing treatment and waste disposal facilities of the beauty parlour.

Customers' satisfaction for aspects of service quality:

The data revealed the fact that all the sub-aspect service quality of beauty parlour were found to be scoring between -0.01 to -1.00 on customers satisfaction scale which clearly displays that customers were moderately dissatisfied with the all the sub-aspect of the services of beauty parlour.

In conclusion the difference score of customer satisfaction implies that improvement and enhancement in various sub-aspects of service quality of beauty parlour are essential to bring maximum satisfaction in customers satisfaction and to sustain in the market.

IMPLICATION

The field of family and community resource management is concerned with effective family and resource management practices. Thus, the present study will be helpful in providing and insight of service quality aspects of interior of beauty parlour. The information can be used for curriculum development for both specializations viz: hospitality management and interior design.

The study will provide students with guideline for providing quality services and designing community facilities like beauty parlour, spa, salon, and massage centers keeping in mind specific needs of customers, and on customer expectations for beauty parlour services will provide insight for personnel, interior designers, and women entrepreneurs.

RECOMMENDATIONS

1. A similar kind of study regarding customers' expectations and perceptions for sanitation and hygiene practice followed in the beauty parlour can be carried out to Study.
2. A dearth was found of specific guidelines given by the Indian authorities for beauty parlour services. Thus, research can be carried out throughout the nation to know the various standards study on customers' satisfaction.
3. A comparative research of service standards followed by branded chain beauty parlour common local beauty parlour and home delivery service providers can be undertaken.
4. A same kind of a study can be done with various other motivation aspect for selection of beauty parlour and be undertaken.
5. A research study can be done to know the level of awareness regarding service quality aspects amongst the personnel of beauty parlour services.
6. A need-based information program can be carried out to enhance the level of awareness about service quality aspects and impact assessment for the same can be done.

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AN INITIATIVE TOWARDS SOCIAL RESPONSIBILITY: ENHANCING KNOWLEDGE OF RURAL ADOLESCENT GIRLS REGARDING MONEY MANAGEMENT SKILLS

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ABSTRACT

There is no end to human wants and needs throughout life. Money is an essential element to sustain life to accomplish the goals and desires of human life as it plays an important role not only in an economic but also in a psychological sense. Money allows one to meet his/her basic needs. The present study was undertaken to assess the extent of knowledge of the Adolescent girls regarding Money Management before and after the Skill Development training programme. The research design was descriptive in nature as it aimed to conduct a training program for enhancing Money Management skills of Adolescent girls residing in selected rural area of GujaratThe Locale of the Study was Dajipura village, Savli Taluka, Vadodara, Gujarat. The unit of Inquiry were 60 Adolescent girls who were studying in secondary school selected via purposive sampling. Questionnaires were used as a tool for collecting data. The questionnaire comprised of two sections. The study concluded that the training program enabled the respondents to gain knowledge and understanding towards the concepts related to Money Management. The respondents were found less aware regarding money management concepts towards savings, credit, budget, investment. The training programme acted as a tool in enhancing the knowledge and clearing the concepts of Money Management. The findings of the study will be helpful to the stakeholders in academics to enhance the curriculum and teaching aids to enhance the awareness towards financial knowledge of the youth. The findings of the study will also act as an eye opener to the government, parents and adolescents to get sensitized towards enhancing skills and knowledge of the youth specially girls regarding Money Management.

INTRODUCTION

There is no end to human wants and needs throughout life. Money is an essential element to sustain life to accomplish the goals and desires of human life as it plays an important role not only in an economic but also in a psychological sense (Shukul et al., 2011). Money allows one to meet his/her basic needs. Money must be handled with great care. The quality of life lived is determined by how much disposable income is available. It determines the location of residence, quality of health care that can be accessed, education and every other basic need necessary for comfortable living. Proper money management is of paramount importance (Dhimmar, 2023; Jamal, 2019). Money management provides with a 360 – degree view of

financial picture while applying key financial disciplines to help overcome the obstacles to wealth. Money management incorporates the key financial disciplines for developing wealth accumulation, protection, and preservation strategies specific to needs, objectives, values, priorities and risk tolerance. Money management ensure financial security for family. Proper financial management can lead to financial freedom. [1] Money management is the process which consists of various activities such as a budgeting, spending, saving, investing, managing (Indrani & Yamunadevi, 2019;Kulkarni,2014; Kumari,2021).

Since ancient times, women have played a variety of roles in their home activities; as wives, in their personal lives with their husbands, as mothers in their responsibility for the development for their children and as homemakers in charge of operation of their house. As a home manager it is very important to balance to money earning sources and expenditures to efficient use of all resources required to achieving goals of the family. (2) Gradual impact of modernization, women in modern Indian society enjoy equal position as men in many areas such as politics, economics, and legal rights (Pandya, 2006; Pandya, 2008). They have to manage the home, family and occasion as well as workplace. The purpose of management is not isolated, but important and can be applied to all areas of family's life (Shukul & Gandotra, 2006). Adolescence girls are future of the country to develop social and economic systems, challenge leadership and values, and lay the foundations for the world's future (Kotwal, 2017, Ahuja, 2015). From the childhood, a large portion of adolescent girls have to be involved in income generating activities. Like other adolescents of other developing countries of the world, although poor, they deal economic activities with friends and families and with others. In most cases, they are from the families of rickshaw pullers, mechanics, bus/truck drivers, auto-cab/taxi drivers, shopkeepers, handicrafts makers, carpenters, potters, tailors, hawkers, day laborers, household workers, garment workers, small businessmen etc. Like their parents they are also engaged in helping their parents including some other activities like domestic help, street hawker, sales man, electronic shop helpers, garment workers, and sawmills, workshops. As their income is too low, they should spend according to their income. Therefore, financial idea is needed for managing their life as well as their family (Ami, 2008). Significant outcomes can be achieved towards development in rural area by participation of adolescent girls.

The studies conducted in abroad explored on money and financial attitudes, knowledge and behaviour. The study also focused on money management education for women. The related studies conducted within India pay attention on various areas include attitude, behavior, impact, habits, patterns, and practices on money management, savings, investment and credit. Other areas involve perception towards usage of plastic money and users perception regarding plastic money and cashless transaction prospects and challenges. Few studies also focused on role of women in family financial management. A dearth of researches was found regarding development of Money Management Skills among Adolescent girls. Thus, a need was felt to conduct the present research. The present study will be beneficial for the students as reference material and also help the adolescent girls who will become money manager for their families. Home scientists and curriculum planners can also utilize such information in conducting training for adolescent girls. The present study will provide fresh data that will help further to identify areas of focus and beneficial towards appropriate selection of study research.

OBJECTIVES OF THE STUDY

- To enhance the knowledge of the Adolescent Girls with the aid of Skill Development

training programme.
- To conduct pre and post assessment regarding extent of knowledge of the Adolescent girls regarding Money Management.

HYPOTHESIS FOR THE STUDY

- The Extent of Knowledge of the respondents regarding Money Management will differ before and after the training program.

DELIMITATIONS OF THE STUDY

- The study was limited to the Adolescent girls aged between 12 to 17 years studying in the secondary school of Dajipura village. Gujarat.

METHODOLOGY

The research design was experimental in nature as it aimed to conduct a pre post assessment based on the training program for enhancing Money Management skills of Adolescent girls residing in selected rural area of Gujarat. For the present study, Money Management Skills were operationally defined as imparting knowledge of the respondents to enhance skills regarding Resources, Sources of Family Income, Money Management, Credit, Investment and Savings. The Locale of the Study was Dajipura village, Vadodara, Gujarat. The unit of Inquiry were 60 Adolescent girls who were studying in secondary school of Dajipura village, Savali district, Vadodara, Gujarat. The sample were selected through purposive sampling. The consent was taken from the respondents for co-operation in giving the needed information for the present study. Questionnaires were used as a tool for collecting data. The questionnaire comprised of two sections. The first section contained background information of the respondents. The second section included information related to Extent of Knowledge of the Adolescent girls regarding Money Management. It comprised of a summated rating scale of likert type having 47 statements regarding various aspects of Money Management namely Resources, Sources of Family Income, Money Management, Credit, Investment and Savings. It had a 3 - point of continuum for the responses "Agree", "Maybe" and "Disagree" which were scored 3 through 1 respectively. The reliability was computed via Cronbach's alpha test and was computed as 0.892. the ethical number for the present research was IECHR/FCSc/M.Sc./10/2023/15. The data were collected by the researcher from 25th October to 4th November 2023. The questionnaire was distributed to each respondent to collect information on their Extent of Knowledge regarding Money Management before the training program. As an initiative of social responsibility, the researchers had developed a Skill Development training program wherein researcher imparted knowledge on topics such as Resources, Sources of Family Income, Money Management, Credit, Investment and Savings via PowerPoint presentation. After, the Skill Development training program, the questionnaire was again distributed to collect the data on their Extent of Knowledge of the Adolescent girls regarding Money Management after the training program. The data were then collected, coded, tabulated and statistical analysis was applied.

RESULTS

Background Information: This section associated with the information with reference to the background information of the respondents, that is, their personal and family characteristics. Personal characteristics includes age (in years) and educational status of the respondents, whereas family characteristics include type of family, size of family and family monthly income (in ₹), educational level of father, mother and occupation of father, mother.

Personal Information: More than two-third (66.67%) of the respondents belonged to the age group of 12 - 14 years whereas little more than one-third (33.33%) of the respondents were between 15 - 17 years. The mean age of the respondents was 14.23 years. A little more than one-half 51.67 per cent of the respondents were pursuing their education in 9th standard, 28.33 per cent of the respondents belonged to the 8th standard, and 20.00 per cent of the respondents were studying in 10th standard.

Table 1: Distribution of the respondents according to their Personal Information

Sr. No.	Personal Information of the Respondents	Respondents (n=60)	
		f	%
1.	**Age (in years)**		
I	12 – 14 Years	40	66.67
II	15 – 17 Years	20	33.33
	Mean	14.23	
	Standard Deviation	0.82	
2.	**Educational Status**		
I	8th standard	17	28.33
II	9th standard	31	51.67
III	10th standard	12	20.00

Family Information: More than two-third (66.67 %) of the respondents belonged to the joint family and one-third (33.33 %) per cent of the respondents had nuclear family. The data also depicted that 48.33 per cent of the respondents belonged to medium size of family comprising of 5-7 members whereas 38.33 per cent of the respondents had large size of family comprising of more than 8 members. The family monthly income of the respondents ranged from ₹6,000 – ₹10,000 of 63.33 per cent of the respondents. 61.67 per cent of the respondent's father had completed their education till the SSC (10th standard). The findings revealed that more than two-third 68.33 per cent of respondent's mother obtained formal education till the primary school. More than two-third 70.00 per cent father of the respondents were doing business, while less than one-third 30.00 per cent of respondent's father were doing service. Majority (65.00%) of the respondents mothers were homemakers.

Table 2: Distribution of the respondents according to their Family Information

Family Information of the Respondents	Respondents (n=60)	
	f	%
Type of Family		
Joint family	40	66.67
Nuclear family	20	33.33
Size of Family		
Small (2-4 members)	8	13.34
Medium (5-7 members)	29	48.33
Large (>8 members)	23	38.33
Family Monthly Income (in ₹)		
₹6,000 - ₹10,000	38	63.33
₹10,001 - ₹14,000	10	16.67
₹14,001 -₹ 20,000	12	20
Mean	11,316.7	
Standard Deviation	3857.10	
Educational level of Father		
Primary school	17	28.33
SSC	37	61.67
HSC	4	6.67
Certificate course	2	3.33
Educational level of Mother		
Primary school	41	68.33
SSC	19	31.67
Occupation of Father		
Service	18	30.00
Business	42	70.00
Occupation of Mother		
Service	11	18.33
Homemaker	39	65.00
Business	10	16.67

Extent of knowledge of the respondents regarding Money Management: Extent of Knowledge of the respondents regarding Money Management before and after the Skill Development training program is presented here. This section involves various sub-section namely Resources, Sources of Family Income, Money Management, Credit, Investment and Savings.

Extent of Knowledge of the respondents regarding Money Management on Resources: An attempt was made to find the Extent of Knowledge of the respondents regarding Money Management on Resources. An in-depth scrutiny revealed that that 33.33 per cent of the respondents agreed that "Resources help in achieving goals" before the training program whereas after the training program 60.00 per cent of the respondents agreed that "Resources help in achieving goals". Only 15.00 per cent of the respondents agreed that "Human resources and non-human resources are interrelated" when asked before the training program. Whereas after the training program, it was seen that 50.00 per cent of the respondents agreed that "Human resources and non-human resources are interrelated" (Table 3).

Extent of Knowledge of the respondents regarding Money Management on Sources of Family Income: In depth analysis revealed that 3.33 per cent of the respondents were aware that "Psychic income is a type of income" before the training program whereas the knowledge regarding same was increased among 51.67 per cent of the respondents after attending the training program, the knowledge regarding "Nutritious food prepared by a housewife is an example of psychic income" was also found to be increasingly from 8.33 per cent before the training program and to 53.33 per cent after the training program (Table 4).

Table 3: Distribution of the respondents according to their Extent of Knowledge regarding Resources

Statements regarding Resources	Before Training Program (n=60)						After Training Program (n=60)					
	Agree		Maybe		Disagree		Agree		Maybe		Disagree	
	f	%	f	%	f	%	f	%	f	%	f	%
Resources help in achieving goals.	20	33.33	18	30.00	22	36.67	36	60.00	11	18.33	13	21.67
Human Resource is one type of resource.	10	16.66	25	41.67	25	41.67	33	55.00	25	41.67	2	3.33
Money is a type of non- human resources.	2	3.33	30	50.00	28	46.67	26	43.33	19	31.67	15	25.00
Human resources and non-human resources are interrelated.	9	15.00	28	46.67	23	38.33	30	50.00	23	38.33	7	11.67
Knowledge is an example of human resources.	20	33.33	26	43.34	14	23.33	41	68.33	13	21.67	6	10.00
Physical Strength is a Type of human resource.	10	16.67	26	43.33	24	40.00	38	63.33	14	23.33	8	13.34

Table 4: Distribution of the respondents according to their Extent of Knowledge regarding Sources of Family Income

Statements regarding Sources of Family Income	Before Training Program (n=60)						After Training Program (n=60)					
	Agree		Maybe		Disagree		Agree		Maybe		Disagree	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
Salary is a source of family income.	27	45.00	21	35.00	12	20.00	39	65.00	12	20.00	9	15.00
Income helps to bring money in the family.	26	43.33	23	38.34	11	18.33	43	71.67	14	23.33	3	5.00
Expenditure takes money out of the family.	27	45.00	14	23.33	19	31.67	35	58.33	14	23.33	11	18.34
Psychic income is a type of income.	2	3.33	21	35.00	37	61.67	31	51.67	24	40.00	5	8.33
Profit is a source of money income.	6	10.00	36	60.00	18	30.00	32	53.33	19	31.67	9	15.00
Rent is source of financial income.	12	20.00	20	33.33	28	46.67	21	35.00	25	41.67	14	23.33
Nutritious food prepared by a housewife is an example of indirect income.	5	8.33	22	36.67	33	55.00	32	53.33	20	33.33	8	13.34
Budgeting helps keep control over income and expenditure.	5	8.33	29	48.33	26	43.33	40	66.67	14	23.33	6	10.00
Money income is type of family income.	12	20.00	30	50.00	18	30.00	42	70.00	15	25.00	3	5.00
Savings are essential for efficient use of money.	15	25.00	27	45.00	18	30.00	36	60.00	16	26.66	8	13.34
Financial allocation is very important in budget.	5	8.33	40	66.67	15	25.00	31	51.67	20	33.33	9	15.00

Table 5: Distribution of the respondents according to their Extent of Knowledge regarding Money Management

Statements regarding Money Management	Before Training Program (n=60)						After Training Program (n=60)					
	Agree		Maybe		Disagree		Agree		Maybe		Disagree	
	f	%	f	%	f	%	f	%	f	%	f	%
Money management means planning the expenses.	8	13.34	24	40.00	28	46.66	23	38.33	29	48.33	8	13.34
Budget means a spending plan.	10	16.67	27	45.00	23	38.33	34	56.67	17	28.33	9	15.00
Money management is done based on total income of the family.	29	48.33	22	36.67	9	15.00	26	43.34	29	48.33	5	8.33
Written budgets are easy to manage.	7	11.67	28	46.67	25	41.66	39	65.00	14	23.33	7	11.67
A budget helps in planning for the future and achieving goals.	8	13.34	40	66.66	12	20.00	46	76.67	9	15.00	5	8.33
Mental budget is difficult to manage.	4	6.67	20	33.33	36	60.00	30	50.00	24	40.00	6	10.00
Budgets needs to be modified according to time.	28	46.67	23	38.33	9	15.00	33	55.00	20	33.33	7	11.67

Extent of Knowledge of the respondents regarding Money Management: The findings of the study depicted that majority 86.66 per cent of the total respondents were aware regarding money management at moderate level before the training program whereas less than one-third 30.00 percent of the respondents had knowledge at the same after the training program (Table 5).

Extent of Knowledge of the respondents regarding Money Management on Credit: An indepth analysis on credit reflected that only 5.00 per cent of the respondents had knowledge regarding "Credit means borrowing money" before the training program. After the training program 56.67 per cent of the respondents gained knowledge regarding the same.

Table 6: Distribution of the respondents according to their Extent of Knowledge regarding Credit

Statements regarding Credit	Before Training Program (n=60)						After Training Program (n=60)					
	Agree		Maybe		Disagree		Agree		Maybe		Disagree	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
Credit means borrowing money.	3	5.00	26	43.33	31	51.67	34	56.67	17	28.33	9	15.00
Financial emergencies of family lead to borrowing.	11	18.33	20	33.33	29	48.34	32	53.33	22	36.67	6	10.00
Credit can be taken from commercial banks.	7	11.67	25	41.67	28	46.66	31	51.67	20	33.33	9	15.00
Credit cards can be used for loans.	4	4.67	17	28.33	39	65.00	30	50.00	23	38.33	7	11.67
There are some legal conditions for taking loans.	19	31.67	28	46.66	13	21.67	44	73.33	10	16.67	6	10.00
A rate of interest is levied for taking credit.	10	16.67	24	40.00	26	43.33	29	48.33	18	30.00	13	21.67
Gold Loan is a form of credit.	10	16.67	16	26.66	34	56.67	28	46.67	21	35.00	11	18.33
Loans can also be granted by government bank.	31	51.67	20	33.33	9	15.00	51	85.00	7	11.67	2	3.33

Extent of Knowledge of the respondents regarding Money Management on Investment: Majority 78.33 per cent of the total respondents were aware regarding investment at moderate level before the training program whereas less than one-third 30.00 percent of the respondents had knowledge at the same after the training program. The data also revealed that no respondent had low extent of knowledge regarding investment after the training program (Table 7).

Table 7: Distribution of the respondents according to their Extent of Knowledge regarding Investment

Statements regarding Investment	Before Training Program (n=60)						After Training Program (n=60)					
	Agree		Maybe		Disagree		Agree		Maybe		Disagree	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%

Investment are done by the family for security.	22	36.67	24	40.00	14	23.33	40	66.67	14	23.33	6	10.00
Property is a form of investment.	10	16.67	20	33.33	30	50.00	42	70.00	15	25.00	3	5.00
PPF is a type of investment.	5	8.33	13	21.67	42	70.00	30	50.00	22	36.67	8	13.33
National Savings Schemes is a form of investment.	9	15.00	33	55.00	18	30.00	41	68.33	12	20.00	7	11.67
Investments provide return in the future.	12	20.00	31	51.67	17	28.33	32	53.33	15	25.00	13	21.67
Investments of the family are based on the income.	26	43.34	17	28.33	17	28.33	47	78.34	8	13.33	5	8.33
Shares is a form of investment.	8	13.33	26	43.34	26	43.33	27	45.00	25	41.67	8	13.33

Extent of Knowledge of the respondents regarding Money Management on Savings: The in-depth findings on the Extent of Knowledge of the respondents regarding Money Management on savings depicted that only 3.33 per cent of the respondents had knowledge that "Fixed deposit is a form of savings" before the training program whereas after the training program 51.67 per cent of the respondents gained knowledge regarding the same (Table 8).

Table 8: Distribution of the respondents according to their Extent of Knowledge regarding Savings

Statements regarding Savings	Before Training Program (n=60)						After Training Program (n=60)					
	Agree		Maybe		Disagree		Agree		Maybe		Disagree	
	f	%	f	%	f	%	f	%	f	%	f	%
Income – Expenditure = saving.	8	13.34	32	53.33	20	33.33	47	78.33	10	16.67	3	5.00
Future is secured through savings.	30	50.00	23	38.33	7	11.67	48	80.00	12	20.00	0	0.00
Savings are useful to meet emergency expenditure.	8	13.34	29	48.33	23	38.33	41	68.34	11	18.33	8	13.33
Savings is money set aside for future use by the	9	15.00	27	45.00	24	40.00	43	71.67	8	13.33	9	15.00

individual.												
Post office is the oldest practice of savings.	25	41.67	22	36.67	13	21.66	45	75.00	13	21.67	2	3.33
Voluntary saving is a form of savings.	22	36.67	17	28.33	21	35.00	39	65.00	14	23.33	7	11.67
Recurring deposit is a form of savings.	15	25.00	16	26.67	29	48.33	24	40.00	31	51.67	5	8.33
Fixed deposit is a form of savings.	2	3.33	26	43.33	32	53.34	31	51.67	14	23.33	15	25.00

Hypothesis Testing : To find out the relationship between selected variables several hypotheses were formulated for the present study.

Ho1: There exists no variation in the Extent of Knowledge of the respondents regarding Money Management before and after the training program

To find out the Extent of Knowledge of the respondents regarding Money Management before and after the training program paired t-test was computed to observe the efficacy of the Skill Development training program.

Table 1: Paired t-test showing variation in the Extent of Knowledge of the respondents regarding Money Management will differ before and after the training program

Selected Variables	Mean Score	t-value	df	Level of Significance
Before training program	91.683	23.423	59	0.05
After training program	116.066			

Note: df = Degree of Freedom N.S = Not Significant

Statistically significant t-values revealed that null hypothesis was rejected thereby concluding that Training Program prepared and marked a positive difference in the existing knowledge of the respondents regarding Money Management.

CONCLUSION

The study concluded that the training program enabled the respondents to gain knowledge and understanding towards the concepts related to Money Management. The respondents were found less aware regarding money management concepts towards savings, credit, budget, investment. The training programme acted as a tool in enhancing knowledge and

clearing the concepts of Money Management. The findings of the study will be helpful to the stakeholders in academics to enhance the curriculum and teaching aids to enhance the awareness towards financial knowledge of the youth. The findings of the study will also act as an eye opener to the government, parents and adolescents to get sensitized towards enhancing skills and knowledge of the youth specially girls regarding Money Management.

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AWARENESS AND ATTITUDES TOWARDS HIGH FAT, SUGAR AND SALT (HFSS) FOODS AMONG ADOLESCENTS STUDYING IN VARIOUS COACHING CENTRES IN VARANASI DISTRICT: A SURVEY STUDY

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ABSTRACT

Foods that fall under the category of HFSS, or high in fat, salt, and sugar, are often maleficent to one's health due to the high content of these three components. The high fat content found in HFSS foods can lead to excessive calorie intake and elevated cholesterol levels, which in turn increases the risk of cardiovascular diseases. The study aimed to examine adolescents' awareness of the adverse effects of HFSS foods. This was a cross-sectional study undertaken on adolescents (16-19 years old) from various areas in Varanasi district. Data were obtained through the self-structured questionnaire. The results revealed that students consumed pre-packaged items multiple times per week. The majority of respondents (81%) preferred to eat HFSS foods. They chose to eat pre-packaged foods due to their taste and flavour. Less than half of the respondents (42%) recognized that eating packaged foods heavy in fat, sugar, and salt was harmful, but they (49%) felt satisfied after eating them. Respondents were well aware that after consuming packaged food, the short-term adverse impacts could be dental caries (18.4%) and weight gain (23.2%), while the long-term consequences could be diabetes (19%) and obesity (17.2%).

Keywords: Adolescents, Awareness, HFSS Foods, Harmful effects, Non-communicable Diseases.

INTRODUCTION

India is currently experiencing a nutrition transition period, during which the consumption of high fat, salt, and sugar food items (HFSS food items) has increased while physical activity levels have decreased. As a result, adolescents and other age groups are at a higher risk of developing diet-related non-communicable diseases (Kamboj *et al.,* 2019). According to reports, non-communicable diseases, also known as chronic diseases, are responsible for causing the deaths of 41 million people each year, which accounts for 71% of all global deaths. The four main types of NCDs are cardiovascular diseases, such as heart attacks and strokes, cancers, chronic respiratory diseases, and diabetes mellitus. It's important to note that the risk of dying from NCDs is strongly linked to factors like physical inactivity, tobacco use, excessive alcohol consumption, and unhealthy diets (WHO 2021). NCDs have a major effect on the economy worldwide, with

negative consequences that extend beyond human health and welfare to encompass economic development, productivity, and growth (WHO 2017). Dietary factors play a significant role in the prevention of non-communicable diseases (NCDs). Numerous epidemiological and case-control studies have found links between excessive consumption of sugars, salt, and fats and a heightened risk of NCDs, such as obesity, hypertension, diabetes, cardiovascular diseases, and certain cancers (Pervin *et al.,* 2020). Unhealthy foods, whether packaged or unpackaged, that are low in nutrients like protein, vitamins, phytochemicals, minerals, and dietary fibre, but high in fat, salt, sugar, and energy, should be avoided as they can negatively impact health if consumed regularly or in excessive amounts.

According to the World Health Organisation, adolescence is a transition stage between childhood and adulthood and ranges between the age of 10 – 19 years. With rapid physical, cognitive and psychosocial growth, this is an important stage which lays the foundation for future health. During this stage, adolescents establish patterns of behaviour related to diet, physical activity, sexual activities etc. Adolescents often consume fast/junk food due to not only its palatable taste, but also because of their peers' behaviours. Some of the most widely consumed fast food items include salty snacks, candies, sweet desserts, fried foods, and carbonated beverages. The frequent consumption of soft drinks, sweets, and fast food, along with a low intake of fruits, vegetables, and dairy products at this age is a cause for concern. This eating pattern can result in obesity and an increased risk of non-communicable chronic diseases. It is an alarming situation because NCDs are increasing in India. More than 101 million people in India are suffering from diabetes and 136 million people are at the risk of prediabetic, 35% are hypertensive, 28.6% have general obesity (Anjana *et al*., 2023). A study conducted by Critchlow *et al*. (2020) aimed to assess the level of awareness regarding marketing of high fat, sugar, and salt (HFSS) foods among adolescents and its association with consumption. The study found that the vast majority of adolescents (90.8%) were aware of at least one marketing activity for HFSS foods, with many reporting exposures to such marketing more than 70 times in the past month. The most common sources of marketing were television, social media, and price offers. The results revealed a clear correlation between the level of marketing awareness and higher weekly consumption of HFSS foods. These foods, which are typically unhealthy, can lead to obesity, diabetes, heart disease, and other health problems. Similar study conducted by Naru & Battalwar (2022) found that consumption of HFSS foods was quite frequent among early adolescents (10-14 years), they were consuming sugars, sweetened beverages, butter and mayonnaise more frequently than late adolescents' students. This suggests that there is a high demand for HFSS foods and a low awareness of their health risks. Hence, to gain a comprehensive understanding of adolescents' perceptions regarding the harmful impact of high fat, sugar, and salt intake, it is essential to consider the data provided and assess their awareness of the harmful effects.

OBJECTIVE

- The objective of the study was:
- To assess the awareness of adolescents (16-19 years) about the harmful effects of HFSS foods.

METHODOLOGY

The study aimed at identifying the awareness and attitudes of adolescents studying in various coaching institutes of Varanasi, Uttar Pradesh (India). The study targets individuals between the age groups of 16-19 years, who are enrolled in coaching institutes. Various coaching centres of Varanasi, which prepared students for medical and engineering entrance exams were contacted. Three centres agreed to participate in the study. From these centres, adolescents staying away from home, who either stayed in hostels or as paying guests were purposively selected to understand the full extent of consumption of HFSS foods. To ensure voluntary participation, the respondents were informed about the objectives of the study and guaranteed about the confidentiality of their data. Informed consent was obtained from the participants on the standard format, before interview. Data were collected from total 156 students, out of which the centre wise distribution was 54, 49 and 53 students.

For data collection, a self-structured questionnaire was developed. Questionnaire included questions related to demographic details (name, age, gender, educational status), awareness about high fat, sugar and salt foods and their harmful effects, consumption pattern of respondents, challenges faced while avoiding these kinds of foods, reason for consuming these foods etc. Before data collection, the questionnaire was validated by subject matter specialists. The data was analyzed using statistical package for social science (SPSS version 20). Descriptive data such as frequency, mean, standard deviation was computed for demographic details. Chi-square test was used to examine the relationship between age groups regarding awareness about harmful effects of high fat, sugar and salt foods. Same test was carried out to compare the consumption pattern among genders. p values less than 0.05 were considered statistically significant.

FINDINGS AND DISCUSSION

Section 1: Background Information: Out of 156 individuals that were surveyed, 28.8% of them were aged between 16 to 17 years, while majority respondents (71.2%) were between 18 to 19 years of age and were female. Most of the students surveyed were from grades 11 to 12 and belonged to the study stream of science.

Section 2: Source of awareness about HFSS foods

Table 1: Distribution of the respondents based on their source of awareness about HFSS foods

Source of awareness about HFSS foods	Frequency (N=156)	Percentage%
Reading material	53	35.6
From family members	46	30.9
Through peer groups	8	5.4
Through social/mass media	14	9.4
Not aware	28	18.8

Table 1 depicts that among 156 respondents 24% of the younger group (age 16-17 years) and 18% of the older group (age 18-19 years) reported that they had not heard the term before. The findings indicate that a significant portion of participants (35.6%) claimed to have knowledge of HFSS due to their prior exposure to the term through reading. Interestingly, female students (26%) displayed a more extensive awareness compared to their male counterparts (20%). Furthermore, approximately one-third (30%) of the sample attributed their understanding of HFSS foods to their family as their primary source of information. A study by Dhruv *et al.* (2022) was conducted to know the consumption pattern of foods which is high in fat, salt and sugar, found that most respondents were aware of these foods through advertisements that were shown on television or printed in newspapers.

Section 3: Attitude about HFSS foods

Table 2: Distribution of respondents based on educational status and understanding about consuming HFSS foods

Educational Status	Consuming High fat, sugar and salt food is harmful				Total	p-value
	Yes, it is harmful	No, don't think so	Somewhat	Eating less is not harmful		
11th – 12th	35	9	9	35	88	
Undergraduate	43	4	5	16	68	0.036
Total	78	13	14	51	156	

According to table 2, more than a quarter of the respondents (34%), said that consuming high-fat, sugar, and salt foods in moderate amounts is not harmful. Majority of participants (45%) were aware of the potentially harmful effects of these types of foods, while 10% of respondents indicated that consuming such foods is not harmful. A chi-square test of independence was performed to examine the relationship about understanding regarding harmful effects of high fat, sugar and salt between participants from different educational status.

Table 3: Distribution of respondents based on gender and understanding about consuming HFSS foods

Educational Status	Consuming High fat, sugar and salt food is harmful				Total	p-value
	Yes, it is harmful	No, don't think so	Somewhat	Eating less is not harmful		
Male	38	6	8	24	76	
Female	25	6	6	43	80	0.034
Total	63	12	14	67	156	

The largest section of the respondents (42.94 %) believed that eating less amount of HFSS foods is not harmful, which also included a larger percentage (53.75 %) of female participants. Majority of the male respondents (50 %) reported to understand that consuming HFSS foods could be harmful.

A null hypothesis was formed 'there is no significant relationship between respondents from different educational status and gender about awareness regarding harmful effects of high fat, sugar and salt'. The relationship between these variables was not significant. X^2 (3, N=156) =8.541, p= 0.036. X^2 (3, N=156) =8.700, p= 0.034 respectively. In this case null hypothesis was rejected because there was a significant difference between respondent from different educational status and between genders regarding understanding about harmful effects of high fat, sugar and salt.

Section 4: Consumption pattern of HFSS foods

Table 4: Distribution of respondents based on their consumption pattern of HFSS foods

Gender	Consumption Pattern					Total	X^2/p-value
	Daily	Several times a week	Weekly	Occasionally	Rarely		
Male	23	20	14	9	10	76	11.102, 0.025
Female	9	25	15	20	11	80	
Total	32	45	29	29	21	156	

As per table 4, consumption pattern of respondents' shows less than quarter of the respondents (23) who were male consuming HFSS food products daily and similar percentage of female respondents (31.25 %) agreed that they consume these products several times a week. Chi-square test was computed to know the association between male and female regarding consumption pattern. The analysis shows that difference among gender and their consumption pattern is significant. X^2 (4, N=156) =11.102, p= 0.025. Kamboj *et al*., 2019 conducted a cross-sectional study between (11 to 18 age groups) to find out the consumption of high fat, salt and sugar foods among adolescents from urban areas of New Delhi. It was found out that more than half of the respondents were consuming packed foods and Indo-Chinese food items more than twice a week. Less than half of the respondents reported consuming sugary items more than twice a week.

Section 5: Reasons for consuming HFSS foods

Figure 1: Distribution of respondents based on reasons for consuming HFSS foods
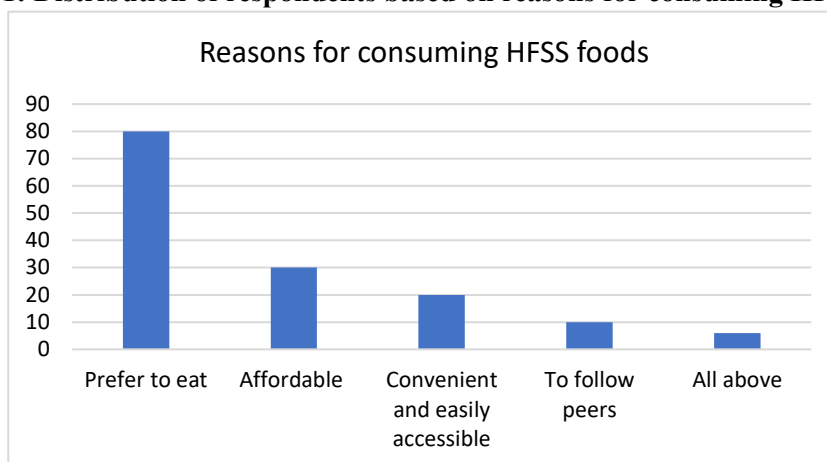
The graph depicts that the primary reason for the majority of respondents (80%) to consume high fat, sugar, and salt (HFSS) foods is due to their taste and flavour, followed by convenience and time-saving. Additionally, a third (33%) of respondents consume these foods because they are affordable, easily accessible, or influenced by their peers. Only 12% of students consume HFSS foods for all the aforementioned reasons. This indicates that various factors contribute to individuals' food choices and preferences. These results also strongly show the factors that attract the younger generation towards these foods. These factors can be targeted by the healthy foods industry to enhance consumption among. A study conducted by Saranya *et al.* (2016) found similar results, as teenagers frequently consume fast food not only because of its taste but also due to the influence of their peer group's behaviours. Similar study was conducted by Motta *et al. (*2021) found that reason of consuming these types of food because of their taste.

Section 6: Perception about short-term and long-term problems associated with HFSS foods

Table 5: Distribution of respondents based on perception about short-term and long-term problems associated with HFSS foods

Short-term Problems	Frequency (N=156)	Percentage %
Dental caries	90	18.4%
Nutritional deficiencies	72	14.8%
Difficulty in concentration	41	8.4%
Feeling low	49	10.0%
Skin problems like pimples	94	19.3%
Weight gain	113	23.2%
Urine infection	29	5.9%
Long-term Problems	**Frequency (N=156)**	**Percentage %**
Obesity	84	17.2%
Diabetes	93	19.0%
Hypertension	57	11.7%
Heart disease	81	16.6%

Weak memory and learning	36	7.4%
Impact on digestive system	83	17.0%
All of the above	55	11.2%

If an individual regularly consumes high-fat, sugar, and salt (HFSS) foods, they may be at risk for several health issues. The study reveals that 23.20 percent of the respondents perceived that the consumption of HFSS foods may cause weight gain. Moreover, 19.3 percent of respondents believed that they may develop skin problems such as pimples, 18.4 percent considered these foods to cause dental caries, and 14.80 percent participants expected nutritional deficiencies to result from HFSS foods. The respondents reported these outcomes to be the short-term consequences of consuming HFSS foods. Major long term problems that were perceived as result of HFSS foods were diabetes (19%), obesity (17.2%), and digestive system related issues (17%). Study conducted by Naru & Battalwar (2022) concluded that diet high on salt, sugar and fat is a matter of concern as it can result in development of non-communicable diseases in adulthood.

Section 7: Challenges faced while avoiding HFSS foods

Figure 2
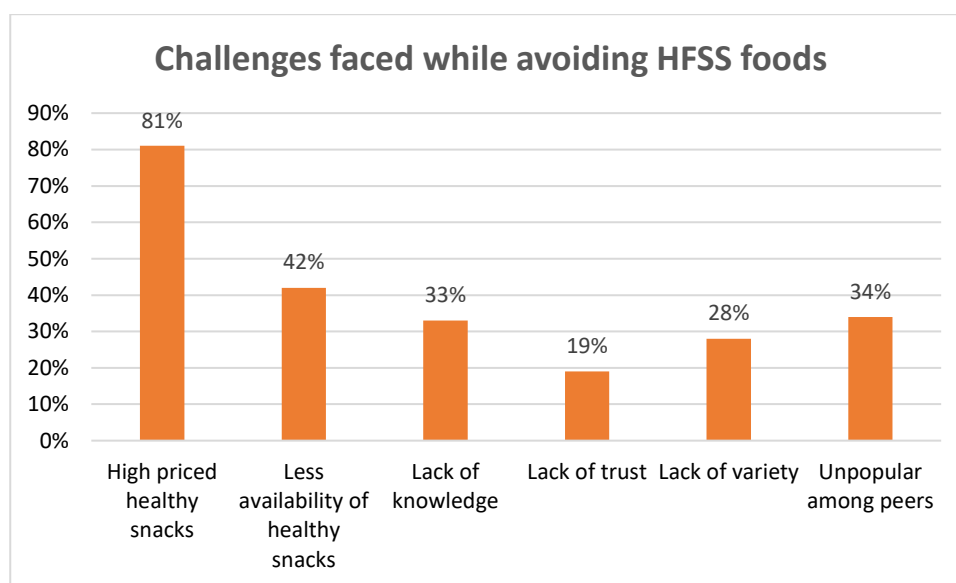
With a wide array of HFSS foods available in varied and attractive flavors, and at very competitive prices, makes it difficult for the people to avoid such food items. The respondents were enquired about the factors which made it difficult to reduce the consumption of HFSS foods. Results showed that the healthy food products offering similar experience and convenience were comparatively costlier and was reported to be the biggest challenge for the respondents (81 %) to avoid HFSS foods. Second biggest reason was comparatively lesser availability (42 %) of healthier snack options which were low in fat, salt or sugar and yet offered the same variety of flavors and texture. The respondents also reported a lack of knowledge (33 %) about the fat, salt and sugar contents of various packaged foods and did not trust (19%) the claims made by the products about its nutrition value or health benefits. The participants accepted to avoid healthier snacks due to its unpopularity among their peers and often made choices popular among friends.

CONCLUSION

The Indian markets are witnessing a surge of packaged, convenient products that serve as a quick meal for the masses, especially the students who are staying away from their homes, preparing for competitive exams at coaching centres. The lifestyle of such students is hectic, with little or no time for proper and timely meals. This leaves a massive scope for packaged snacks that are though distinct and acceptable in taste, are also high in fat, salt or sugar. The present study concludes that the adolescent students staying away from home are consuming HFSS foods for their taste and convenience and lacks awareness about their probable health ill-effects. There is also a knowledge gap in the fat, salt and sugar contents of these food items among the respondents. More number and variety of food items that can compete with HFSS foods in terms of its taste, price, widespread availability and popularity and convenience, but low in fat, salt and sugar are required in the market. Adolescents are required to be made aware about the harmful impacts of HFSS foods and should be encouraged to make informed choices about their diets.

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FOOD HANDLERS' KNOWLEDGE, ATTITUDE AND PRACTICES REGARDING FOOD SAFETY IN UNIVERSITY OF DELHI CAFETERIAS

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ABSTRACT

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Cafeteria is an outlet where food is prepared on site and consumed by the customers. It is known to serve affordable meals with a variety of menu to offer. However, food can be a carrier of disease-causing pathogens, from the site of preparation to consumption. So, this research is conducted to assess the Knowledge, Attitude & Practice (KAP) of food handlers (n=40) working in cafeterias of colleges of University of Delhi, regarding food safety. An observational checklist and a structured questionnaire comprising of two parts: a) Demographic profile; b) KAP of food handlers were developed to gather the responses. The survey discovered that food handlers had low level of knowledge and practice with respect to safe food handling. Food safety knowledge with respect to food storage temperature, food contamination, Food Borne Diseases (FBDs), personal hygiene, regular medical checkup, regular pest control and food spoilage were lacking. It was also observed that the cafeterias lacked adequate infrastructure. Hence, the study highlights the reinforcement of food safety behavior with the help of regular food safety trainings.

Key words: Cafeteria, food safety, knowledge, personal hygiene.

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INTRODUCTION

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Fast paced lifestyle, increased mobility and alignment towards fast food has left little interest and time for preparing and eating meals at home (Singhal, 2021). This is more profound in case of university students who often eat lunch outside (Diaz-Mendez and Garcia, 2017; Middendorff et al., 2016). College cafeterias are crafted to serve diverse range of affordable food while offering a place for students to relax (Kwun et al., 2013). It provides a social space for students to eat and accustom themselves to their new life at the university (Hassanain et al., 2016).

As food can be a hidden carrier of pathogens, unhygienic practices may result into FBDs (Aluko et al., 2014; Borchers et al., 2010). Developing countries are at a greater risk of FBDs because of not only faulty food handling practices, but due to an added burden of inadequate supply of potable water and poor environmental sanitation (Boro et al., 2015).

Increased cases of FBDs not only pose the burden of diseases but also decrease the productivity and hence accentuate the economic burden (Kumar et al, 2017).

Research depicts that cafeterias try to impress their customers with cleanliness, however, cleanliness is limited to the eating area only. It has been disclosed in a research conducted by Kumari and Kapur, (2018) in 24 Delhi based catering establishments. Clean uniforms were worn by the food handlers employed at service counters, whereas in the kitchen, food handlers were spotted wearing personal clothing. Not a single catering establishment could produce food handlers' medical fitness certificate as per the proforma recommended by FSSAI. It was also seen that 70.8% food establishments had no regular supply of consumables for personal hygiene maintenance. Food handlers admitted that in the absence of soap, they wash their hands with just water or detergent.

Another research conducted by Yadav et al., (2018), in Delhi, concluded that significant number of food handlers weren't familiar with basic knowledge concerned with food safety and hygiene. Many researchers have deduced that food safety knowledge of food handlers, determine the victory or failure of a food outlet. Hence, it is essential for food handlers to have sound food safety knowledge. Minor variances from the established norms can have harmful consequences (Padmaja, 2004). Food handlers' health status, personal hygiene and practice also determines the probability of food getting contaminated. Use of bare hands to exchange money and touching of food while serving the food can harbour large number of pathogens.

The rise in awareness concerning food safety among youngsters and rising number of non-residential students has led to increased expectations for better dining experiences and hygienic cafeteria environment (Boro et al., 2015). Students nowadays place more importance on hygiene related factors while consuming food at cafeteria. Thus, this study is conducted to assess the KAP of Food handlers employed in the cafeterias of various colleges of University of Delhi, regarding food safety.

OBJECTIVES OF THE STUDY

Broad objective of this research is to assess the KAP of Food handlers employed in the cafeterias of various colleges of University of Delhi, regarding food safety.

The specific objectives of study are to:

1. Study the socio-demographic profile of the food handlers working in college cafeterias.

2. Assess the KAP of food handlers related to food safety and personal hygiene.

3. Assess the layout, design and facilities of various college cafeterias.

METHODOLOGY

Study design and sample

A cross sectional study was carried at cafeterias of University of Delhi colleges. 40 food handlers working in 10 cafeterias were taken as the sample of the study from various colleges (3 from North campus, 3 from south campus and 4 off campus colleges).

Cafeterias were running in colleges after getting tender.

Study tools

KAP of food handlers related to food safety were assessed with the help of pilot tested bilingual questionnaire and observational checklist. Questionnaire prepared by the researcher was parted into four fragments, namely: a) Demographic profile (12 questions), b) Knowledge (13 questions), c) Attitude (6 questions) and d) Practices (10 questions). Observational checklist comprised of 44 focus points emphasizing on: personal hygiene maintained by the food handlers, infrastructure of the cafeteria, sanitary conditions of work environment and consumption area, and food safety practices followed by the food handlers. Participant consent form was obtained by the respondents, regarding confidentiality of the responses and respondents. Tools prepared for data collection were pilot tested on 5 food handlers working in private cafeterias,which were not incorporated in the study. On the basis of findings of the pilot study, language of questions was modified for the ease of respondents' understanding.

Data collection

Cafeterias were visited during the months of February-July, 2023 in the less workload hours. 40 food handlers were asked to answer the questionnaire and illiterate food handlers were assisted by the researcher. The hygiene practices and infrastructure of the cafeteria were observed. The serving area, preparation area, kitchen and food storage area were observed in terms of cleanliness and availability of desired facilities. Data was also collected on frequency of pest control, medical checkup, licensing and source of water supply. The data were then entered in MS Excel and percentages were calculated.

RESULTS

The study was carried to evaluate the KAP of food handlers employed in ten cafeterias of University of Delhi colleges. The conditions of catering establishment and the food safety standards and & procedures to be adhered by them were evaluated as per Schedule 4 (Part 2 and Part 5) of FSS regulations, 2011 under FSS Act 2006.

Socio-demographic profile of food handlers

First fragment of the developed questionnaire comprised of the socio-demographic profile of food handlers. Details which are relevant to the study like sex, age and education were collected and analyzed.

Table 1: Demographic profile of the Food handlers (n=40)

S.No.	Attribute		No. of Employees	Percentage
1.	Sex	• Male	37	92
		• Female	3	8

2.	Age	• 14-20	8	20
		• 21-40	24	60
		• 41-60	8	20
3.	Education	• Middle school (8th)	16	40
		• High school (12th)	19	47.5
		• Graduation	3	7.5
		• Uneducated	2	5

Table 1 depicts the socio-demographic profile of food handlers employed in Delhi universitycafeterias highlighting that most of them were males (92%) and females (8%), who were predominantly engaged in the cleaning section. 20% food handlers were in the age bracket of 14-20 years and maximum food handlers were in the age bracket of 21-40 years.

For inculcation of food safety knowledge, the education attainment of food handlers plays a significant role (Reddy et al., 2020). It was noticed that larger part (95%) of the population had formal education and were literate. 47.5% food handlers were educated till high school. Very few (7%) of them were graduates and were designated additional tasks like handling cash and other managerial tasks.

Food handlers' job characteristics

Focus of the research regarding characteristics related to food handlers' job included job responsibility, work force, FoSTaC training status, work experience and type of employment.

Table 2: Job characteristics of Food handlers

S.No.	Attribute		Frequency	Percentage
1.	Job responsibility	• Cook	20	50
		• Waiter	7	17.5
		• Cleaning staff	5	12.5
		• Manager	3	7.5

		• Multiple responsibilities	5	12.5
2.	No. of food handlers in cafeteria	• 2-5	-	-
		• 2-10	20	50
		• 11-20	17	42
		• >20	3	8
3.	FoSTaC training	• Yes	4	10
		• No	36	90
4.	Work experience (in years)	• 0-2	9	22
		• 2-5	8	20
		• >5 years	23	58

Table 2 represents job characteristics of food handlers underscoring that maximum food handlers were engaged in cooking, but some were observed performing multiple responsibilities like handling both food and money simultaneously. Reason behind multitasking could be the constant race of providing efficient service to their customers in thehighly competitive business or due to under staffing. Reddy et al., (2020) in their study emphasizes that managing money with bare hands while serving the food can harbour large number of pathogens. Similar outcomes were also deduced by Gedik et al., (2013) in their study conducted in Netherlands. Food handlers with good work experience (>5 years) stated that food safety trainings were not required, hence great no. of food handlers employed in college cafeterias hadn't received FoSTaC training. It was witnessed that majority of the staff was contractual, so even if they get trained, they leave in some time and again new untrained staff enters.

Food safety knowledge

Literature illustrates that knowledge related to food safety has a prominent impact on hygiene practices and attitude of food handlers whereas low knowledge increases the perils of food contamination (Kalua, 2001; Ahmed et al., 2021). Current study too, observes that food handlers had low food safety knowledge related to hand washing, food storage temperature, danger zone and food spoilage. 72.5% food handlers had appropriate knowledge related to hand washing. The remaining 27.5% were not acquainted with the significance of washing hands before handling food. Insufficient knowledge regarding safe food storage temperature (as shown in Fig.1) was seen in 47.5% food handlers. Figure 2

depicts that only 2.5% food handlers were aware about the correct danger zone temperature for food storage, 50% food handlers weren't familiar with the danger zone temperature and 42.5% food handlers answered incorrect temperature danger zone. The cause of low food safety knowledge might be the lack of food safety training offered by the owners. Cafeteria owners admitted that because of the contractual nature of job, staff keeps on changing in every few months. So, even if management strives to train the food handlers, he/she leaves the job within few months and the new untrained staff joins.

The study observed that 20% cafeterias weren't using potable water for pre-cooking and cooking procedures. Literature depicts that using untreated water for pre-cooking and cooking practices can contaminate food and cause FBDs (Ahmed et al., 2021; Water education foundation, 2024). The data also depicts that knowledge regarding causes of food contamination was low among food handlers. Only 50% food handlers stated that processed and raw food when kept together can cause contamination. 40% food handlers were aware about the surfaces on which FBD causing microbes can be found. Various researches on food safety also report that FBD causing microbes can be found on food processing surfaces and unawareness of food handlers about surface contamination is prevalent in developing countries, thereby escalating the risk of FBDs (Teixeira et al., 2008; Das et al., 2018; Bearon et al., 2007). Only 57.5% food handlers stated that contaminated food & water is a reason for FBDs. The reason for low food safety knowledge could be low or absence of food safety supervisor in cafeterias. 65% food handlers were unaware about the characteristics of spoiled food and lacked ability to assess the food spoilage. Thus, the data shows insensitive attitude of food handlers about food safety and hygiene, which can cause health concerns in their customers. It was noted that food handlers lacked basic food safety knowledge because of no formal training. 65% food handlers knew that vomiting, diarrhoea, abdominal pain and fever are symptoms of FBDs. 47.5% food handlers weren't familiar with the importance of pest control.

The data indicated that food handlers' knowledge related to food safety was based on work experience rather than training.
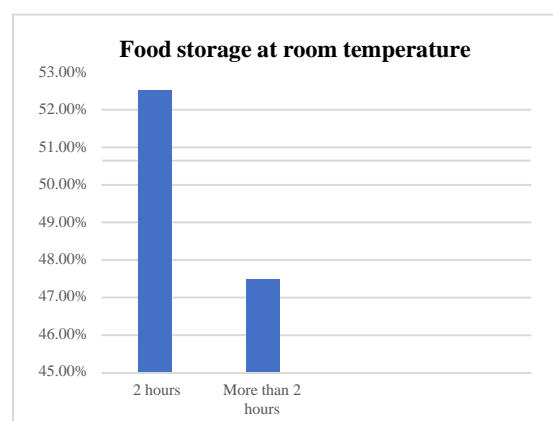

Figure 1: Knowledge of food storage at room temperature
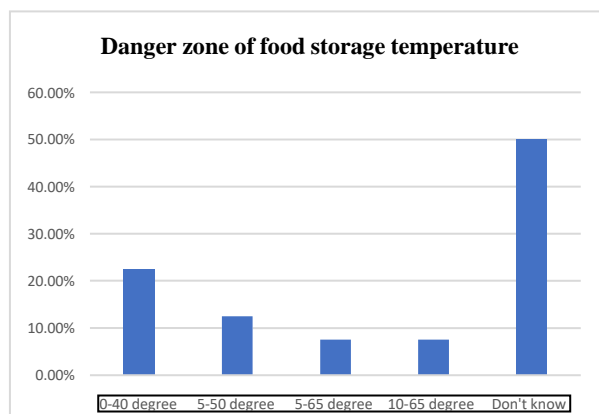
Figure 2: Knowledge regarding danger zone of food storage temperature

Food handlers' attitude towards food safety

The literature shows that practice and behaviour of food handlers at cafeteria is influenced by the attitude of food handlers (Ma et al., 2019). In the study, 87.5% food handlers agreed that hot served food are always safe for consumption and 35% food handlers feel that reheating of food is not always necessary before consuming. The data regarding food label understanding on ready to eat packaged food indicates that 20% food handlers didn't read the food label. Although 80% of them specified the prominence of best before date on the label.

Only 5% food handlers answered that hand washing every time with soap and water before touching food is necessary. 95% food handlers indicated that washing hands with just water is sufficient before touching food. This indicates their unawareness and ignorant attitude towards food safety. According to Ma et al., (2019), the education level of food handlers influences their attitude towards food safety and in the study it can be seen that 5% food handlers were illiterate and 40% couldn't complete their schooling, which could be the reason for their insensitive attitude towards food safety and hygiene practices

Food safety practices

Studies have revealed that practices followed by food handlers are largely responsible for increasing or decreasing the threat of food contamination (Reddy et al., 2020). Figure 3 indicates food safety and hygiene practices followed by food handlers at the cafeterias, which shows that only 15% food handlers were spotted wearing head gear, out of which 5% wore it only in the morning hours. 60% of the food handlers didn't change their head gear daily. Hygiene practices like wearing gloves and clean apron were also absent. The cafeteria management did not provide food handlers with fresh head gears, gloves and clean aprons. Non-availability of fresh consumables every day at the cafeteria might be the reason for not using and regularly changing them. It was also observed that 5% food handlers were having long and dirty nails. Separate dusters for cleaning preparation and consumption area were used by 80% of food handlers.

Fig.3: Absence of apron and head gear

The data indicated that 70% food handlers kept the food covered. Thus, it shows that the knowledge related to safe food handling was not translated into practice. Hence, regular trainings emphasizing on food safety & hygiene practices are important. The data indicated that basic food safety equipment like thermometer, liquid hand wash, dusters, towels for wiping sweat were not provided by the owners to their employees. This shows the casual attitude of the cafeteria owner towards food safety.

Large portion of students and employees have their meals in the college cafeteria that results in generation of sizable amount of leftover food (Gashaw et al., 2012). On the contrary, data from present study shows that 65% food handlers didn't label leftover food, as most of them stated that they discard the leftover food. This resulted in wastage of food, thereby increasing the expense of the cafeteria. Hence importance of proper utilization and labelling of leftovers should be imparted to everyone in the cafeteria. Practice regarding discarding the complete spoilt food was low amongst food handlers. 25% food handlers said that they use the food items which have started to spoil after discarding the visible spoilt part.

Figure 4: Food safety practices followed by the food handlers

Infrastructure of cafeteria

Infrastructure of the cafeteria plays a pertinent role in ensuring food safety. Inadequate ventilation, less number of dish racks, less space for storing food products and utensils may lead to contamination. In the study, it was found that 70% cafeterias had appropriate space for storing washed utensils, rest of the 30% were lacking in providing appropriate space, which can lead to contamination. Unclean walls (20%) and inadequate ventilation (30%) was noted in cafeterias which may lead to excessive sweating resulting in substandard hygiene practice.

Fig.5: Dirty windows   **Fig.6: Uncovered food**

DISCUSSION

Cafeteria in colleges provides variety of delicacies, which is the chief attraction for the students. But along with taste, food safety has to be considered, so as to prevent FBDs. It was noted that majority of the food handlers had appreciable amount of experience but lacked food safety training. Veteran food handlers opined that there is no requirement for formal training because they have been doing the same work for years. The unwillingness of food handlers to attend formal food safety training could be due to low wages, contractual system of work, hectic work schedule which leaves no time for training and lack of basic amenities like gloves, apron and head gear provided by the cafeteria owner.

Data depicts that food safety knowledge was lacking amongst the food handlers. Knowledge and practice related to safe food handling like proper food storage temperature, danger zone of temperature, recognition of food spoilage, food contamination, symptoms of FBDs, importance of pest control and proper hand washing practice were lacking. The education attainments of food handlers plays a noteworthy role in increasing awareness about the significance of food safety and hygiene practices. Reddy et al. (2020), conducted a research in India, in which they observed that 55% food handlers had completed schooling or were graduates, rest either dropped out of school or never attended school**.** Similar findings were reported in the present study, 5% food handlers never attended formal schooling and 40% food handlers completed only middle school. Low education rates of food handlers might be the cause of unsatisfactory food safety knowledge & ignorant attitude towards food

safety and hygiene practices.

Multitasking was witnessed in many cafeterias. Food handlers were seen handling money and food with bare hands simultaneously. Researchers have found that paper currency can harbor various infectious agents such as S. aureus and E. coli (Gedik et al., 2013). Enormous amount of work pressure, under staffing or poor knowledge about food handling could be the reason for multitasking by food handlers.

Data reveals that majority of the food handlers were not wearing clean apron, head gear and gloves. Large no. of food handlers (70%) kept the food covered. Only 12.5% food handlers were reported checking the temperature of food with thermometer as most of the cafeterias didn't have thermometer. It could be due to food handlers' attitude, unavailability of the material or untrained staff. 90% food handlers at cafeteria were untrained, but few food handlers (10%) who were trained and had average knowledge about food safety principles weren't following the food safety practices. This shows that the knowledge wasn't being converted into practice. Lack of hygiene practices among trained food handlers can be due to ignorant attitude and to bring a positive transformation in attitude of food handlers, reinforcement of food safety principles is required. Also, providing trainings to the whole staff might help, as influential learning helps in increasing the knowledge about food safety.

The present study found that 20% of cafeterias were not using potable water. Such practices can lead to contamination, resulting in FBDs. Lack of adequate infrastructure like dish racks, space for storage of food products and washed utensils, which may lead to contamination was also noticed in cafeterias. Inadequate ventilation may lead to excessive sweating resulting in substandard hygiene practice.

Number of customers in college cafeterias is almost fixed, so food handlers might not recognize the necessity of strengthening competitiveness, which might be the cause of ignorant attitude of food handlers concerning food safety & hygiene practices (Cha and Seo, 2018). But, it is essential for food handlers and owners to understand that the success of an eating outlet depends upon each and every employee of the organization. So, even if some of them are not following food safety practices, it can lead to disastrous results. Thus, formal food safety trainings and good hygiene practices are of utmost importance for each and every food handler. Since, the study was limited to few cafeterias of Delhi university colleges, future research can be recommended with a larger sample size.

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EXPLORING THE RELATIONSHIP BETWEEN BODY MASS INDEX AND HEALTH-RELATED QUALITY OF LIFE IN TYPE II DIABETES PATIENTS

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ABSTRACT

Diabetes has a strong negative impact on Health-Related Quality of Life (HR-QoL) especially in the presence of complications. Research suggests that there is a strong relationship between Body Mass Index (BMI) and the HR-QoL of individuals with diabetes. The study was conducted among 500 outpatient type II diabetics who were non-randomly selected. Height and weight of the patients were taken following standard methods and Body Mass Index of the patients were computed. In order to assess the HR- QoL of the patients a Likert's 5 point scale as developed by modifying the QOLID formulated for the assessment of diabetes specific HR-QoL in Indian subjects and were self administered on the patients. Statistical analyses were conducted to establish the relation between BMI and HR-QoL using SPSS version 21.0. The results show that the mean BMI values of both male and female patients depicted that they were in the overweight category. The overall prevalence of overweight individuals was found to be 36 percent, while the prevalence of obesity stood at 21 percent. HR-QoL assessed using the QOLID tool revealed that among the six domains studied, the most distressed was the general health. Conclusively, the findings suggest that there is a significant positive correlation exist between Body Mass Index and HR-QoL of Type II Diabetes Patients

Keywords- Type II diabetes mellitus, BMI, Health-Related Quality of Life

INTRODUCTION

Diabetes mellitus, a common metabolic disease among general population and its management can have a considerable impact on people's lives (SIGN, 2010), due to feelings of isolation, codependency, experience of loss, overuse of defense mechanisms, and loss of freedom, all of which takes a toll on the Quality of Life (QoL) outcome of the patients. Quality of Life (QoL) is a multidimensional construct incorporating an individual's subjective perception of physical, emotional, and social well-being, including both a cognitive component (satisfaction) and an emotional component, whereas Health Related Quality of Life (HR-QoL) is primarily concerned

with only one particular aspect of QoL and how it may be affected by health and disease. Several studies have demonstrated that diabetes has a strong negative impact on HR-QoL, especially in the presence of complications (Jain et al, 2014).

Research suggests that there is a strong relationship between Body Mass Index (BMI) and the HR-QoL of individuals with diabetes (Ranasinghe et al, 2013). The BMI, which is a measure of body fat based on height and weight, is often used as an indicator of a person's health status. In the case of diabetes patients, maintaining a healthy BMI is crucial for managing the condition and improving their overall QoL Poorly managed diabetes, coupled with a high BMI, can lead to various health complications, including cardiovascular issues, nerve damage, and kidney problems, all of which significantly impact the patient's HR- QoL. So, it is crucial for healthcare providers to encourage and support diabetes patients in achieving and maintaining a healthy BMI to ensure better disease management as the ultimate goal of diabetes management is to safeguard and if possible, improve patients' HR-QoL.

OBJECTIVES

- To determine the correlation between BMI and the overall HR- QoL in individuals diagnosed with Type II diabetes.

HYPOTHESIS

H_0 – There is no significant correlation between BMI and the overall HR- QoL in individuals diagnosed with Type II diabetes

MATERIALS AND METHODS

A considerably large sample of 500 type II diabetes patients who attended the outpatient department of one of the leading hospitals in Thiruvananthapuram were non-randomly selected for this study. Details on various nutritional status indicators, namely socio-economic profile, anthropometric, biochemical profile, clinical status and dietary factors were collected from the patients using standard tools through direct Interview method.

Height was measured up to the nearest millimeter using a stadiometer. The subjects were made to stand erect on a flat floor against a levelled wall with heels together and upper limbs hanging closely to the side. Weight was recorded to the nearest 100g using a bathroom weighing scale. The scale was placed on flat ground and zero error was adjusted. The patients were made to stand erect on the scale without foot wear to measure the

Body mass index (BMI):- The nutritional status of adults (men and women) was determined by computing BMI as suggested by WHO guidelines. The BMI (kg/sq.m), also known as the weight-height index, is derived by computation as the quotient of weight (kg) divided by height (meters) squared.

$$\text{Body Mass Index (BMI)} = \text{Weight (kg)/height (m}^2)$$

In order to assess the HR- QoL of the patients a Likert's 5 point scale was developed by modifying the QOLID formulated by Nagpal et al (2010), which is a reliable, valid and sensitive tool for the assessment of diabetes specific HR-QoL in Indian subjects and were self administered on the patients, which covered six major domains such as role limitation due to diabetes, limitation in

physical endurance, general health, treatment and diet satisfaction, financial worries and emotional and mental health of the patients. Statistical analyses were conducted to establish the relation between BMI and HR-QoL using SPSS version 21.0.

RESULTS AND DISCUSSION

Background information of the patients

The selected patients consisted of 283 male patients and 217 female patients. More than half (52%) of the patients belong to the age group of 45-60 years category. Overall, most of the patients (86.8 %) were married. When the educational background of the patients was scrutinized it was observed that close to half of the patients (male patients 50.5% and female patients 51.0%) were educated till SSLC only. There were patients (8.6%) who had mere primary school level education, double to this (15.8%) were graduates, post graduates or other professional degree holders. Employment level of the patients, which has been speculated as a strong determinant of socio-economic status revealed that 8.1 percent of male patients against almost one fourth (70.5%) of the female patients remained jobless. The patients were also grouped based on their total monthly income of the family and it was observed that an equal number of the patients received a total monthly income less than Rs 15000 (53%) and income between Rs 30000-45000 (52%). Only a negligible count of the patients (1.8%) enjoyed the comfort of income above Rs 45000 per month. Detailed information are depicted in Table 1, 2 and 3

Table 1. Personal details of the patients

Particulars	Gender				Total		χ^2	
	Male patients		Female patients					
	N	%	N	%	N	%	Value	p-value
Age of the patients								
30-45	62	21.9	38	17.5	100	20.0	9.819[a]	0.007 (S)
45-60	130	45.9	130	59.9	260	52.0		
Above 60 years	91	32.2	49	22.6	140	28.0		
Total	283	100	217	100	500	100		
Marital status								
Married	257	90.8	177	81.6	434	86.8	20.129[a]	0.000 (S)
Unmarried	7	2.5	2	0.9	9	1.8		
Separated	5	1.8	2	0.9	7	1.4		
Widow (er)	14	4.9	36	16.6	50	10		
Total	283	100	217	100	500	100		
Educational status								
Upto primary	13	4.6	30	13.8	43	8.6	15.929[a]	0.003 (S)
Up to SSLC	143	50.5	112	51.6	255	51.0		
Pre-degree	54	19.1	35	16.1	89	17.8		
Technical education	23	8.1	11	5.1	34	6.8		
Graduation & above	50	17.7	29	13.4	79	15.8		

Total	283	100.0	217	100.0	500	100.0		
Occupation of the patients								
None	23	8.1	153	70.5	176	35.2		
Labourer/Coolie	40	14.1	10	4.6	50	10.0		
Private job	51	18.0	15	6.9	66	13.2		
Government job	32	11.3	20	9.2	52	10.4		
Foreign returned	17	6.0	2	0.9	19	3.8	222.194[a]	0.000 (S)
Retiree	69	24.4	13	6.0	82	16.4		
Large scale business	47	16.6	3	1.4	50	10.0		
Small scale business	4	1.4	1	0.5	5	1.0		
Total	283	100.0	217	100.0	500	100.0		

Table 2. Demographic profile of the patients

Particulars	Gender				Total		$\chi 2$	
	Male patients		Female patients					
	N	%	N	%	N	%	Value	p-value
Type of family								
Nuclear	189	66.8	129	59.4	318	63.6	4.953[a]	0.084 (NS)
Extended	93	32.9	84	38.7	177	35.4		
Joint	1	0.4	4	1.8	5	1.0		
Total	283	100.0	217	100.0	500	100.0		
a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is 2.17.								
Family Composition								
Upto 4	194	68.6	134	61.8	328	65.6	8.219[a]	0.016 (S)
5-7	86	30.4	72	33.2	158	31.6		
>7	3	1.1	11	5.1	14	2.8		
Total	283	100.0	217	100.0	500	100.0		
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 6.08.								
Location of housing								
Urban	141	49.8	90	41.5	231	46.2	11.074[a]	0.004 (S)
Rural	121	42.8	121	55.8	242	48.4		
Remote	21	7.4	6	2.8	27	5.4		
Total	283	100.0	217	100.0	500	100.0		

Table 3. Socio-economic details of the patients

Particulars	Gender				Total		χ^2	
	Male patients		Female patients					
	N	%	N	%	N	%	Value	p-value
Educational status of the spouse								
Not applicable	24	8.5	40	18.4	64	12.8	13.411[a]	0.020 (S)
Upto primary	19	6.7	17	7.8	36	7.2		
Up to SSLC	115	40.6	82	37.8	197	39.4		
Pre-degree	50	17.7	34	15.7	84	16.8		
Technical education	26	9.2	11	5.1	37	7.4		
Graduation & above	49	17.3	33	15.2	82	16.4		
Total	283	100.0	217	100.0	500	100.0		
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 15.62.								
Occupation of the spouse								
None	183	64.7	20	9.2	203	40.6	173.336[a]	0.000 (S)
Labourer/Coolie	6	2.1	29	13.4	35	7.0		
Private job	14	4.9	30	13.8	44	8.8		
Government job	26	9.2	29	13.4	55	11.1		
Foreign returned	3	1.1	9	4.1	12	2.4		
Retiree	25	8.8	37	17.1	62	12.4		
Large scale business	2	0.7	20	9.2	22	4.4		
Small scale business	0	0.0	3	1.4	3	0.6		
Not applicable	24	8.5	40	18.4	64	12.8		
Total	283	100.0	217	100.0	500	100.0		
a. 2 cells (11.1%) have expected count less than 5. The minimum expected count is 1.30.								
Monthly income								
Upto 15000	137	48.4	128	59.0	265	53.0	5.787 [a]	0.122 (NS)
15000-30000	124	43.8	76	35.0	200	40.0		
30000-45000	17	6.0	9	4.1	26	5.2		
Above 45000	5	1.8	4	1.8	9	1.8		
Total	283	100.0	217	100.0	500	100.0		
a. 1 cells (12.5%) have expected count less than 5. The minimum expected count is 3.91.								

BMI profile of the patients

In this study the mean BMI of the patients was analysed using Welch Robust Tests of equality of means and the result is furnished in Table 4.

Table 4. Mean BMI values of the patients

Gender	N	Mean	S.D	Range values	Welch Robust tests of equality of means	
					Value	p-value
Males	283	25.91	3.96	15.7-38.9	17.708[a]	0.000 (S)
Females	217	27.52	4.44	17.8-44.7		

a. Asymptotically F distributed.

The mean BMI values of both male and female patients depicted that they were in the overweight category according to WHO (2004) classification (25.91 ± 3.96 for male patients against 27.52 ± 4.44 for female patients). The higher values of BMI for male patients (38.9) stood in the obesity class II category (35-39.9), whereas that of female patients (44.7) came under the obesity class III category (>40). The observation was statistically significant too.

Analyzing the distribution of patients based on specific BMI cutoffs provides a comprehensive overview of the prevalence of underweight, normal weight, overweight, and obesity within the patient cohort, the details of which are presented in Table 5.

Table 5. Distribution of patients based on BMI cutoff values

BMI Categories	Male patients		Female patients		Total		Pearson Chi-Square	
	N	%	N	%	N	%	Value	p-value
Underweight: BMI < 18.5	7	2	6	3	13	3	29.141a	0.000 (S)
Normal weight: 18.5 - 24.9	132	47	74	34	206	41		
Overweight: 25- 29.9	101	36	77	35	178	36		
Obesity: BMI >= 30	43	15	60	28	103	21		
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 8.60.								

The results obtained from the analysis demonstrate a substantial prevalence of overweight and obesity among the patient population under investigation. Notably, the overall prevalence of overweight individuals was found to be 36%, while the prevalence of obesity stood at 21%. These figures highlight a concerning trend that necessitates attention and proactive measures to address the issue of excessive weight among patients. The analysis reveals that a significant proportion of female patients, accounting for 28%, were classified as obese. In contrast, a comparatively lower percentage of male patients, approximately 15%, were found to be obese. This discrepancy suggests potential

gender-based differences in the predisposition to obesity within the patient cohort. The observation was statistically significant.

HR-QoL of the patients

The mean scores for HR-QoL elicited using QOLID tool was statistically treated to determine the low (Scores <2.39), moderate (Scores 2.39-2.70) and high grades (Scores >2.70) QoL cut-off values for the patients and accordingly the interpretations were made.

The mean score for all the 6 domains included in the QOLID tool for the patients showed that the mean score of QOLID variables for male patients, it was in the moderately affected range, i.e., 2.62 (2.39-2.70) and for female patients it was found to be highly affected, i.e.,2.90 (>2.70). However the Welch Robust Tests of Equality of Means showed that the observation is statistically significant.

Gender wise comparison of mean score for each variable under 6 domains of QOLID tool was examined and found that five domains namely role limitation due to physical health, physical endurance activities, general health, financial worries as well as emotional and mental health of the female diabetes patients had been highly affected when compared to their male counterparts. But the treatment and diet satisfaction domain were found to have affected male patients much even though the female patients were also in the highly affected range (2.70). Independent sample t-test has proved all the observations except treatment and diet satisfaction, to be statistically significant.

The analysis progressed step by step and eventually ended up in sorting out which is the most affected domain in the QOLID tool through One-way Anova the results are demonstrated in Table 6.

Table 6. The most affected HR-QoL domains in the patients

HR-QoL domains	Mean	S.D	Anova	
			F-value	p-value
Role limitation (D1)	2.48	0.911		
Physical endurance limitation (D2)	2.43	0.891		
General health (D3)	3.34	0.834		
Treatment & diet satisfaction (D4)	3.04	0.736		
Financial worries (D5)	2.75	0.959		
Emotional and mental health (D6)	2.60	0.792		
Total	2.77	0.916	86.73	0.000 (S)

Tukey simultaneous comparison t-values (d.f. = 2994)						
	D2	D1	D6	D5	D4	D3
	Mean	2.43	2.48	2.60	2.75	3.04	3.34
D2	2.43						
D1	2.48	0.91					
D6	2.60	3.20	2.29				
D5	2.75	5.99	5.08	2.79			
D4	3.04	11.33	10.41	8.12	5.33		
D3	3.34	16.94	16.03	13.74	10.95	5.61	
critical values for experiment wise error rate:						

	0.05	2.89	
	0.01	3.42	

When the mean scores of individual domains were examined, it was found that general health, treatment and diet satisfaction and financial worries were the highly affected domains followed by role limitation, physical endurance activities and emotional and mental health. However, the results were statistically significant (p-value <0.05). The Tukey simultaneous comparison among the variables revealed the truth that among the six domains studied in QOLID, the most distressed was the general health (highly statistically significant mutual exclusiveness from all other domains) of the patients (mean score 3.34), followed by treatment and diet satisfaction (3.04) and financial worries (2.75).

Correlation between BMI and HR-QoL

The computed BMI was correlated with the overall HR-QoL scores to understand its influence and the results are presented in Table 7.

Table 7. Correlation between BMI and HR-QoL

	QOLID
BMI	0.115 (S)
Critical value 0.05 (Sig.2-tailed)	± .088

The present study delved into the intricate relationship between Body Mass Index (BMI) and the Health-Related Quality of Life (HR-QoL) among patients diagnosed with Type II Diabetes. Through a meticulous analysis of the data, it was ascertained that there exists a positive correlation between BMI and HR-QoL of these patients that is both noteworthy and statistically significant, that is the H0 is rejected. This assertion is fortified by the establishment of a critical value of ±0.088, serving as the threshold for statistical significance in this particular investigation. This observation serves as a call to action for healthcare professionals underscore the pivotal role of BMI management in promoting an enhanced quality of life for individuals living with Type II Diabetes.

CONCLUSION

The results show that the mean BMI values of both male and female patients depicted that they were in the overweight category. The overall prevalence of overweight individuals was found to be 36 percent, while the prevalence of obesity stood at 21 percent. HR-QoL assessed using the QOLID tool revealed that among the six domains studied, the most distressed was the general health. Conclusively, the findings suggest that there is a significant positive correlation exist between Body Mass Index and HR-QoL of Type II Diabetes Patients

IMPLICATIONS OF THE STUDY

The study underscores that the healthcare providers should emphasize weight control as a means to improve overall quality of life. The high prevalence of overweight and obesity among Type II diabetes patients calls for public health initiatives promoting healthy eating habits, physical activity, and lifestyle modifications. As female patients showed a higher prevalence of obesity and poorer HR-QoL scores, gender-based interventions should be considered in diabetes management programs. Since financial worries were one of the most affected HR-QoL domains,

policymakers should ensure affordable access to diabetes treatment, medications, and lifestyle modification programs.

SUGGESTIONS FOR FUTURE RESEARCH

- Future research should focus on long-term studies to assess how BMI fluctuations impact HR-QoL over time.
- Studies evaluating the effectiveness of weight management interventions (diet, exercise, lifestyle changes) on HR-QoL in Type II diabetes patients would provide practical recommendations.
- Examining differences in HR-QoL between urban and rural populations or across various socio-economic groups could provide tailored intervention strategies.
- Future studies could explore additional health markers like blood glucose levels, lipid profiles, and inflammatory markers to better understand the interplay between metabolic health and HR-QoL.

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NUTRITIONAL AWARENESS OF WORKING MOTHERS REGARDING DIETARY PRACTICES OF THEIR PRE-SCHOOL CHILDREN: A CROSS-SECTIONAL STUDY

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ABSTRACT

Pre- School children stage is the foundational age of life and require essential nutritional care but working mothers are unable to take care of their pre-school children due to lack of time. The aim of the study is to assess nutritional knowledge of working mothers of pre-school children. The study was conducted on 105 working mothers working in private, public and other sectors and having pre-school child aged 3 to 5 years of Varanasi. Self-structured questionnaire was used for the collection of data and data was analyzed using SPSS 16.0 version statistical software and the chi-square test was used to compare frequencies for qualitative variables. Result shows that the mothers working in private sector and business were facing major problems in child care due to workload. More than 80 percent mothers were having knowledge about balanced diet as they were educated but due to insufficient time mothers were feeding ready to eat food and canned food. More than 40 percent mothers were spending only 2-4 hours with their child on working days. There was also significant association between occupation of mothers and problems faced by them during child care. There was a need to establish creche centers in every sector of work.

Key words: Children, Nutrition**,** Pre-School, Working mothers, Women

INTRODUCTION

In ancient times, Women's roles were limited to bearing children and taking care of the home but now in the era, working women are playing a dominant role in the improvement of society and the economy of the country (Bishnoi at. el., 2020). In addition to this, they act as paradigm for their child and community. The women's rate entering in workforce force is the result of a multifaceted combination of socioeconomic and structural factors. The latest Periodic Labor Force Survey (PLFS) report for 2021–2022 clearly shows that Indian women labour force participation rate (LFPR) has improved (PLFS report, 2023). National Family Health Survey found that Indian working women contribute 18% in gross domestic product (GDP) in the study (Singh, 2024). A woman performs as a homemaker who works all domestic chores as well as child rearing, caring the health of the family members as well as handling financial duties of family (Gandhini at.el.,2023). In which mothers' employment effects on the all over development of their children during the working time. Working women face challenges of double burden of unpaid caregiving duties, which negatively impacts both their personal welfare and their child well-being (Sudeshna and Shubhika, 2017).

The period of early childhood is very crucial age for the development of three domains in children cognitive, affective and psychomotor. During growth and development of pre-school children, they suffer from many behavioural problems. Various research suggests that maladaptive eating patterns later in life may be preceded by problematic eating behaviours that appear in early childhood (Dubois et.al., 2007). A healthy diet for child in life is largely determined by the dietary patterns developed in pre-school age (Brand et.al., 2023). Here, mothers need to take care of children and spend few times with the children to make them feel very special and loved (Alexander & Shetty, 2014) because pre-school children stage is the foundational age of life and require essential nutritional care but working mothers are unable to take care of their pre-school children due to lack of time. Pre-School children are more vulnerable to suffer from nutritional deficiencies, they need extra nutritional care.

According to numerous studies conducted worldwide, anemia is quite common in malnourished children, and treating anemia significantly impacts malnutrition (M. et al., 2016). Malnutrition in under five years of age is a widespread health problem globally that has repercussions everywhere. It is the major nutritional problem indicator in underdeveloped countries, and affects the growth and development of early age children (Badami et al., 2014). Good nutrition is a key factor in determining a child's well-being. Healthy children lead economically and socially active in their life, whereas children who are malnourished suffer from adverse health effects and experience an increase in the incidence of illness (Halder & Kejriwal, 2016). Physical development, motor development, and cognitive developmental issues all delayed in children under the age of five who are malnourished (Warsit et.al., 2012). According to WHO estimates, 45 million children under the age of five are wasted, 149 million are stunted, and 37 million children under the five years age are overweight or obese (WHO, 2022). Nutrition indicators for children in all-India level shows a minor improvement as stunting has decreased from 38 to 36 percent, wasting from 21 to 19 percent, and underweight between 36 to 32 percent (NFHS-5, 2019-2021).

JUSTIFICATION OF THE STUDY

Mothers play a vital role in growth and development of children but working mothers are facing many challenges regarding nourishment of pre-school children due to workload, busy schedule and sometimes, lack of nutritional knowledge. Therefore, the main causes of malnutrition among preschoolers were inadequate nutritional management. Varanasi has found high rate of stunting, wasting and underweight children. A very few studies emphasized on working mothers as well as the dietary management of pre-schoolers. Therefore, the present study was focused on nutritional awareness of working mothers regarding dietary practices of their pre-school children.

OBJECTIVES

1. To assess nutritional knowledge of working mothers of pre-school children.
2. To study dietary practices of pre-school children
3. To study the association between education level of working mothers and their nutritional knowledge

RESEARCH METHODOLOGY

Research Design- The cross-sectional study was conducted in Varanasi, Uttar Pradesh, India.

Sampling - Purposive sampling technique has been used for the selection of study area and sample. Working mothers as respondents were selected by purposive sampling.

Data Collection- The study was based on primary data in which total 105 working mothers were selected for the study who have 3-5 years preschool children and working in Government, Private and other sectors.

Research Tools- Self-Structured Questionnaire and Interview were used for assessment of nutritional knowledge of working mothers.

Statistics- The data was analyzed using SPSS 16.0 version software and Chi-Square statistical technique was used to compare frequencies between variables. The level of significance of ≤ 0.05 was considered between the significance difference.

Ethical Approval- The study has approved on April 13, 2024 by Ethics Committee, Institute of Science, Banaras Hindu University, Varanasi-221005, Uttar Pradesh, India and also taken individual consent from working mothers of child.

CTRI Trail registration: ctri@gov.in CTRI/2024/06/068434 [Registered on: 06/06/2024]

FINDINGS AND DISCUSSION

Table-1 Distribution of working mothers according to their age and occupation

Occupation	Age of Working Mothers							
	25-30 years		31-35 years		36-40 years			Total
	f	%	f	%	f	%	f	%
Private Sector	11	10.47	26	24.76	3	2.85	40	38.09
Public/ Government sector	7	6.66	20	19.04	10	9.52	37	35.23
Business Sector	0	0	3	2.85	03	2.85	6	5.71
Other sectors	14	13.33	8	7.61	0	0	22	20.95
Total	32	30.47	57	54.28	16	15.23	105	100

Table 1- shows about 38.09 percent working mothers were working in private sector, 35.23 percent working in government sector and 20.95 percent working in other sectors. In which 30.47 percent working mothers were from 25-30 age group, 54.28 percent working mothers were from 31-35 age group and 15.23 percent working mothers were 36-40 age group. Here, 38.09 percent working mothers were working in private sector, 35.23 percent were working mothers were working in public/ government sector, 5.71 percent working mothers were in business sector and 20.95 percent were working in another sector. This table found that most of the mothers were working in public/ government sector and belong to 31-35 age group. From ancient times, a women's place was in her home and now, this situation has changed and started seeking jobs outside their homes. Those are working the workplace have various changes in life. Firstly, increases the family income but decreases into the time that has to spend with her children (Yasmeen et al., 2022).

Table-2 Distribution of respondents according to their food choices (Fruits & Vegetables) in pre-school children's diet

Occupation	Fruits & Vegetables included in their pre-school child's diet		
	Yes	No	Total
Private Sector Mothers	22	18	40
Public/Government Sector Mothers	31	6	37
Business Mothers	6	0	6
Other Sector Mothers	19	3	22
Total	78	27	105
$\chi^2 = 13.293$, df= 3, p<0.05			

Table-2 This table shows most of the respondents include fruits and vegetables in the diet of pre-school children. Public sector working mothers were very active in caring of their preschool children (31 percent). Chi-Square value was 13.29. In business sector working mothers' child consuming very less fruits and vegetables while private sector working mothers' child intake found very high. Fruits and vegetables. Inadequate intake of the fruits and vegetables are becoming a concern because low consumption leads to malnutrition and other micronutrient deficiencies in pre-school children, which is responsible for poor growth and development (Baruah & Bhattacharyya, 2020).

Table-3 Distribution of respondents based on their knowledge of balanced diet in relation to their level of education

Balanced Diet	12th		U.G		P.G		Ph.D.		Total	
	f	%	f	%	f	%	f	%	f	%
Yes	2	40	22	100	64	96.96	12	100	100	95.23
No	3	60	0	0	2	0	0	0	5	4.76
Total	5	100	22	100	66	100	12	100	105	100
$\chi^2 = 35.776$, df=3, p<0.05										

Table-3 This table shows 95.23% respondents were well aware from balanced diet and their benefits but sometimes they were unable to provide balanced diet to their children due to lack of time and workload. Chi-Square test value was 35.7 and P value was <0.01 was statistically significant. Similar results were found that providing a balanced diet which fulfils the nutritional requirements of children can help to improve their health. Balanced diet is adequate composition of food according to the age, sex and occupation that the body requirements and provide nourishment to the needs of children at every age (Intan Fazrin et al., 2022).

Table-4 Distribution of respondents (working mothers) based on their knowledge of dietary supplements knowledge in relation to their level of education

Dietary Supplements	12th		U.G		P.G		Ph.D.		Total	
	f	%	f	%	f	%	f	%	f	%
Yes	0	0	16	72.7	41	62.12	12	100	69	95.23
No	5	100	6	27.27	25	37.87	0	0	36	4.76
Total	5	100	22	100	66	100	12	100	105	100
$\chi^2 = 16.70$, df=3, p<0.05										

Table-4 This table revealed that about 62 percent respondents were post graduated having dietary supplements knowledge. Chi-Square value was 16.7 percent and P value was <0.01 was statistically significant. Education plays a significant impact on enhancing mothers' knowledge and child's nutritional status. The study was found that most of the working mothers were giving dietary supplements. Although dietary supplements are good for child but it should be in proper amount according to their child age and requirements. Similar results found in recent study that its very useful to raise awareness among parents about the knowledge of consumption of dietary supplements when necessary and with the recommendation of a Pediatrician (Koç, 2024).

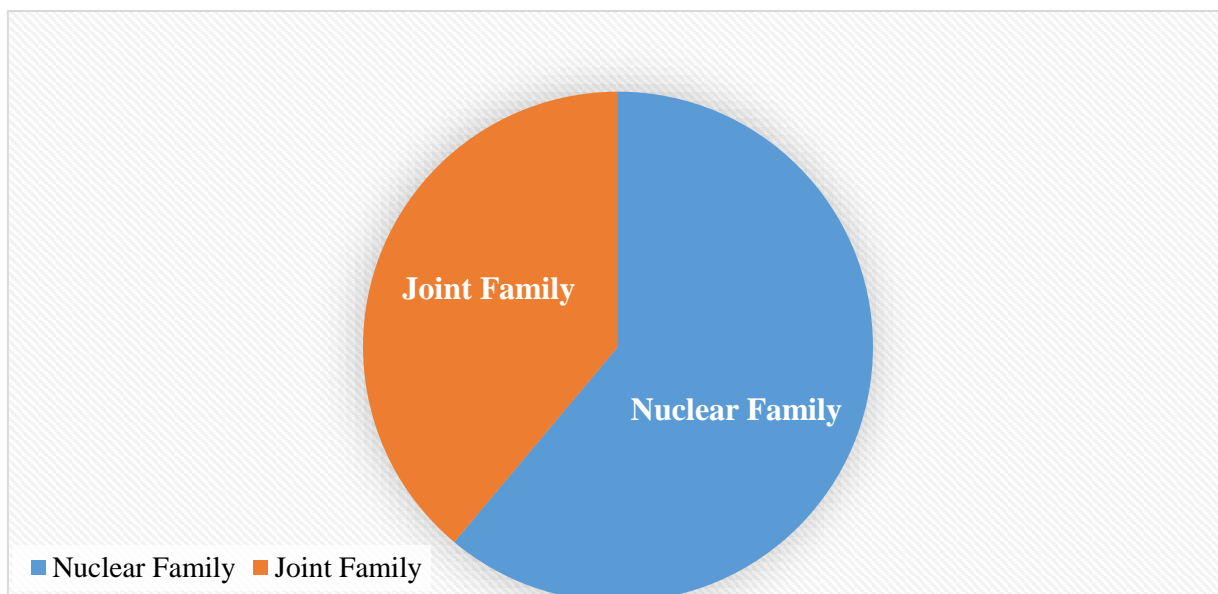**Fig-1 Distribution of respondents according to their family type**

Fig.-1 Shows a very few working mothers live in nuclear family while most of the working mothers live in joint family because child care needs more attention as well as more time. Joint family play a crucial role in growth and development of child. In recent study (Gurav & Vipin Vageriya, 2019) found that children nurtured in joint families have superior social-cognitive and language development than children reared in nuclear families. Joint and nuclear family are prevalent and both of them have distinct effects on children. Compared to nuclear family, there is stronger bond of

affection and cooperation among all family members as well as relations in a joint family (Niranjan et al., 2005).

Fig.-2 Distribution of respondents according to their food choices among different Fruit & Vegetables
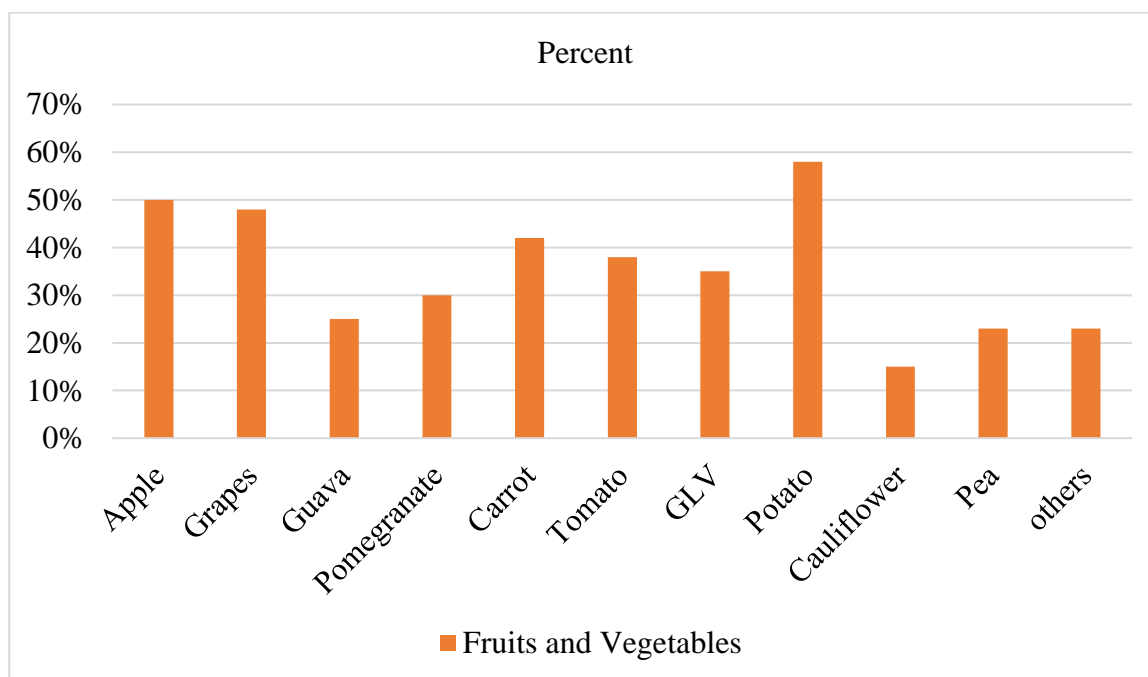

Fig.-2 shows most of the respondents were less aware benefits of fruits and vegetables while very few respondents were including fruits and vegetables in child's diet and well aware from their benefits. Poor intake of fruits and vegetables creates many micronutrients deficiencies, neurological disorders and other diseases such as; intellectual slowness, poor cognitive function and all over development of child. Consumption of fruits and vegetables are necessary for preschoolers because it helps in overall health of child. Pre-school children who consume a variety of fruits and vegetables categories have proper growth and development (Ramsay et al., 2017). It's preferred by parents to use these veggies in creative ways if their child doesn't like them (Intan Fazrin, 2022).

CONCLUSION

The present study was conducted to assess knowledge of working mothers regarding nutritional care of their pre-school children. The study was found that most of working mothers were well educated but they were unable to take care of their children due to their busy schedule and other household responsibilities. In this study most of the respondents were having knowledge about balanced diet as well as importance of protein rich diet among pre-school children. The study also revealed that most of the pre-school children were taken care by their paternal grandparents, nanny, relatives and others which is play crucial role in all over development of pre-school child because this stage needs love and affection from parents and other family members. The majority of working mothers were unknown about benefits of fruits and vegetables in inclusion in the diet of child. Fruits and vegetables come under the protective foods because it contains vitamins and minerals which are responsible for structural and functional development of various parts of the body. Thus, there is a greater need to

emphasize the variety of fruits and vegetables that preschoolers can intake according to their taste. The study was concluded that the role of parents is pivotal role in nurturing the child.

SUGGESTIONS

1. There is a need to pay great attention regarding eating behavior of pre-school children by which decline the malnutrition rates in early childhood/ pre-school children. Parents of child should be live in joint family. So that, child can learn moral values from other family members

2. Pre-school children dietary modification can be done by nutritional programmes in the community or group of working mothers. Dietary changes by parental involvement can be important in all round development of child. National child welfare programs should place more of an emphasis on health education, better nutrition, hygienic practices for children and prompt treatment of childhood illnesses, and immunizations.

3. Women's economic empowerment depends on increasing their opportunities and conditions for paid employment, as well as identifying, reducing, and redistributing their unpaid care burden.

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ROLE OF INFLAMMATORY CYTOKINES AND GUT MICROFLORA IN REGULATING BLOOD GLUCOSE LEVELS IN WOMEN WITH GESTATIONAL DIABETES MELLITUS (GDM): A CROSS-SECTIONAL STUDY

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ABSTRACT

Gestational Diabetes Mellitus (GDM) is a condition marked by glucose intolerance, which is first identified during pregnancy. The present study investigated the association between gut microbiota diversity and inflammatory markers in GDM women. A cross-sectional study was carried out wherein 76 GDM women were enrolled visiting tertiary care hospital in rural Vadodara. Key parameters analysed were glycaemic status (FBS, HbA1c), inflammatory markers (hs-CRP, IL-6), and gut microbiota (*E. coli*, Bifidobacteria, Lactic Acid Bacteria). Data analysis revealed mean FBS and HbA1c values were 139 ± 12.9 mg/dL and $6.9 \pm 0.3\%$, respectively. Notable correlations were found between IL-6 and HbA1c ($r=0.472$, $p<0.001$), IL-6 and Bifidobacterium ($r=-0.623$, $p<0.01$), and HbA1c and *E. coli* ($r=0.29$, $p<0.01$). These results underscore the role of gut microbiota diversity in modulating inflammatory responses and glycaemic control in GDM women.

Keywords: Gestational Diabetes Mellitus, Gut Health, IL-6

INTRODUCTION

Gestational Diabetes Mellitus (GDM) is a condition characterized by glucose intolerance that is first detected during pregnancy. GDM develops due to intricate metabolic and hormonal changes that happen during pregnancy. In healthy pregnancies, pancreatic beta-cell function compensates for increased insulin demand. However, in some women predisposed to GDM due to

genetic, environmental or lifestyle factors, this compensation fails, leading to hyperglycemia (Farrar et al., 2017). Risk factors of GDM include maternal age over 30 years, obesity, polycystic ovarian syndrome (PCOS) and family history of Type 2 Diabetes Mellitus. Lifestyle factors such as dietary pattern, physical activity and stress levels also contribute to the pathogenesis of GDM. Moreover, women with GDM are also likely to develop Diabetes Mellitus later in their life, and their children are at greater risk of developing obesity, metabolic syndrome, and diabetes as they grow older (Kim et al., 2010). As hyperglycemia during pregnancy can lead to adverse maternal and foetal outcomes, early identification and treatment of GDM are crucial (American Diabetes Association, 2020).

Chronic low-grade inflammation is linked to the development of GDM. Inflammation significantly contributes to increased insulin resistance. The inflammatory cascade is initiated by cytokines such as IL-6 and TNF-α, which activate specific pathways including NF-κB and STAT3. This further trigger inflammatory responses. Elevated IL-6 and TNF-α levels inhibit insulin signalling through the IRS/mTOR pathway. Additionally, Toll-like receptors (TLRs) on muscle and liver tissues are up regulated, exacerbating insulin resistance (de Mendonça et al, 2022). Research has consistently indicated elevated levels of inflammatory markers in GDM women. A study conducted in China found that there were significantly higher levels of TNF-α and IL-6 in the GDM group as compared to control group (Yaqiong L et al, 2020). Additionally, another study reported that there was a significant increase in hs-CRP and IL-6 levels in the GDM group, with hs-CRP showing a positive correlation with HbA1c ($P < 0.05$) (Xiang, L. L. et al, 2023). Furthermore, Srivastava et al. (2023) observed significantly higher serum IL-6 levels in GDM women compared to those without the condition ($p < 0.01$). These findings underscore the heightened inflammatory state associated with GDM (Srivastava, N et al, 2023).

The human gut hosts a varied community of microorganisms referred to as the gut microbiota. This microbial ecosystem plays an essential role in digestion, nutrient absorption, immune modulation, and metabolic homeostasis (Rooks & Garrett, 2016). Over recent years, research has highlighted the gut microbiota's involvement in various metabolic diseases, including obesity, T2DM, and fatty liver disease. The gut microbiome composition and diversity are influenced majorly by diet, environment, systemic inflammation and insulin resistance (Cani et al., 2007).

In GDM, the gut dysbiosis occur, resulting in a decrease in beneficial bacteria and an increase in harmful ones. This imbalance is associated with difficulties in blood glucose regulation and heightened inflammation (Crusell et al., 2018). Recent studies have examined the relationship between gut bacteria and inflammation in GDM. The inflammatory state and compromised insulin signalling during pregnancy result in a reduction of beneficial gut bacteria and an increase in pathogenic bacteria. As pregnancy progresses, the woman experiences increased insulin resistance which is linked with gut dysbiosis, which results in decreased butyrate production. An imbalance in the gut microbiota can lead to increased intestinal permeability, allowing the translocation of bacterial endotoxins such as lipopolysaccharides into the bloodstream. This process, known as metabolic endotoxemia, triggers an inflammatory response that exacerbates insulin resistance and glucose intolerance (Kim et al., 2020). A 2017 study by Kuang et al. found that women with GDM experienced alterations in gut microflora and various inflammatory markers. The study indicated that GDM patients were particularly prone to gut dysbiosis, with increased inflammatory factors, suggesting their potential role in the progression of diabetes. (Kuang, Y. S et al, 2017).

Additionally, the study by Zhao et al., revealed that there is potential link between inflammatory markers and glucose intolerance in GDM women and found that IL-6 levels were higher in GDM women as compared to those in the healthy control group. The research also revealed a positive correlation between inflammatory cytokines, body mass index, and HbA1c levels. (Zhao, X. et al, 2018). Therefore, investigating the link between gut microbiota diversity and inflammatory markers may offer valuable insights into the pathogenesis of GDM and its potential treatment.

Thus, this study aimed to examine the association between gut microflora diversity and inflammatory markers in women with GDM. The findings may offer novel therapeutic targets to improve outcomes for GDM-affected women through modulation of gut microbiota and inflammation

OBJECTIVES

1. To evaluate the levels of glycaemic parameters (FBS, HbA1c) in GDM women.

2. To assess the inflammatory markers (hs-CRP, IL-6) in GDM women and their relationship with glycaemic control.

3. To assess the possible correlation between gut microbiota diversity, inflammatory markers, and glucose metabolism in GDM women

HYPOTHESIS

There is no possible correlation between Gut Microflora, Inflammatory markers and glycaemic parameters in GDM women.

METHODOLOGY

A cross-sectional study was conducted at a tertiary care teaching hospital in rural Vadodara where in 76 women diagnosed with Gestational Diabetes Mellitus were enrolled for the study. This study aimed to understand the relationship between inflammatory markers, glycaemic control, and gut microbiota diversity in women experiencing GDM.

Statutory clearance was obtained from the ethical committee- Institutional Ethics Committee for Human Research (IECHR), Faculty of Family and Community sciences, The Maharaja Sayajirao University of Baroda, Vadodara (Ethical approval number IECHR/FCSc/PhD/2021/4) to ensure that the study met ethical standards and guidelines for conducting research involving human participants.

GDM women were enrolled based on inclusion and exclusion criteria. The inclusion criteria for the study required that women should be in their second trimester of pregnancy and aged between 18 to 40 years. Furthermore, all participants had to provide informed consent voluntarily, indicating their willingness to take part in the research.

Inclusion Criteria:

- Second trimester GDM women.
- Age range of 18 to 40 years.
- Consent to participate in the study.

The exclusion criteria were equally important to refine the participant pool and eliminate potential confounding variables. Women with existing health issues that could affect the study outcomes were excluded.

Exclusion Criteria:

- Pregnant women with health conditions such as obesity, severe underweight, HIV/AIDS, cancer, or renal diseases.
- Women undergoing insulin therapy for GDM.

After enrolment, blood samples were collected from participants following an overnight fasting to ensure accurate measurements of fasting blood sugar (FBS), glycated haemoglobin (HbA1c), high-sensitivity C-reactive protein (hs-CRP), and interleukin-6 (IL-6), both of which are important inflammatory markers. Additionally, stool samples were collected to analyse the microbial counts of beneficial bacteria, specifically *E. coli*, Bifidobacteria, and Lactic Acid Bacteria. These microbes play a crucial role in gut health and can influence metabolic and inflammatory responses.

Standard laboratory equipment and reagents were used to ensure the accuracy and reliability of biochemical analyses and microbial assessments. Blood glucose levels: fasting blood sugar (FBS), and HbA1c tests were measured using Calorimetric Method (EM360, EM200) and fully automated H.P.L.C. Inflammatory markers like CRP and IL-6 were measured through serum blood samples using ELISA techniques. The collection of stool samples was aimed at determining microbial diversity, which is increasingly recognized as an important factor in metabolic health.

The data gathered from the blood and stool samples were analyzed using established laboratory techniques. Descriptive statistics were utilized to summarize the demographic and clinical characteristics of the participants, providing a clear overview of the study population. To explore the relationships between inflammatory markers, glycemic parameters, and gut microbiota diversity, Pearson's correlation coefficients were computed. This statistical method helps in understanding the degree of association between different variables, which can provide insights into the underlying mechanisms of GDM. All statistical analysis were performed using SPSS software, with a significance threshold set at $p < 0.05$. This level of significance indicates a strong likelihood that the observed relationships are not due to chance, lending credibility to the study's findings.

FINDINGS AND DISCUSSION

This study investigated the association between inflammatory markers, glycemic control, and gut microflora diversity in women diagnosed with GDM. The findings highlight significant correlations that can provide insights into the mechanisms underlying GDM and suggest potential avenues for intervention.
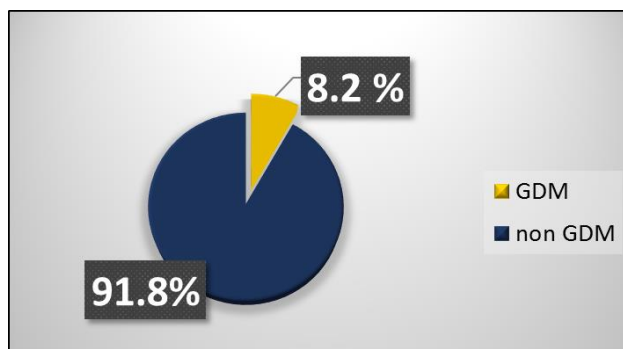
Figure 1: Prevalence of GDM among Pregnant Women in the Study

A total of 923 pregnant women attending a tertiary care hospital, Dhiraj Hospital, Vadodara were screened for Gestational Diabetes Mellitus (GDM). The initial screening involved measuring Random Blood Sugar (RBS) levels. Women with an RBS level of 200 mg/dL or higher underwent an Oral Glucose Tolerance Test (OGTT). Out of these, 76 pregnant women met the diagnostic criteria for GDM were identified for the study (Figure 1).

The mean RBS level of GDM women was 194 mg/dL. OGTT levels of GDM at fasting was 140 mg/dL, at hour 198 mg/dL and at 2-hour 151 mg/dL above the threshold levels (Figure 2).
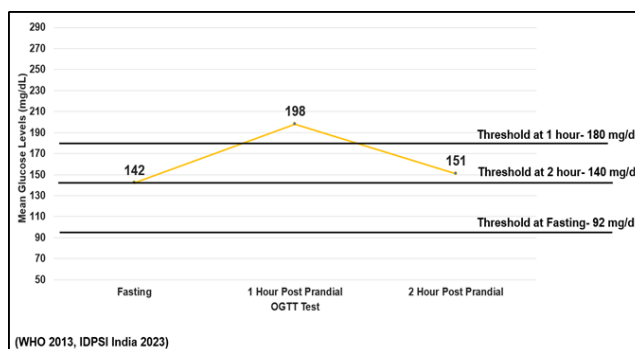
Figure 2: Mean OGTT levels of GDM women

The mean fasting blood sugar (FBS) level among participants was found to be 140 ± 13.7 mg/dL, with a mean HbA1c level of 7.0 ± 0.40 %. (Table 1). These values indicate suboptimal glycaemic control, as levels above 140 mg/dL for FBS and HbA1c greater than 6.5% are generally considered indicative of diabetes (American Diabetes Association, 2020).

Table 1: Mean FBS and HbA1c Levels of GDM women

Parameters	Mean values(N=76)
Fasting Blood sugar (mg/dL)	140±13.7
HbA1c (%)	7.0±0.40

The mean hs-CRP level was measured at 1.0 mg/L, suggesting mild systemic inflammation. High-sensitivity C-reactive protein (hs-CRP) is a well-established marker for inflammation, and elevated levels have been linked to insulin resistance (Dandona et al., 2004). IL-6 found to be 6.3 pg/mL, which indicates heightened inflammation often associated with metabolic disturbances. (Table 2) IL-6 is known to play a major role in the inflammatory response and has been implicated in insulin resistance, a key factor in the development and progression of GDM (Rabe et al., 2008).

Table 2: Mean Values of Inflammatory markers of GDM Women

Parameters	Mean values(N=76)	Normal Values
hs- CRP (mg/L)	1.0±1.2	0.3–1.0 mg/dL
IL-6 (pg/mL)	6.3±1.0	<5 pg/mL

A positive significant correlation was observed between IL-6 and HbA1c (r = 0.472, p < 0.001), indicating that higher levels of IL-6 are associated with poorer glycemic control. This correlation underscores the role of inflammation in impairing glycemic regulation, suggesting that managing inflammatory responses may be crucial for improving glucose metabolism in GDM women. (Table3)

Conversely, a significant negative correlation was found between IL-6 and Bifidobacterium (r =0.55, p < 0.05). This relationship suggests that increased inflammation correlates with lower levels of this beneficial gut bacterium. Bifidobacterium is known for its anti-inflammatory properties and its role in gut health (Rinttilä & Posimo, 2009). The depletion of beneficial gut flora may thus exacerbate the inflammatory state, leading to worsened metabolic outcomes. (Table 3).

Additionally, a significant positive correlation was noted between HbA1c and *E. coli* counts (r =0.29, p < 0.01), indicating that higher glucose levels are associated with an increased presence of this bacterium. The overgrowth of pathogenic bacteria like *E. coli* has been linked to dysbiosis, which can further disrupt metabolic health (Shin et al., 2015). (Table 3)

The observed correlations emphasize the intricate interplay between inflammation, glycemic control, and gut microbiota in women with GDM. The positive correlation between IL-6 and HbA1c suggests that inflammation may directly contribute to impaired glycemic control. This aligns with existing literature, where elevated inflammatory markers are often found in individuals with insulin resistance and type 2 diabetes (Hotamisligil, 2006).

The negative correlation between IL-6 and Bifidobacterium suggests that maintaining or restoring beneficial gut microbiota could have a protective effect against inflammation. This finding supports emerging research advocating for interventions aimed at improving gut health, such as dietary changes rich in fiber and probiotics, which may help reduce inflammation and enhance glycemic control (Sanders et al., 2019). (Table 3)

Furthermore, the positive association between HbA1c and E. coli underscores the potential consequences of gut dysbiosis in GDM. It raises concerns about how an imbalanced gut

microbiome can exacerbate metabolic dysregulation, suggesting that strategies aimed at restoring gut flora might improve glycemic control in this population.

Moreover, a deeper investigation into the mechanisms by which gut microbiota influence inflammation and glycemic regulation may provide novel therapeutic targets for GDM management. Overall, this study contributes valuable insights to the understanding of GDM, highlighting the multifaceted relationships between diet, gut health, and metabolic outcomes.

Table 3: Correlation amongst glycaemic, inflammatory markers and gut micro flora of GDM women (r value)

Parameter	Correlation Coefficient (r)	p-value
hs-CRP and Bifidobacterium	-0.58	< 0.05
hs-CRP and FBS	0.65	< 0.05
HbA1c and *E. coli* count	0.29	< 0.01
IL-6 and Bifidobacterium	-0.55	< 0.05
IL-6 and HbA1c	0.47	< 0.001

Note: level of significance: * p-value <0.05, ** p-value<0.01,*** p-value<0.001,NS=not significant

SUMMARY, CONCLUSION AND IMPLICATIONS

This study examined the link between gut microflora diversity and inflammatory markers in Gestational Diabetes Mellitus women. Significant correlations were observed between inflammatory markers, glycemic parameters, and the composition of gut microflora. The findings suggest that changes in gut microflora diversity can be associated with altered inflammatory responses and impaired glucose level in GDM patients.

The research highlights that gut microflora diversity play a crucial role in modulating inflammatory markers and glycemic regulation. Increased inflammation was associated with reduced levels of beneficial gut bacteria and a rise in potentially harmful bacteria, which further affected glucose metabolism. These results have important implications for managing GDM.Enhancing gut microbiota, in conjunction with glycemic control, presents a promising intervention for reducing maternal and fetal complications in GDM. Improving gut health through prebiotic supplementation or other dietary interventions could help reduce inflammation and enhance glycemic control. The study advocates for further research, particularly longitudinal studies, to confirm causality and assess the effectiveness of specific interventions aimed at modifying gut microflora and reducing inflammation in GDM women. Addressing gut dysbiosis may offer a promising non-pharmacological strategy for better GDM management and improving maternal and fetal health outcomes.

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ASSOCIATION OF BMD WITH AGE AND BMI IN A SELECTED GROUP OF PERI AND POST-MENOPAUSAL WOMEN FROM NADIAD CITY, CENTRAL GUJARAT

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HSAI Membership Number-HSAI-2024-GJ-1894-LF[1] & HSAI-0/S-4/LF[3]

ABSTRACT

Osteoporosis is a condition represented by decreased bone density and strength, leading to fragile bone. Low bone mineral density, or BMD, elevates the likelihood of osteoporotic fractures. Women of the menopausal age are at greater risk than men because the normal bone turnover cycle is impaired by estrogen deficiency. In the present study, the association of BMD with age and BMI was assessed in a selected population of peri- and post-menopausal women in Nadiad. About 95 healthy women were selected from a screening conducted at a BMD camp. Body weight and BMD were recorded and BMI was calculated. The correlation of BMD with age and BMI was studied. The mean age of the subjects was 55±9 years. Of the subjects studied, 74% were osteopenic, 20% were osteoporotic, and 6% were normal. The subjects were categorized into age groups: 40-55 and 56-70 years. Osteoporosis was higher (34%) in the older age group whereas osteopenia was higher in the younger age group(83%). Mean BMI for both age categories were 26.67 and 28.26, respectively. The findings from this study indicate that age is a good indicator of BMD, but BMI is not.

Keywords: Age, BMD, BMI, Osteopenia, Osteoporosis

INTRODUCTION

Osteoporosis, a progressive systemic skeletal disease described by the World Health Organization (WHO) as low bone mass and microarchitectural degeneration of bone tissue, increases the susceptibility to fractures and fragility of bones (Compston, J et al.,2017). As age advances, bones become thinner as the rate of breakdown becomes faster compared to the rate of new bone formation, due to which the amount of calcium and other minerals in the bone reduces and, the bone becomes lighter and the fragility of bone increases. A direct relationship exists between bone strength and osteoporotic fractures (Boskey, A. L.,2010). The bone density (BMD) test measures the bone density. A special scan is used to measure the density of minerals in the bones called a bone mineral density test (Haseltine, K. N., et al 2021).

Approximately 200 million people in the world are affected by osteoporosis and 8.9 million fractures occur each year worldwide (Pisani, P. et al. 2006). Numerous reports have

identified multiple factors that are linked to osteoporosis and may exacerbate its risk. Women, decreasing body mass index (BMI), aging postmenopausal familial history, poor diet, sedentary lifestyle, smoking, alcohol consumption, and associated comorbidities are the factors considered (Khinda, R. et al. 2022). Osteoporosis is more common in women because estrogen is necessary for the development and maintenance of bone in females. Decreased periods of exposure to estrogen during a woman's lifetime may contribute in a significant way to the development of osteoporosis(Kumar, A.,2016).

Research on the association between BMI and BMD has yielded inconsistent results. The validity of BMI as a reliable indicator has been suggested by certain studies, however others (Steinschneider, M. et al. 2003) indicate that BMI can predict BMD. In contrast to Robbins et al. (2006), who showed no such link, Iqbal et al. (2005) observed a positive correlation between low BMI and loss of BMD. Even though osteoporosis is a major global health concern, Nadiad, a city in central Gujarat, has received little attention in the few studies that have been conducted on this condition in Gujarat. This study attempts to fill that gap by investigating the relationship between age, BMI, and bone mineral density (BMD).

OBJECTIVE

To assess the bone mineral density (BMD) status and its association with age and body mass index (BMI) in middle-aged and older women of Nadiad city, with the aim of identifying risk factors for osteoporosis.

METHODOLOGY

Research Design

This research employs a cross-sectional observational design to evaluate bone mineral density (BMD) and its correlation with age and body mass index (BMI) in women aged 40 to 70 years from Nadiad city. Data were gathered using structured assessments, encompassing demographic information, anthropometric measures (height, weight, BMI), and BMD evaluations, followed by suitable statistical analysis.

A free BMD camp for women was organized in Nadiad city. Wide publicity was given for the camp telephonically and through pamphlet circulation in various city areas. About 106 women above 40 years of age attended this camp. A previously prepared and pilot-tested questionnaire was utilized to collect data on demographics, family history and risk factors that affect BMD. The inclusion criteria for the sample selection comprised women between 40 and 70 years of age. Exclusion criteria comprised of subjects who suffered from thyroid disease, had a history of chronic non-communicable disease, had taken other osteoporosis treatments, or were currently on medication to prevent osteoporosis. Independent variables included age and BMI (Body Mass Index using height and weight) and the dependent variable was BMD (Bone Mineral Density). For data analysis, subjects were divided into two age groups: 45–55 years (n = 54) and 56–70 years (n = 41).

Parameters analyzed

In the questionnaire, age was recorded. Both the subjects' weight and height were measured using a conventional approach. By dividing height in meters squared by weight in kilograms, Body mass index (BMI) is calculated (Khanna, D. et al, 2022). BMD was performed

using ultrasound measurement of the heel bone (calcareous), which was reported using T-scores. The T-score is the number of standard deviations concerning the young age group's standard speed of sound (SOS) value. A T-score of -1 or higher is considered normal. Osteopenia is defined as a T-score ranging between -1.0 and -2.5. Osteoporosis is a T-score ranging from -2.5 or lower(Rhee, Y. et al. 2009).

Statistical analysis

Chi-square, ANOVA, Correlation and Regression were analysed using SPSS program (version 22).

RESULTS AND DISCUSSION

A total of 95 women from the age group between 40 and 70 years from Nadiad were studied. Fig.- 1 & 2: Graphs displaying the distribution of BMD and BMI, respectively. Fig. 1 illustrates the high prevalence of osteopenia (74%) and osteoporosis (20%), while Fig. 2 shows that most women (48%) were overweight, followed by 22% who were obese. Only 5% were underweight. Of 95 subjects,25% of females were in the normal BMI category.
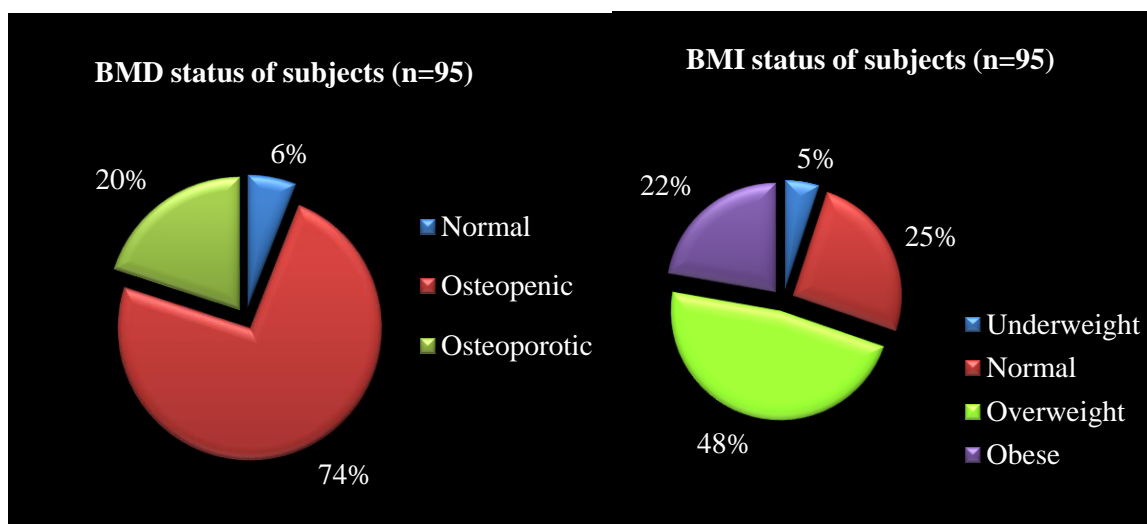
Fig.- 1: BMD status of the subjects.   **Fig.- 2: BMI status of the subjects**

The table- 1 shows the age-wise distribution of subjects based on their BMD. Among women aged 40-55 years, 83% were osteopenic, and only 9% were osteoporotic. In the older group (56-70 years), 34% of the subjects were osteoporotic, and 61% were osteopenic. It shows that as age advanced, % of subjects suffering from osteopenia decreased, but osteoporosis number increased. There is a correlation between age and BMD, as seen by the significant positive correlation ($p<0.05$) between age category and BMD.

Table -1:Agewise distribution of subjects into the BMD category

BMD	Age category in years, n (%)			Chi-square
	40-55	**56-70**	**Total 40-70**	
Normal	4(8)	2(5)	6(6)	
Osteopenic	45(83)	26(61)	70(74)	9.034*
Osteoporotic	5(9)	13(34)	19(20)	
Total	**54(100)**	**41(100)**	**95(100)**	

* significant (P<0.05)

The data in Table 2 demonstrates that bone mineral density (BMD) declines with age across all categories (normal, osteopenic, and osteoporotic). The average T-score of the osteopenic and osteoporotic subjects was -2.05±0.27 and -2.74±0.27, respectively, compared to -0.67±0.81 in the normal population. BMD was lower as age advanced. Both age groups showed significant differences in T-score, as expected. The most severe bone loss is observed in the osteoporotic group, where the T-scores fall from -2.62 in the 40-55 group to -2.78 in the 56-70 group. The F-values (p<0.01) are statistically significant, indicating a substantial difference in bone mineral density (BMD) between the normal, osteopenic, and osteoporotic groups. This underscores the distinct influence of age on bone health, with older individuals being more susceptible to bone density loss, particularly in osteoporotic cases.

Table- 2: Mean T-score of subjects based on age category

BMD			Total 40-70 years
Normal	-0.50 ±1.0	-1.00 ±0.00	-0.67 ±0.81
Osteopenic	-2.01 ±0.27	-2.13 ±0.27	-2.05 ±0.27
Osteoporotic	-2.62 ±0.16	-2.78 ±0.29	-2.74 ±0.27
F value	**43.71****	**47.242****	**93.74****

** significant (P<0.01)

Age was the independent variable, while the subjects' BMD was the dependent variable. The two variables were utilized in a regression analysis. Cohen guidelines [40] were used to interpret the correlation among the independent variable (age), looking at r- value as follows: 0.1 to 0.29 as weak, 0.30 to 0.49 as medium, and 0.50 to 1.0 as large or strong correlation. This further supports the observation that BMD declines as age progresses.

Fig.- 3 shows that a significant association was observed between age and T-score. (R^2=0.147, F=16.023, P=0.000) which indicates that age is a predictor for BMD. A scatter diagram that illustrates the correlation between age (independent variable) and bone mineral density (BMD) as calculated by T-score (dependent variable). The linear regression line shows a

negative slope of -0.0239, indicating that as age increases, the T-score tends to decrease, which suggests a decline in bone mineral density with advancing age.
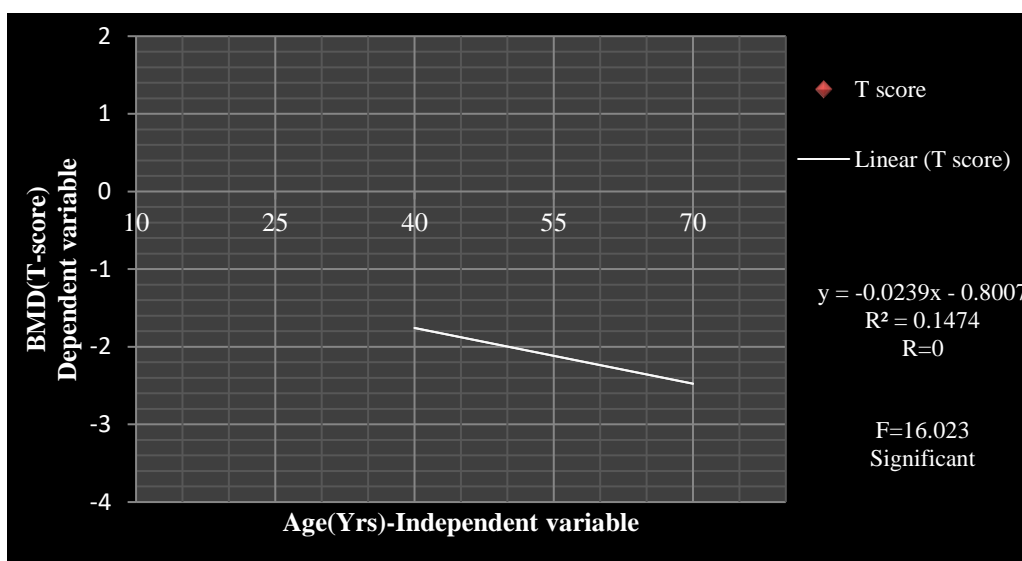
Fig.- 3 Regression analysis of BMD and Age (All subjects)

Table- 3 shows the distribution of BMD across different BMI categories. Most of the underweight (60%), normal (75%), overweight (75%), and obese (71%) women were osteopenic, indicating that osteopenia is prevalent across BMI categories.

Osteoporosis was more common in obese women (29%) compared to normal (17%) and overweight women (16%).BMI was not significantly associated with BMD. This suggests that BMI may not be a strong predictor of BMD status.

Table- 3: Distribution of subjects based on BMI and BMD of the subjects

BMD	BMI category, (%)				Chi-square
	Underweight	Normal	Overweight	Obese	
Normal	0(0)	2(8)	4(9)	0(0)	4.78 [NS]
Osteopenic	3(60)	18(75)	34(75)	15(71)	
Osteoporotic	2(40)	4(17)	7(16)	6(29)	
Total	5(100)	24(100)	45(100)	21(100)	

NS-non significant

Fig. 4 illustrates the regression analysis between BMD and BMI, which indicates that there is no significant correlation between the two variables ($R^2 = 0.017$, F = 1.620, p = 0.206). Given that BMI accounts for only 1.7% of the variance in BMD, the low R^2 value implies that BMI is not a significant predictor of bone mineral density in this population. Despite variations in BMI across the subjects, it does not appear to have a meaningful impact on bone health.
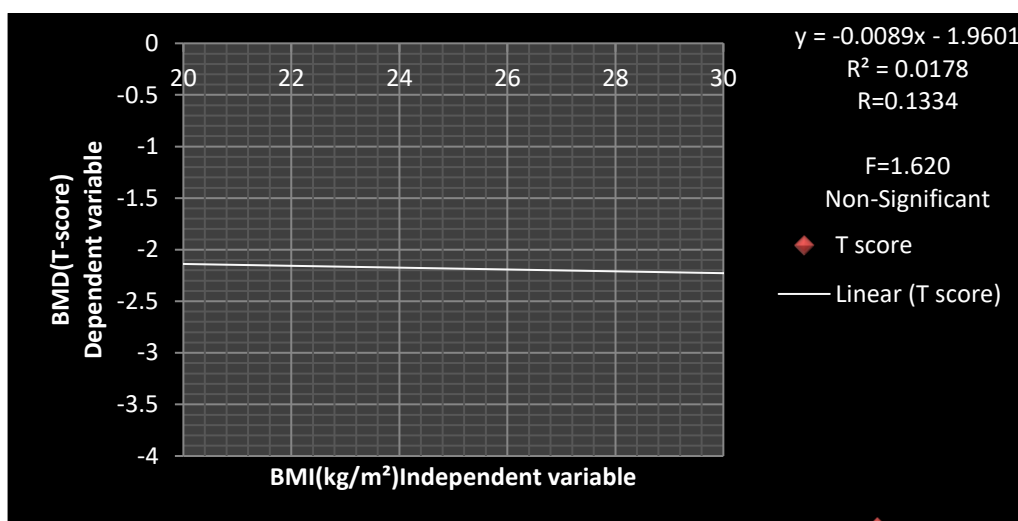
Fig.-4 Regression analysis of BMD and BMI (All subjects)

Table -4 shows the mean BMI of subjects based on the BMD category. While there was no statistically significant difference between the three groups of participants (normal, osteopenic, and osteoporotic), the BMI of the osteoporotic group was higher (29.02) in the younger age range (40-55 years) than that of the normal and osteopenic patients. The BMIs of normal patients (25.77) and osteopenic and osteoporotic subjects (28.37–28.40), but not statistically significant, were higher in the older age group (56–70 years).

Table- 4:Mean BMI of subjects based on BMD category

	BMI	
BMD		
Normal (n=6)	26.15 ±2.67	25.77 ±2.88
Osteopenia(n=74)	26.46 ±4.11	28.37 ±6.66
Osteoporosis(n=19)	29.02 ±7.04	28.40 ±8.51
F value	0.812 [NS]	0.123[NS]

NS-non significant

Table-5 shows the correlation of BMD with age and BMI for the combined group of subjects (n=89) who were either osteoporotic or osteopenic.BMD showed a significant correlation with age but not with BMI.

Table -5: Correlation of bone mineral density with age & BMI for combined group of osteopenic and osteoporotic subjects(n=89)

Category	Age	BMI
Bone mineral density	0.275^{**}	0.046^{NS}

**-significant ,NS-non significant

DISCUSSION

The results of the present study indicated a correlation between age and BMD, but there was no correlation between BMI and BMD. Therefore, Body weight and BMD do not show an association. This study is similar to the survey by Ebrahimi et al.(2013), where the body weight and Body mass index did not act as indicators of bone mineral density in a professional cyclist.

Another study indicated that BMI did not predict total body BMC (bone mineral content) as well as total femur and femoral neck BMD (Salamat M.R.,2013). Also, Robbins et al (2006) found that body weight alone is a much better predictor of BMD than BMI , in contradiction with the study who showed a positive association (significant) between body weight and BMD is stronger than the relationship between BMI and BMD (Rahimi Petroudia, S.,2016) . BMI was not a determinant of postmenopausal BMD in multiple regression analysis in a population of Korean women, as demonstrated by a study discovered that the determination of BMD in postmenopausal osteopenia could be influenced by age, years since menopause, and potentially a genetically determined alteration of estrogen hydroxylation (Lim et al.1997)..

CONCLUSION AND RECOMMENDATIONS

The study, which included 95 women aged 40 to 70, revealed that the decline of bone mineral density (BMD) is significantly influenced by age. While 74% of the subjects were osteopenic and 20% were osteoporotic, the prevalence of osteoporosis increased as age advanced. Regression analysis confirmed a significant association between age and BMD ($R^2 = 0.147$, $p < 0.0001$), indicating that age strongly predicts bone health deterioration. T-scores were lower in older women across all BMD categories, with significant differences between normal, osteopenic, and osteoporotic groups ($p < 0.01$). Although BMI was higher in osteoporotic subjects compared to osteopenic subjects, particularly in the younger age group (40-55 years), there were no significant differences in BMI between normal, osteopenic, or osteoporotic women. Moreover, BMI showed no meaningful association with BMD ($R^2 = 0.017$, $p = 0.206$), suggesting that BMI is not a reliable predictor of bone health. The findings emphasize the importance of monitoring bone health as individuals age, particularly in populations at risk for osteoporosis. Thus, age, rather than BMI, is the critical factor affecting bone health in this population.

More investigation is required to gain a more comprehensive understanding of the role of BMI in the prediction of BMD. It is recommended that health awareness programs be implemented to inform at-risk populations about the importance of maintaining bone health. Additionally, targeted interventions for high-risk populations, including postmenopausal women over 50 and those with risk factors such as a family history of fractures, include weight-bearing and resistance exercises (e.g., walking, jogging, yoga) that enhance bone strength and minimize bone loss, regular

bone mineral density (BMD) screening for early detection, and sufficient calcium and vitamin D intake to promote bone health. Fall prevention techniques, cessation of smoking and excessive alcohol consumption, and the use of medications as prescribed by a healthcare professional can also prevent osteoporosis-related fractures.

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MICROORGANISM IN FOOD PRESERVATION- VIRTUAL REALITY SIMULATIONS FOR SCHOOL STUDENTS

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ABSTRACT

Microorganisms are living organisms that play a major role in our food. Microorganisms enhance the taste and preserve the food from degradation. Despite young children being introduced to concepts of microorganisms in schools, they often have limited understanding of their functions. They learned about food preservation techniques and categories of microorganisms that are edible and those that are not. However, traditional methods of teaching microorganisms often relied on static images, leading students to develop abstract concepts. To enhance understanding, a 360-degree immersive environment utilizing IVR technology was created to elucidate the significance of microorganisms in food preservation. This immersive experience illustrated both beneficial and harmful microorganisms, aiding comprehension of their roles in maintaining food quality and safety. Furthermore, the cognitive abilities of students in virtual reality (VR) environments were analyzed post-experience. This article discussed the development of a VR application aimed at elucidating the principles of food preservation for everyday life.

Keywords: Food preservation, Microorganism, Virtual Reality

INTRODUCTION

Microorganisms were a part of daily life, and while many were harmless or even beneficial, some were indeed harmful to health. Microorganisms were significant in the production of a wide variety of food products, such as yogurt, cheese, and fermented beverages. They enhanced the flavor, texture, and nutritional value of food (Lorenzo et al., 2018; Choi, Yu, & Lee, 2022; Cocolin et al., 2018; Kaur et al., 2023). Certain microorganisms caused food spoilage, leading to undesirable changes in the food's texture, smell, taste, or appearance. More importantly, some caused diseases if ingested, such as foodborne illnesses from bacteria like Salmonella or viruses like Norovirus (Mazhar et al., 2022). To minimize the risk of consuming harmful microorganisms, practicing good food hygiene, such as proper cooking, storage, and handling of food, was essential. Additionally, food preservation methods like pasteurization, salting, and boiling helped control the growth of harmful microorganisms (Mazhar et al., 2022). Introducing the concept of microorganisms and their impact at an early age was highly beneficial. It helped children develop a better understanding of the world around them and fostered healthy habits (Marco et al., 2021). Classic methods of teaching

microbiology were not always the most effective, especially when it came to engaging students and helping them understand complex concepts (Pommerville, 2012).

In the context of microbiology, VR (Virtual Reality) simulations helped students visualize and understand the microscopic world, which was often challenging due to the abstract nature of the subject (Damasceno et al., 2023). By using VR, students could "see" microorganisms up close and learn about their roles and the importance of preservation techniques in preventing foodborne illnesses and spoilage (Damasceno et al., 2023). VR applications not only aided in the comprehension of complex scientific concepts but also helped in developing critical thinking and observational skills (Pellas et al., 2021). When these VR tools were integrated into school curricula, they provided a unique and memorable learning experience that could inspire future interest in science and technology fields. This study aimed to explore the potential of VR in improving students' understanding of microorganisms and their real-world implications. VR simulations allowed learners to engage with microbiology concepts through experiential learning, making the process more effective and memorable. As digital tools were increasingly incorporated into science education, investigating their impact on student learning became crucial. Additionally, fostering an early interest in microbiology through interactive technologies encouraged students to pursue careers in science and technology-related fields. By examining the effectiveness of VR-based microbiology instruction, this study contributed valuable insights into the role of immersive learning in science education and its potential to enhance teaching methodologies.

OBJECTIVES

The study mainly focused on the following two research questions: • To what extent did the features implemented in the VR environment enhance comprehension of food preservation concepts, particularly regarding microorganisms?

• To what extent did students' cognitive abilities and observational skills influence their understanding of abstract food science principles?

HYPOTHESES

• **H_0** (Null Hypothesis): There was no significant difference in students' comprehension of food preservation concepts between those who learned through traditional methods and those who engaged with Virtual Reality (VR) simulations.

• **H_1:** Students who experienced VR-based microbiology lessons exhibited improved cognitive abilities and observational skills in understanding abstract food science principles compared to those in conventional learning settings.

METHODOLOGY

The development of the VR simulation of microorganisms was conducted using the ADDIE model, encompassing Analysis, Design, Development, Implementation, and Evaluation phases (Cotter et al., 2023). The features of the VR environment were scrutinized, and students' cognitive

and observational skills were examined during the product implementation phase. The VR simulation of microorganisms met the criteria of validity, practicality, and effectiveness.

The Steps Followed in VR Development:

- The initial step involved creating the objects to be exhibited first. Generally, the objects formed included Artificial Intelligence (AI) images, 3D models, animations, textures, and other assets using software such as Blender, Maya, or 3ds Max, tailored for VR environments.

- After creating the 3D models and objects, they were uploaded to the Unity store. Then, a VR environment was built within Unity, ensuring that the objects integrated smoothly into the VR software. This integration was crucial for functional consistency, especially for compatibility with VR devices like Oculus Rift or HTC Vive. Additionally, attention was given to user interaction in the VR environment, including movement, grabbing, and object manipulation. This careful planning ensured a user-friendly experience in the virtual world.

- After the VR environment was created, the development focused on designing activities related to microorganisms in the virtual world. VR simulations were then used to teach food preservation techniques and microorganisms in the context of food safety and storage.

The research trial design employed in this study was a one-shot case study. The abstract concept of food preservation techniques, as exemplified in biology, emerged as an outcome of the VR simulation of microorganisms. A total of 64 middle school students from Dr. PGV Matriculation Higher Secondary School, Coimbatore, participated in this study. The research comprised both a control group (32 students) and an experimental group (32 students).

In the control group, students learned about the abstract concept of microorganisms and food preservation through conventional methods. Conversely, the experimental group engaged with VR simulations to grasp these abstract concepts. Consequently, this study focused on the development of the VR simulation and its impact on students' cognitive abilities and observational skills concerning abstract concepts.

FINDINGS AND DISCUSSION

In the initial phase of development, various applications were utilized to create the VR experience (Al-Gindy et al., 2020). This included Bing AI Image Creator for image generation, 3D Blender for crafting 3D animations, and Unity for integrating these animations with audio. The resulting VR output was in the form of an APK file, compatible with mobile phones and Android smartphones. Operating the VR experience was straightforward: upon opening the application on a smartphone, it automatically paired with the VR headset. Users utilized a remote control to manipulate objects, clicking and dragging as needed. Students had the freedom to move closer or further from objects for detailed examination and could immerse themselves in a 360-degree environment. With the remote, they could initiate or halt simulations as desired.

Features of the VR Environment on Microorganisms:

The virtual reality classroom presented an immersive environment demonstrating traditional food preservation techniques, such as boiling water. Figure 1 depicted the VR environment,

showcasing the process of boiling water and its effects on bacteria and minerals present within. Students observed firsthand the changes occurring during the boiling process.

Figure 2 expanded on various food preservation methods beyond boiling, providing insights into different techniques for home food preservation. Additionally, it educated students on avoiding unhealthy processed foods, promoting a healthier approach to food consumption and storage.

Fig.-1: Virtual Reality Head-Mounted Display (HMD)

Fig. -1 depicted a student wearing a virtual reality (VR) head-mounted display (HMD) within the headset appeared sleek and modern, with adjustable straps to ensure a comfortable fit for the wearer. The HMD covered the student's eyes, providing an immersive visual experience. Within the virtual environment, the student experienced a simulation of the traditional food preservation technique of boiling water. The VR environment replicated the process of boiling water in a pot, with bubbles forming and rising to the surface. Through the VR simulation, students observed the effects of boiling on bacteria and minerals present in the water, gained a deeper understanding of how this method contributed to food safety.
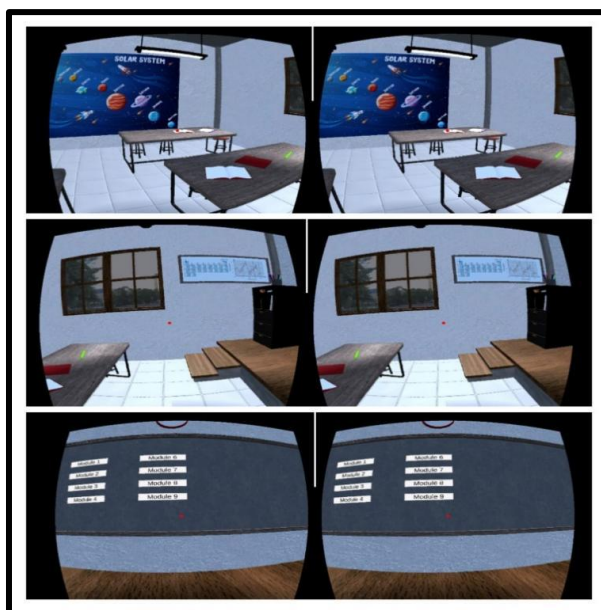
Fig. -2: VR Environment Developed for Food Preservation by Researchers
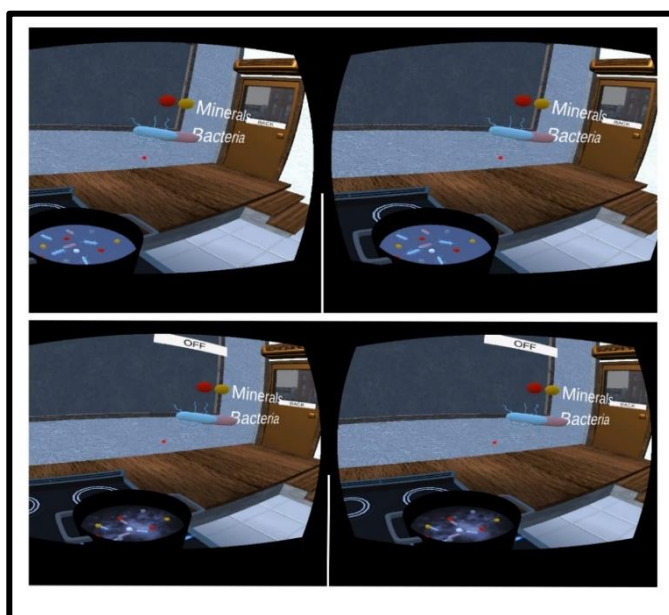
Fig. -3: Food Preservation Techniques Activity in VR

Fig. -2 expanded on the exploration of food preservation methods within the VR environment. This VR simulation provided insights into various techniques for home food preservation beyond boiling. Through interactive modules and visual demonstrations, students were educated on alternative methods for preserving food, promoting a healthier approach to food consumption and storage. Additionally, the simulation highlighted the importance of avoiding unhealthy processed foods, encouraging students to make informed dietary choices for better overall health and well-being.

Fig. -3 learners delved deeper into the virtual reality environment, focusing on an activity centred around boiling water and its effects on both minerals and bacteria present within. Students

engaged in an immersive experience where they witnessed the process of water boiling firsthand. However, this was not merely a visual spectacle; rather, it served as an educational opportunity where students observed the dynamic changes occurring to the minerals and bacteria within the water as it reached its boiling point.

This activity served as a foundational lesson in the study of food preservation techniques, particularly emphasizing the significance of boiling as a traditional method. Through VR technology, students observed how boiling effectively eliminated harmful bacteria, rendering the water safer for consumption. Moreover, they gained insights into the impact of boiling on the minerals present, fostering a comprehensive understanding of the scientific principles underlying this preservation method.

Furthermore, **Fig. -3** introduced students to a broader spectrum of preservation techniques beyond boiling. Within the VR environment, students explored various methods such as salting, sugaring, drying, cooling, and fermentation. Each technique was visually demonstrated, allowing students to witness its application and understand its efficacy in preserving food. This multifaceted approach enhanced students' knowledge of diverse preservation methods, empowering them to make informed choices about food storage and consumption.
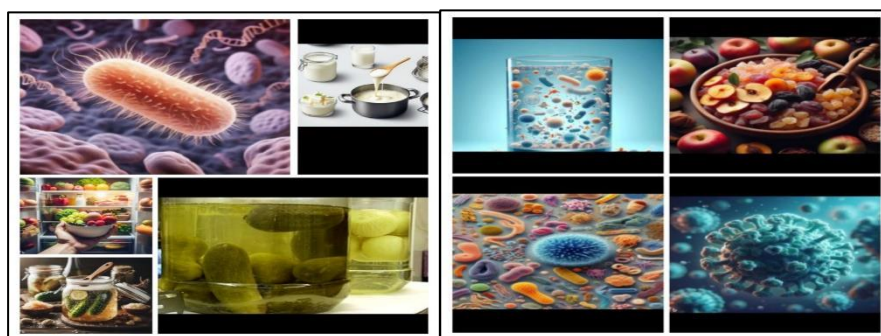
Fig. -4: Visual Representation of Lessons in the VR Environment

Fig. -4 provided a glimpse into the visual representations utilized within the VR environment to deliver educational lessons on food preservation techniques. These images served as instructional aids, guiding students through the complexities of each preservation method in a clear and visually engaging manner. Whether depicting the salting process, the art of drying, or the intricacies of fermentation, each image was meticulously crafted to enhance students' comprehension and retention of the subject matter.

The incorporation of visual elements into the VR environment enriched the learning experience, making abstract concepts tangible and accessible to students. By immersing students in virtual lessons, they not only absorbed information more effectively but also developed a deeper appreciation for the science behind food preservation. Through the integration of VR technology and interactive visual aids, educators created dynamic learning environments that inspired curiosity, critical thinking, and a lifelong passion for learning.

Table -1. Observation Test Score of Control Group and Experimental Group

Group Statistics						
Observation skill	N	Mean	Std. Deviation	Std. Error Mean	df	t value
Control Group	32	1.2500	.95038	.16801	62	22.97**
Experimental Group	32	6.8750	1.00803	.17820		

** p<.001

Cognitive Ability and Observational Skill of Two Groups

The introduction of VR as a learning tool aimed to enhance students' comprehension of abstract concepts, particularly by assessing their cognitive abilities. Within cognitive ability, four dimensions were analyzed: Representational Fidelity, Perceived Enjoyment, Control and Active Learning, and Reflective Thinking (Makransky & Petersen, 2021). This analysis focused solely on the experimental group, utilizing worksheets to gauge learning outcomes.

Pearson Intercorrelation analysis revealed a significant correlation between Control and Active Learning and Reflective Thinking. This indicated that students who exhibited high levels of reflective thinking tended to engage in controlled and active learning processes. Such findings suggested that VR facilitated a more dynamic and reflective approach to concept assimilation among students.

The comparison between students who learned food preservation via usual blackboard methods and those who learned using VR simulations revealed significant differences in observational skills.

From Table-1, the t-test value indicated a highly significant difference in the observation skills of students exposed to the VR experience compared to those who were not. The process of microorganisms in food was clearly understandable to students who learned the concept through VR. They were also proficient in answering questions requiring observational skills. Conversely, students in the control group, who learned the abstract concept conventionally, struggled to respond to such questions. These results underscored the effectiveness of VR in enhancing students' observational abilities compared to traditional teaching methods.

Teaching and learning about microorganisms through the blackboard method may not always be effective (Nussbaum & Novick, 1982). However, virtual reality (VR) offered a superior opportunity to explore various types of microorganisms and their roles in daily life. Moreover, the VR application proved effective in enhancing students' active learning and reflective thinking skills. Through immersive experiences and interactive simulations, students engaged more deeply with the subject matter, leading to a greater understanding of microorganisms and their significance in daily life (Lloyd, 2014).

SUMMARY, CONCLUSION AND IMPLICATIONS

Microorganisms such as bacteria and viruses can cause foodborne illnesses, making it crucial to understand their role in food and how to control their growth through food preservation techniques. This knowledge can help prevent food spoilage and ensure food safety at home. The VR simulation in the study provided a unique way to teach these important concepts to students, making the learning process more engaging and effective.

After the development of the VR application focusing on microorganisms, its validity, practicality, and effectiveness were evaluated based on preliminary research findings. The study addressed two primary aspects: the VR features depicting microorganisms and the impact on students' cognitive abilities and observational skills regarding abstract concepts. Firstly, the VR application illustrated various food preservation techniques, starting with boiling as a representation of microorganisms. Utilizing a head-mounted VR headset with a remote, the study elucidated the features of the VR environment. Secondly, students' cognitive abilities, including Representational Fidelity, Perceived Enjoyment, Control and Active Learning, and Reflective Thinking, were examined along with observational skills when learning abstract concepts through traditional methods versus VR experiences. The analysis revealed a significant correlation between students' control and active learning and their reflective thinking skills. Additionally, students from the experimental group exhibited higher utilization of observational skills compared to the control group, suggesting that VR has the potential to enhance students' observational abilities.

It can be concluded that the virtual reality (VR) application met the criteria for enhancing students' reasoning and response, indicating its utility in educational settings. Moreover, aligning with the objectives of the Fourth Industrial Revolution and advancements in online and digital learning, the VR application holds promise as a valuable tool for facilitating nuanced and immersive learning experiences. In the future, it could be leveraged to support massive open online courses (MOOCs) and distance learning initiatives, contributing to the evolution of educational methodologies in line with technological advancements.

SUGGESTION FOR FUTURE RESEARCH

- **Expansion of VR Applications in Biology:** The current study demonstrated that VR is an effective tool for teaching about microorganisms. Future research could extend the use of VR to teach other abstract concepts in biology, such as medicinal bacteria like *Penicillium*.

- **Longitudinal Studies on VR Impact:** The present study provided a snapshot of the impact of VR on students' cognitive abilities and observational skills. Future research could conduct longitudinal studies to gain insights into the long-term effects of VR on learning outcomes.

- **Broadening the Target Audience:** The current research was conducted with school students to teach about food preservation. Future research could expand the target audience to include parents, nutrition students, and food industry professionals who could benefit from understanding these abstract concepts.

Cost of the product: The cost of the VR product in Indian Rupees is based on hardware (VR Headset), software development (Blender and Unity Personal), and deployment expenses (3D models, animations, and other assets). Thus, the total estimated cost of the product is ₹1,08,000.

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SITUATIONAL ANALYSIS OF PRIVATE AND GOVERNMENT/GRANT-IN-AID SCHOOL CANTEENS AND OUTSIDE SCHOOL CAMPUSES IN URBAN VADODARA

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ABSTRACT

The pattern in school children and adolescents in developing nations is characterized by an increased consumption of processed foods high in calories and a low intake of fruits, vegetables, and animal products. School meal programs may have a substantial impact on the foods and beverages that children consume regularly. The study aimed to evaluate the situational analysis of Private and Government/Grant-In-Aid School Canteens and Outside School Campuses in Urban Vadodara. A cross-sectional study was conducted in randomly selected eight co-educational schools with canteens in urban Vadodara. Situational analysis of inside school canteens, and canteen evaluation was carried out by collecting data on the cyclic menu, availability of food and beverages, infrastructure of the canteen, and canteen feedback from students. Along with the physical food environment: Outside school campus. Seven out of eight schools had more than 70% of ultra-processed foods on their menus. The prevalence of overweight and obese was 24%. The majority of obese students (private school: 55%, p<0.001 and government/grant-in-aid school: 58%) were consuming food at school canteens daily to two to three times a week. Most commonly consumed food items from the canteens by students across all schools were samosa, puff, and potato chips. Ultra-processed and processed food items were significantly cheaper than minimally processed food items in all schools and easily available in the canteens. As per FSSAI Eat Right Campus guidelines, all four government/grant-in-aid schools need urgent improvements in their canteens. Food vendors were selling ultra-processed and processed foods within 50 m of the vicinity around 75% of schools. The results highlighted, that school canteens offered processed, ultra-processed food significantly higher than minimally processed food. This adds to students' bad eating habits and elevated BMIs. Fostering improved health outcomes in schools requires expanding the availability of healthy food alternatives and enhancing adherence to nutrition requirements.
Key words: Processed food, Ultra-processed food, School Canteen, Situational Analysis

INTRODUCTION

All around the world, obesity is on the rise as an epidemic. Globally, one in six children is now considered overweight or obese due to rising rates of childhood obesity (World Health Organization, 2024). As per National Family Health Survey 2019-20, the number of people with

obesity has doubled over the last 10 years in India; with an increasing trend of being overweight in children and adolescents.

During adolescence, teenagers develop autonomy and independence in food choices, making schools an ideal environment to influence nutrition-related behaviours (Fitzgerald, 2015). Schools are an excellent place to influence children at their critical developmental stages, providing an ideal environment for addressing adolescents' eating habits (Jourdan D. et al, 2021). However, evidence suggests that the school food environment is not always conducive to healthy food choices and may be obesogenic (Comprehensive National Nutrition Survey: 2016-2018, 2019).

A study on adolescents' food choices in canteens found that factors like availability, quality, appearance, taste, price, worth for money, peer pressure, food hygiene, school menu, wait times, and seating availability influence their choices (McEvoy CT. et al, 2015). A study conducted on the intake of ultra-processed foods (UPF) among adolescents (n=1030) in Delhi showed that the mean energy intake from UPF was 371 kcal (16.2%) of the total energy intake. The mean intake of macronutrients from UPF was 7.1 g (16.3%) fat, 78.9 g (18.6%) carbohydrate and 4.8 g (10.9%) protein. Also, the consumption of a variety of UPF was regular (Jain and Mathur, 2020).

Globally, there is ample data on predicting obesogenic food environments in schools and colleges, but India has limited evidence due to a lack of comprehensive research on school canteen food environments.

AIM OF THE STUDY

The broad objective of the present study was:

- To conduct the situational analysis of private and government/grant-in-aid school canteens and outside school campuses in Vadodara City.

Null Hypothesis: There will be no significant difference between private and government/grant-in-aid school canteens and outside school campuses in Vadodara City.

Alternate Hypothesis: There will be a significant difference between private and government/grant-in-aid school canteens and outside school campuses in Vadodara City.

METHODOLOGY

Study Design

A cross-sectional study was conducted in randomly selected eight co-educational schools having canteens in urban Vadodara. For the selection of schools, data were collected from the District Education Office, Vadodara, and approached schools in urban Vadodara. The schools that agreed to participate in the study were considered. Amongst the consented schools four private and four government/grant-in-aid co-educational schools having canteens were randomly selected.

Sampling of participants

The sample size was estimated to be 150 with a 95% confidence interval and 5% error, assuming 11.1% prevalence of high Fat Salt Sugar diet (National Nutrition Monitoring Bureau). To account for dropouts, 200 students aged 10–15 years per school were enrolled, totalling 1600 participants.

Measures and Tools

Students from 5th to 10th standard were screened for nutritional status using WHO AnthroPlus software. A canteen evaluation and canteen feedback by students, observations, and interactions were done by using a pre-tested observational checklist. Inside school canteen infrastructure evaluation was done by using the standard inspection checklist for the Eat Right campus given by FSSAI (Food Safety and Standards Authority of India). Outside school campus: physical food environment (spot observation) was carried out using a pre-tested observational checklist.

Participation consent

Participation consent was obtained from schools and canteen operators, with minors requiring written informed consent from their parents or guardians, and active consent from both private and public schools.

Ethical consideration

The study was approved as a part of doctoral research by the Institutional Ethics Committee for Human Research (Ethical Number: IECHR/FCSc/PhD/2021/122).

FINDINGS AND DISCUSSIONS

School canteen characteristics

In the study, a total of eight school canteens were evaluated (private and government/Grant-in-aid) in urban Vadodara. During the evaluation process, five out of eight schools mentioned that in the kitchen they cooked hot meal items only for kindergarten students. For primary and secondary students (1st to 12th standard) pre-cooked meals/snacks, packaged food items, and beverages were available.

Menu assessment

For each selected school in the sample, the cyclic and non-cyclic menus were recorded. A total of 191 menu items were extracted from school canteen menus. As per the NOVA Food Classification, menu food items were classified according to ultra-processed (UPF), processed (PF), and minimally processed foods (MPF). The classification included food items available for kindergarten students and primary and secondary school students. Fig.- 1 depicts that the private school canteens had 48% availability of minimally processed foods on their menu. In comparison to private school canteens, government/grant-in-aid schools only had 30% of minimally processed foods available in the canteens (Fig.-2).
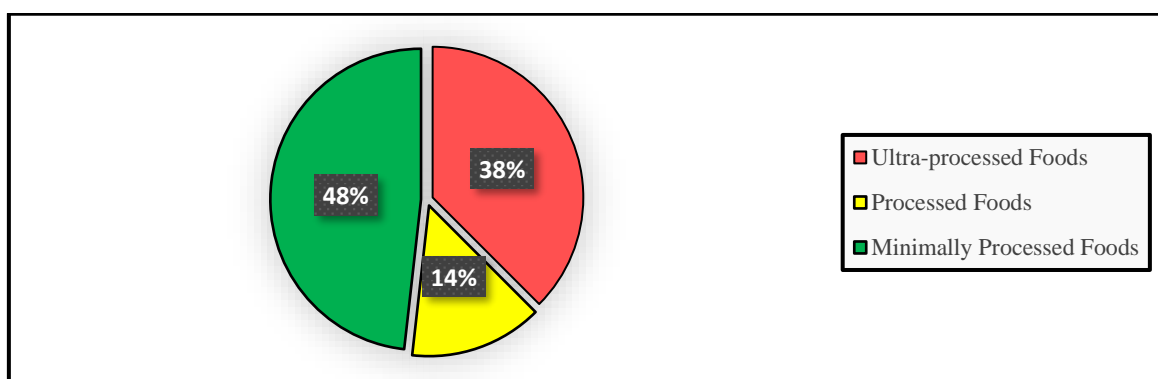
Fig.-1: Food Availability in Private School Canteens as per NOVA Food Classification (%)
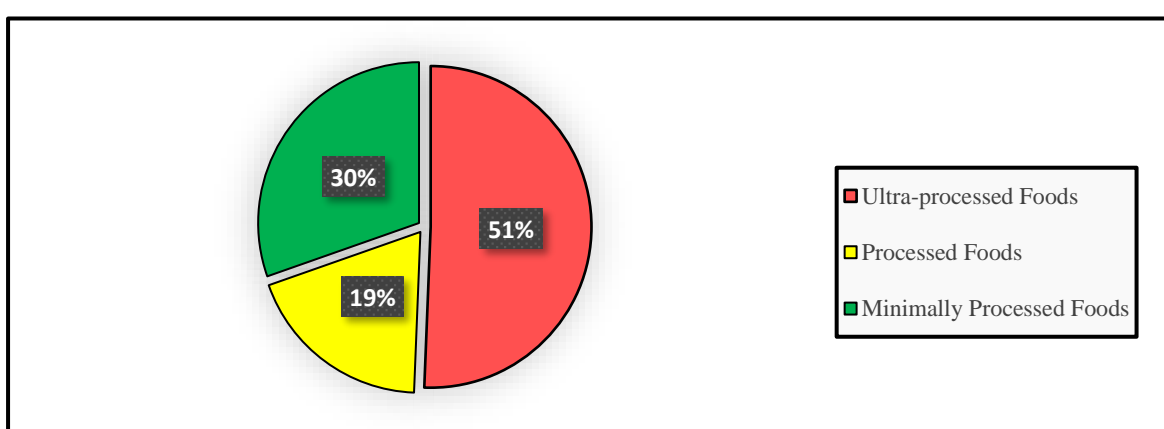
Fig.-2: Food Availability in Government/Grant-in-aid School Canteens as per NOVA Food Classification (%)

With the food items available at private school canteens in the primary and secondary school students (10–15 years), it was observed (Fig.- 3) that three out of four schools were selling ultra-processed foods maximally (75-80%) in their canteens followed by processed foods, which were available (17%) on the school canteen menus. There was only one private school focussing on the availability of minimally processed foods, which was around 67%.

In terms of food items available at government/grant-in-aid school canteens, Fig.- 4 depicts the sale of ultra-processed foods ranged from 73-77% across all schools. Processed foods were available at around 15–27%. Two out of four in the schools did not have minimally processed food items on their school canteen menus for primary and secondary students.
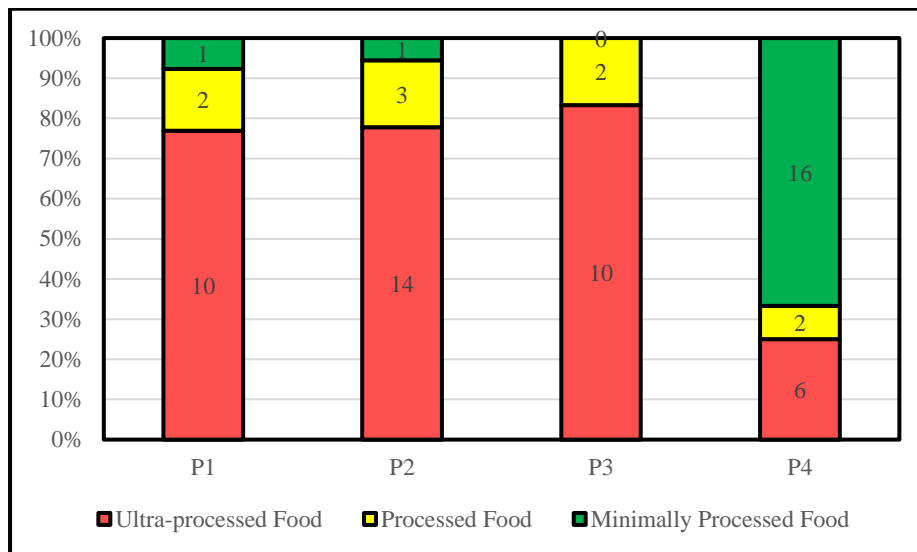
Fig.-3: Food Availability in Private School Canteens for primary and secondary students as per NOVA Food Classification (%)
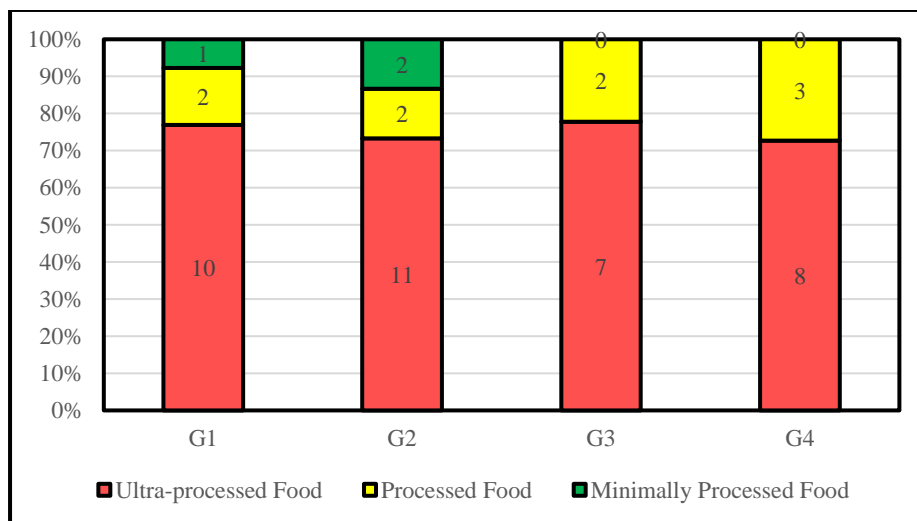
Fig.- 4: Food Availability in Government/Grant-in-aid School Canteens for Primary and Secondary students as per NOVA Food Classification (%)

Frequency of eating at the school canteens amongst students across all BMI categories

In the study, a total of 1631 students participated and were screened (Fig.-5). The ages of participants ranged from 10 to 15 years. Around 58% (n = 948) of students came under the normal BMI category. The prevalence of underweight/thinness was found to be 18%. A total of 387 students (24%) were overweight and obese.
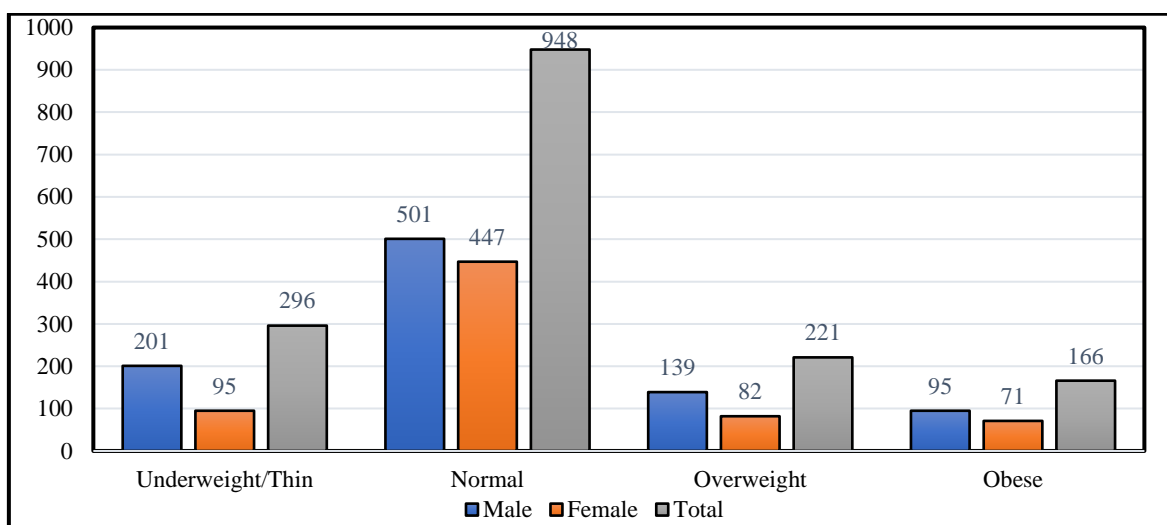
Fig.-5: Prevalence of Thinness, Overweight and Obesity Amongst Private and Government/Grant-in-aid School Students

As per Table 1, more than half of the obese (55%) and overweight (59%) students of the private schools ate in the canteen daily. Underweight kids have a more evenly distributed eating habit, with 53% eating twice or three times a week and fewer students eating daily or occasionally. Around 56% of normal-weight students ate at the school canteen daily, similar to obese and overweight students, indicating that these three groups had a consistent eating pattern. A significant difference was observed between the BMI categories and the frequency of eating at canteens of private schools. However, such a trend was not been seen in the government schools (Table-2).

Most commonly consumed food items amongst school students and their nutritional content

The study analyzed the most commonly consumed four food items among students in all schools. Based on the Dietary Guidelines for Indian, A Manual, 2011 for mid-morning snacks for 10-12 years, Table 3 indicates that the average calorie value (231 kcal) for most liked food items amongst students in private schools was slightly higher than the expected value (210 kcal). The mean total fat content was 13.1 g, with a relatively high standard deviation of 8.3 g. This suggests that there was a considerable range in fat content among the food items, with some being significantly higher in fat than others. The mean total fat content (13.1 g) was also higher than the expected value (7 g). The saturated fat (4.08 g) and sodium (1.29 g) contents were considered to be on the higher side as well, as the recommended values were 1.86 g and 0.5 g, respectively. The average total sugar was 3.93 g, which was near the cut-off value (3 g). Similar results were observed in government/grant-in-aid schools (Table 4). The only noticeable difference was that the average total fat content was 16.7 g, which was double the expected value (7g).

Table-1: Frequency of Eating Food in the Private School Canteens Amongst Students Across BMI categories (n, %)

	BMI Category				
Frequency	**Normal**	**Obese**	**Overweight**	**Underweight**	**Total**
Daily	283	61	82	21	447

	(56.04)	(55.45)	(59.42)	(17.79)	(51.32)
Twice/Thrice a week	39 (7.72)	6 (5.45)	8 (5.79)	63 (53.39)	116 (13.31)
Once a week	161 (31.88)	38 (34.54)	45 (32.60)	29 (24.57)	273 (31.34)
Occasionally	22 (4.35)	5 (4.54)	3 (2.17)	5 (4.23)	35 (4.01)
Total	505 (100.00)	110 (100.00)	138 (100.00)	118 (100.00)	871 (100.00)
Chi-square	198.9***				

*** significantly different p<0.001

Table-2: Frequency of Eating Food in the Government/Grant-In-Aid School Canteens Amongst Students Across BMI categories (n, %)

	BMI Category				
Frequency	Normal	Obese	Overweight	Underweight	Total
Daily	44 (9.93)	11 (19.64)	9 (10.84)	17 (9.55)	81 (10.65)
Twice/Thrice a week	183 (41.30)	22 (39.28)	35 (42.16)	72 (40.44)	312 (41.05)
Once a week	175 (39.50)	19 (33.92)	27 (32.53)	75 (42.13)	296 (38.94)
Occasionally	41 (9.25)	4 (7.14)	12 (14.45)	14 (7.86)	71 (9.34)
Total	443 (100.00)	56 (100.00)	83 100.00	178 (100.00)	760 (100.00)
Chi-Square	9.532[NS]				

[NS] Not Significant

Table-3: Average Nutrient Count of Most Commonly Consumed Food Items by Private School Students (Mean±SD)

Private School (N=4)	Most commonly consumed items by students in canteens	Energy (kcal)	Total Fat (g)	SFA (g)	Total sugar (g)	Sodium (g)	F-value
P1	Samosa	289	29.5	3.7	0.14	0.38	
	Dabeli	300	10	2	5	0.6	
	Puff	264	21.09	9.89	6.24	3.1	
	Potato Chips	150	9	3	0	1.5	
P2	Puff	264	21.09	9.89	6.24	3.1	
	Hot Dog	180	7	2	1	3.5	
	Veg Roll	150	5	1.5	1	0.3	
	Potato chips	150	9	3	0	1.5	
P3	Puff	264	21.09	9.89	6.24	3.1	
	Samosa	289	29.5	3.7	0.14	0.38	258.065***
	Frankie	250	8	3	2	0.6	
	Noodles	250	8	6	3	0.7	
P4	Panipuri	250	10	2	10	0.5	
	Custard	147	7.04	2.8	14	0.3	
	Sev usal	250	10	2	5	0.6	
	Pulao	250	5	1	3	0.5	
	Mean±SD	**231±55**	**13.1±8.3**	**4.08±3.09**	**3.93±3.98**	**1.29±1.20**	

*** significantly different $p < 0.001$

Table-4: Average Nutrient Count of Most Commonly Consumed Food Items by Government/Grant-In-Aid School Students (Mean±SD)

Govt/ Grant -in-aid School (N=4)	Most commonly consumed items by students in canteens	Energy (kcal)	Total Fat (g)	SFA (g)	Total sugar (g)	Sodium (g)	F-value
G1	Samosa	289	29.5	3.7	0.14	0.38	
	Dabeli	300	10	2	5	0.6	
	Puff	264	21.09	9.89	6.24	3.1	
	Potato Chips	150	9	3	0	1.5	
G2	Puff	264	21.09	9.89	6.24	3.1	
	Samosa	289	29.5	3.7	0.14	0.38	
	Hot Dog	180	7	2	1	3.5	296.469***
	Manchurian	290	12	3	10	0.9	
G3	Samosa	289	29.5	3.7	0.14	0.38	
	Bhel	200	6	1	5	0.6	
	Potato Chips	150	9	3	0	1.5	
	Fryum (Packed)	180	10	2	1	0.3	
G4	Samosa	289	29.5	3.7	0.14	0.38	
	Vadapav	300	15	4	5	0.8	
	Puff	264	21.09	9.89	6.24	3.1	
	Frankie	250	8	3	2	0.6	
	Mean±SD	**247±55**	**16.7±9.1**	**4.21±2.92**	**3.01±3.18**	**1.32±1.19**	

*** significantly different $p < 0.001$

Mean price of food items available at the school canteens

Table 5 reports the average rates of food items classified as ultra-processed, processed, and minimally processed foods. The study found a significant difference in food expenditure between private and government schools ($p < 0.001$). Private schools spent more on ultra-processed foods (13.7 ± 7.7 Rs) compared to government schools (9.9 ± 6.1 Rs). Additionally, private schools spent more on processed foods (10 ± 3.5 Rs) compared to government schools (8.3 ± 2.5 Rs). However, spending on minimally processed foods is comparable between private and government schools (18.6 ± 5.1 Rs).

Table-5: Mean Price of Food Items Available at the School Canteens (Mean±SD)

Type of School (N=8)	Ultra-processed Foods (Rs)	Processed Foods (Rs)	Minimally Processed Foods (Rs)	F-Value
Private (n=4)	13.7±7.7	10±3.5	18.6±5.1	5.717**
Government/Grant-in-aid (n=4)	9.9±6.1	8.3±2.5	18.3±2.8	3.860*
Total	11.8±7.1	9.1±3.1	18.5±4.7	12.494***

* significantly different at $p < 0.05$

** significantly different at $p < 0.01$

*** significantly different $p < 0.001$

Inspection of school canteens

Inside the selected school campuses, six observations per school were recorded by using the inspection checklist for Eat Right Campus given by FSSAI. The checklist comprises four sections, with the specifics of each section outlined below:

Part A: Safe Food (comprises of design and facilities, control of operation, maintenance and sanitation, personal hygiene, and training of food handlers and record maintenance at canteens)

Part B: Healthy Food (comprises a daily healthy food checklist)

Part C: Sustainable Food (comprises of sustainable food and its awareness checklist)

Past D: Building Awareness (comprises activities and celebrations of important days such as World Food Day, World Food Safety, etc.)

According to the scoring matrix, it was suggested that marks obtained above 65 are considered satisfactory to good compliance. It was observed that only two private schools (P3 and P4) adhered to the guidelines suggested by the FSSAI (Table 6). The schools (P1 and P2) scores less than 65 lie under partial compliance, which can be advised for necessary improvements in canteens as per FSSAI.

Table 7 depicts the canteen scenario of government or grant-in-aid schools. As per FSSAI Eat Right Campus guidelines, marks scored below 55 all four government/grant-in-aid schools need urgent improvements in their canteens.

Table-6: Overall Scoring of the Private School Canteens (Mean±SD)

School	Part A (Max score-40)	Part B (Max score-25)	Part C (Max score-10)	Part D (Max score-25)	Total (Max score-100)
School P1	27	11	3	10	51
School P2	31	13.5	4	14	63
School P3	33	14	3.5	14	65

School P4	34	19.5	5.5	16	75
Mean ± SD: 63.50 ± 9.84					

Table-7: Overall Scoring of the Government/Grant-in-aid School Canteens (Mean±SD)

School	Part A (Max score-40)	Part B (Max score-25)	Part C (Max score-10)	Part D (Max score-25)	Total (Max score-100)
School G1	27	11	4	11	53
School G2	24	11.5	2	8	46
School G3	24	11	2	10	47
School G4	27	11.5	4	10	53
Mean ± SD: 49.75 ± 3.77					

Situational Analysis of Outside School Campus (Spot Observation)

Within 50 meters of schools (75%) there were vendors selling ultra-processed and processed foods. Table 8 information shows that private and public schools differ significantly in terms of food vendor practices, environment and hygiene standards. Government and grant-in-aid schools were found to have food handlers that did not adhere to standard operating procedures, such as covering fried and unpackaged items or handling food without wearing hand gloves and headgear (100%). Better hygiene, wearing gloves and caps, and covering food were all observed in nearby areas of 50% of private schools. Both kinds of schools, however, claimed that vendors maintained freshly prepared food items and were similar in terms of selling recently manufactured processed and ultra-processed foods.

Table-8: Outside School Campus (Spot Observation)

Variable	Private School (N, %)		Observation (n=6)	Govt School (N, %)		Observation (n=6)	Chi-Square
	Yes	No		Yes	No		
Are there food vendors who sell processed and ultra-processed foods within the vicinity of 50 meters of a school?	3(75)	1(25)	6 (100)	4(100)	0(0)	6 (100)	6.857**
Personal hygiene of Food vendors?	1(25)	3(75)	6 (100)	0(0)	4(100)	6 (100)	9.333**
Is the person handling food keeping the fried and other unpackaged food	3(75)	1(25)	6 (100)	1(25)	3(75)	6 (100)	7.292**

covered?							
Is the person handling food using hand gloves and head caps while preparing food or serving food?	2(50)	2(50)	6 (100)	0(0)	4(100)	6 (100)	9.333**
Cleanliness around the place?	2(50)	2(50)	6 (100)	1(25)	3(75)	6 (100)	9.333**
Do food vendors/shops keep recently manufactured products?	4(100)	0(0)	6 (100)	4(100)	0(0)	6 (100)	9.333**

** significantly different at $p < 0.01$

In the present study, more than 50% of children had unhealthy eating habits, and this also led to a comprehensive understanding of the type of food available at school canteens in urban Vadodara. During the evaluation stage, five schools reported that they provide hot nutritious meals only to kindergarten school kids. The menus mostly consisted of minimally processed foods as per the NOVA food classification. On the other side, the same number of schools were selling processed to ultra-processed foods comparatively higher than the minimally processed foods to primary and secondary students. It showed that there were fewer options for healthy food items available to primary and secondary students. Similar findings were observed by Bassi S. et al (2021) that despite government and educational institution standards restricting high-fat, salt, and sugar (HFSS) foods, there were still high-HFSS food and beverage options near educational institutes. Healthy options are more expensive than HFSS meals.

Data on the anthropometric measurements and frequency of eating at school canteens revealed that obese and overweight students have higher daily eating habits than other students at school canteens. A study on the determinants of food choice in a school environment in Mumbai city showed a significant association between the frequency of eating at the canteen and BMI. 41.2% of students who ate at the canteen more than three times a week were overweight (Bhatt R. et al., 2019).

A statistically significant difference was observed in the nutritional content of the most commonly consumed items across different schools. This significance suggests many of the items are high in fat and energy, with varying levels of total fats. This shows that the nutritional content of the items served in these canteens may be improved to promote healthy eating habits among students. The most popular foods in both private and public schools are energy-dense and rich in fat, particularly samosas and puffs. This implies that students have similar access to and intake of high-calorie, high-fat items regardless of the type of school. A similar study found that schools' lack of nutrition and health policies, along with control over the canteen menu, led to excessive consumption of unhealthy, high-calorie foods and beverages (Mehan M. et al, 2012). Ultra-processed and processed food items were available at a cheaper price than minimally processed food items. Ultra-processed food items were cheaper than minimally processed items. A study in 50 schools found a positive association between healthy and unhealthy food availability and

student purchasing (Clinton-McHarg T. et al, 2018). Therefore schools should focus on increasing minimally processed food availability.

The Eat Right Campus compliance rates in government/grant-in-aid and private schools differ. Government schools need immediate changes to improve food safety, nutrition, and sustainability practices. Whereas some private schools meet or near to meet the FSSAI criteria. Addressing these issues will encourage healthier eating habits and create healthier school environments. Most schools do not adhere to FSSAI regulations, highlighting the prevalence of low-cost unhealthy snacks in schools and a lack of healthy snack options outside the school campus.

SUMMARY, CONCLUSION AND IMPLICATIONS

The study revealed various determinants influencing the obesogenic food environment in educational institutes in India, despite the supportive guidelines for food service and availability in school canteens. The results point to a significant gap in the adoption of dietary guidelines, especially in public and grant-in-aid institutions. Schools must increase adherence to food safety laws, provide more minimally processed food options, and strengthen nutrition programs to encourage better eating. Encouraging healthier school environment will lead to improved health outcomes in children which will pave the way for healthier nation.

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A STUDY TO ASSESS THE CORRELATION OF BMI, BODY COMPOSITION FACTORS AND ENERGY INTAKES WITH SOCIOECONOMIC STATUS OF COLLEGE GOING YOUNG GIRLS OF LUCKNOW CITY

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ABSTRACT

The study aimed to assess the correlation between the SES (socioeconomic status) and body composition along with energy intakes of college going young girls of Lucknow city of India. The study was a cross sectional survey conducted on 400 college going girls aged between 18 - 21 years. The girls were selected from 10 different colleges wherein two colleges from each 5 zones of Lucknow city were selected randomly. A pretested questionnaire was given to the sample to obtain demographic profile as well as their SES. BMI was calculated using **Quetelet Index**. For assessment of body composition, Skin fold thickness (SFT) measurements were recorded namely triceps, biceps, Subscapula and Suprailiac. Percent body fat (%BF) was computed from SFT using **Durnin and Womersley** equation 1974 and fat mass (FM)and fat free mass (FFM) were computed using formulae given by **Gibson 2005**. Dietary survey was done through **24-hour dietary recall method** for 3 consecutive days and energy intakes was calculated. All the three variables i.e. BMI, body composition and energy intakes were correlated with SES of the sample. Data was statistically analysed using SPSS 16.0 version. Analysis of variance (ANOVA) was used to find the correlation between SES and various variables. p value at < 0.05 was considered to be significant. A large percentage (61%) belonged to upper SES and upper middle SES but had normal BMI as weight for health status. Only 10% sample from upper SES and upper middle SES belonged to obese and preobese category. Only 1% from upper SES belonged to obese category and 3% of Upper SES belonged to underweight category also. Next though mean % BF and mean FM was found to be highest in upper SES mean fat free mass was also found to be highest in upper SES. The mean energy intake was found to be highest in middle upper SES. The results conclude that upper SES may not always be positively related to higher BMI, higher percentage of BF and high energy intakes. Thus, null hypothesis rejected and alternate hypothesis accepted.

Keyword: Body Mass Index (BMI), Percent Body Fat (PBF), Fat Mass (FM) , Fat Free Mass (FFM), Socio Economic Status (SES).

INTRODUCTION

Young females are early adults in their youth. A young female is characterized by her appearance, freshness, strength, Spirit etc. **Jones 2010** pointed out that that Young may be just a word but this has been an evolving concept. Western countries have defined youth as the "life stage between childhood and adulthood" and also "transforming to independent from dependent" (**Kehly 2007**). Young adulthood cannot be defined in exact time lines for a number of reasons. Moreover in 21st century, major life event have shifted grossly such as early puberty and longer life expectancy. As stated above, adulthood has no clear starting line, one might propose period of adulthood from 18-30 years and within that young adulthood can be provisionally proposed from 18-21 years. Young adulthood is a critical and unique phase of growth and development. In modern era, rapid technological changes, economic challenges, prolonged transition to adulthood, shrinking family roles, increasing stress and sedentary life style are all contributing to varied health problems in young adults. However, majority of the health problems if intervened at right time can be prevented and lifelong health can be promoted. Health and nutrition are the two chief contributing factors, leading to the growth of country's human resource. Good Nutrition and health of young adults are prerequisite for successful socio-economic development of the nation.

For assessing the nutritional status of a population, Anthropometric measurement such as quetelets Index also known as the Body Mass Index (BMI) is widely used practical tool. BMI is a simple Index of assessing obesity as well as chronic energy deficiency (**Groff and Gropper 2000**). Other Anthropometry measurements allow estimation of body composition through measuring various skinfold sites on human body. With increasing Knowledge regarding importance of regular physical activity for health and fitness assessing body composition has become a basic component of health-related fitness. Body Composition measurements provide an indication of both nutritional status and physical fitness. Apart from Anthropometry a variety of methods are available for body composition measurement such as under water weighing, estimating body water, dual energy X-ray absorptiometry (DXA), whole body electrical conductivity, Computerized tomography etc. Except Anthropometric measurements the use of all other methods is limited in research field due to their cost and Complexity. Assessing body composition by Anthropometric measurement is basically based on a concept which states that the human body is made up of two chemically distinct compartments which are body fat mass and fat free mass (**Venkataramana 2011**). The estimation of both these mass can be done on the basis of skinfold site. Estimation of body fat mass and fat free mass can be of great help in assessing as to how much muscle mass (along with organ mass) and fat exists in humans having different BMI. Thus the most practical method of assessing body composition is determining body fat composition is via skinfold measurements. Equation given by Durnin and Womersley, 1974 is the most frequently used equation for determining percent body fat (PBF). Based on PBF, fat mass in (kg) and Fat free mass can easily be calculated using formulae given by **Gibson 2005**.

In present times, among many other factors SES is a significant factor to be studied in social Science researches and Public health. SES is an indicator of a family's economic and social status based on income, education and occupation. For urban population, **Kuppuswamy SES scale** is the most commonly and easily applicable scale. The original Scale is based on three Components which are occupation, Education and total income of the family,

Occupation criteria and Income criteria are constantly being upgraded by Ministry of skill development and Entrepreneur ship.

Literature Review: Punjab is an economically advance state of India and the SES of the people is similar to SES of other state people. The Socio-Economic development has brought changes in food consumption pattern, dietary intake and physical activity levels. All these factors have Contributed to the problem of overnutrition in people of Punjab (**Sindhu and Tatla 2002**).

NFHS-3 (2005-2006) reports that progressively since past thirty years, there has been Some increase in over nutrition and decline in under nutrition in both rural and urban areas. Obesity and overweight was more common in urban areas with higher wealth quintile and better education.

Poluru and Mukherjee, 2010, presented the results of logistic regression analysis of their study that underweight was negatively and significantly associated with residence, education, standard of living, and household status.

Moli and Mini 2012 conducted a study in Kerala and reported that as the Income level increases and chances of overweight also increase and thus wealth index was pointed out to be important to assess the prevalence of overweight /obesity.

Chhabra and Chhabra (2007) and **Bose et. al (2007)** state that the socioeconomic status was strongly correlated with their nutritional status. People with low SES had less than ideal body weight and were economically sound subjects were more likely to be overweight or obese. According to **Schmeiser 2009** income was found to be significantly raising the BMI.

Sobal et al assessed the relationship between SES and obesity through review of 144 published studies. A strong direct relation between SES and obesity was found as primary finding and the study concluded that the positive association was mainly found in Countries with found high human development Index (HDI).

JUSTIFICATION OF THE STUDY

College going young girls are future mothers and so the responsibility of bearing and nurturing the babies lie on their shoulders. Women are generally vulnerable to under nutrition. Changing life style causes changes in eating patterns which has increased the intake of junk food leading to a change in fat and fat free mass. As to best of scholar's knowledge no study has compared the estimates of percent body fat of adult females (age group 18-21 years) of different BMI in Lucknow. Therefore, an attempt has been made to investigate the association between percent body fat of adult females of Different BMI and also the correlation between socio-economic status and body composition of young female adults.

OBJECTIVE

The main objective of the present study was
- To assess the relationship between SES with BMI, Body composition factors and energy intakes in the college going young girls of Lucknow City.

HYPOTHESIS

Hypothesis (Ho):- Socioeconomics status always has a positive relation to BMI, Body composition and dietary status.

Hypothesis (Ha):- Socio economic status may not always have a positive relation to BMI, Body composition and dietary status.

METHODOLOGY

The present study is a cross sectional study of college going young girls aged between 18 to 21 years and residing in different areas of Lucknow city. The sample size for the present study was determined through formula given by **Barlette et.al 2001** and the estimated sample size came out to be 400. The study was conducted in all the 5 zones of Lucknow City i.e. East, West, North, South and Central zone. Two colleges from each zone were selected randomly and 40 females of the age group 18 - 21 years were chosen from each college to make up the desired sample size. Only those students were selected who were willing to participate in the study and who fulfilled the inclusive criteria Girls attending their regular college were preferred in the study and girls residing such as paying guest or in hostel were not included in the study. Girls on crash diet or on any type of reducing diet were also excluded from the study. A pretested questionnaire was given to each candidate to get the demographic profile as well as their SES. Anthropometric profile mainly BMI was taken to assess the health status of the sample. The most p[popular and reliable tool to assess BMI is Quetelet's index i.e. weight in kg / height in meters square and the same was used to assess BMI of the sample group in the present study. Based on the BMI cut off the subjects were classified into four categories which are Obese, Overweight, Normal and Underweight. For assessment of body composition skinfold thickness was recorded by the scholar. In the present study four SFT sites namely fat fold at triceps, biceps, subscapula and Suprailiac measurement were recorded using skin fold caliper. Percent body fat from the sum of the SFT was computed using **Durnin and Womersley equation 1974.** Simultaneously fat mass and fat free mass was computed using formula given by **Gibson 2005.** Dietary survey was done using 24-hour dietary recall method for three consecutive days. Mainly energy intake was computed on the basis of food exchange list and was compared with **RDA 2011.** Thus, dietary status of the sample group was computed.

All Three Variables i.e. BMI, % Body fat (%BF) and energy intake were correlated with SES of the sample. To assess the SES of the sample the modified Kuppaswamy socio economic status scale was used. Upon application of Kuppuswamy scale, the Sample was categorised in 3 groups: Upper SES, Upper middle SES and lower SES. No girl belonged to Lower SES.

FINDINGS AND DISCUSSION

I. Descriptive characteristics:

Table 1: Frequency distribution of SES in study sample.

Socioeconomic Status	Frequency	Percentage %
UPPER SES	125	31.25
UPPER MIDDLE SES	173	43.25
LOWER MIDDLE SES	102	25.5
Total	400	100.0

Table 1: shows the frequency of subjects according to their SES. Overall, 31.25 % of the girls belonged to upper socio-economic class, 43.25 % girls belonged to upper middle Socio-economic class and only 25.50 % girls belonged to lower middle Socio-economic class.

Table 2: Frequency distribution of study population according to their BMI

Body Mass Index	Frequency	Percentage %
Underweight	23	5.75
Normal weight	331	82.75
Pre obesity	42	10.5
Obesity class I	4	1.0
Total	400	100.0

Table 2 shows the frequency and percentages of the sample group falling under different categories of BMI. Almost 83% of the sample was found to be in the normal weight category and only 10.5 % were in preobese category. Only 1% was found to be in obesity class 1 category and almost 6 % were found to be underweight.

Table 3: Composite table for Anthropometric and Body composition (BC) measurements.

PARAMETERS	Mean	Standard Deviation
WEIGHT (Kg)	54.21	8.70
HEIGHT (cm)	156.85	7.67
BMI (Kg/mt2)	21.69	2.69
BICEPS (cm)	1.22	0.43
TRICEPS (cm)	2.04	0.53
SUPRAILIAC (cm)	2.38	0.58
SUBSCAPULAR (cm)	1.99	0.68
FAT MASS (kg)	16.37	3.89

PERCENT BODY FAT	30.59	4.02
FAT FREE MASS (kg)	36.85	5.66

Table 3 shows the overall anthropometric measurements and BC factors of the samples. Mean BMI of the sample was found to be 21.69 whereas Mean Fat Mass and Percent Body Fat were 16.37 kg and 30.59 % respectively.

II. Relationship **between BMI and SES**.

Table 4: Frequency distribution as per BMI and SES.

		UPPER SES	UPPER MIDDLE SES	LOWER MIDDLE SES	Total
BMI	Underweight	12	4	8	24
		3.0%	1.0%	2.0%	6.0%
	Normal weight	96	148	88	332
		24%	37%%	22.0%	83.0%
	Pre obesity	12	24	4	40
		3.0%	6.0%	1.0%	10.0%
	Class I Obesity	4	0	0	4
		1.0%	.0%	.0%	1.0%
Total		124	176	100	400
		100.0%	100.0%	100.0%	100.0%

p-value=0.001; consider very significant.

Table 4 depicts the relation between SES and BMI of the Subjects. A maximum of 37% subjects of upper middle SES had BMI of normal weight category. 24% of upper SES too belonged to the same BMI Category. Though a small percentage but still maximum 6% from upper middle SES belonged to preobese Category and 3% and 1% belonged to prebese category from upper SES and Lower middle SES respectively. Only 1% from upper SES belonged to obese category and 3% of Upper SES belonged to underweight category also.

III. **Correlates of body composition and SES**

Three components of body composition i.e. % BF, FM and FFM were correlated with the three SES categories of the sample

Table 5. Body composition factors as per the SES of the subjects

Body composition Factors	SES						p-value
	UPPER		UPPER MIDDLE		LOWER MIDDLE		
	Mean	SD	Mean	SD	Mean	SD	

FAT MASS	17.45	4.02	16.88	4.05	14.23	2.35	<0.001
Percentage BODY FAT	31.75	3.68	30.40	4.62	29.74	2.53	0.001
FAT FREE MASS	38.15	6.32	38.01	5.49	33.32	3.02	<0.001

Applied one-way ANOVA for significance.

Table 5 shows the mean distribution of body composition factors (% BF, FM and FFM) In the three SES groups. Mean of percentage body fat and mean of FM was found to be highest in upper SES group. Fat free mass (38.15) was also found to be highest mean in upper SES group. It was found that body Composition factors were strongly correlated by the SES of the Study Population. The one-way analysis of Variance at $p<0.001$ showed that there was significant difference among the means of the three socio economic groups.

IV. **Correlates of SES and energy intake**:

Mean Energy intake of the Sample was categorised as per their SES.

Table 6: **Energy intake as per their SES.**

	Socio Economic Status						
	UPPER		UPPER MIDDLE		LOWER MIDDLE		p-value
	Mean	SD	Mean	SD	Mean	SD	
ENERGY (kcal)	2138.45	191.30	2200.48	229.78	1951.24	202.35	<0.001

Table 6 shows mean distribution of energy and protein intakes of the subjects according to their SES. Higher means of energy and protein intakes were found in upper middle SES group. The one-way analysis of variance showed that there was significant difference among the means of energy and protein intake and Socio-economic status.

Generally, it is believed that subjects from upper SES are more prone to have high BMI, high % BF, fat mass while sample group of the lower SES might be having low BMI, low % BF and fat mass. A positive relationship between upper SES group and high BMI, higher Fat mass and higher percentage FM can be explained through the influence of higher SES on people life style, food Consumption patterns, less physical activity and easy access to transportation. Another factor i.e. food cost might also influence eating pattern of various SES population. Traditional diet of millets, coarse grains and pulses has been replaced by refined cereals and thereby consumption of fibre has been reduced drastically. Consumption of sugars, oil, processed foods and fast food has also parallely increased in urban population of upper SES. Marketing strategies, peer pressure, easily availability also contribute in the intake of energy dense food and thereby obesity in people of affluent families.

The results of present study show that a large percentage 61% (24% and 37%) sample had normal BMI category though they belonged to upper and upper middle SES. Only 10% (6+3+1%) belonged to preobese and obese category and they belonged to upper SES and upper middle SES. 3% of the samples from upper SES belonged to underweight category too. Only 2% of the sample came under low BMI range with a background of lower SES. The

above findings do not very much positively go in accordance with the general belief. When Body composition factors and SES was correlated, it was found that sample group of upper SES had higher means of %BF as well as FM. The mean of fat free mass was also found to be highest in upper SES then in upper middle SES and lower middle SES.

The mean energy intake which is directly responsible for fat mass and overweight was found to be highest in upper middle SES. The mean energy intake of the whole sample was found to be 2110 kcal/day, a slightly higher than the RDA i.e. 1900 Kcal/ day. Mean energy intake was slightly lower in upper SES compared to upper middle SES. Therefore, it can be said on the whole that upper SES may not always be related to high BMI, high energy intakes and high percent body fat and low-fat free mass. Ho is rejected and HA is accepted.

CONCLUSION

From the results of this study, it is concluded that SES does influence anthropometric measurements like BMI and percent body fat, fat mass and dietary status but the relation may not always be positive. It may not always be true that subjects of upper SES will have a higher BMI, higher Fat percentage and higher dietary status. Many other factors such as education, awareness, family dietary habits may also influence BMI, body composition factors and dietary status.

SUGGESTIONS

Assessment of BMI and variation in body Composition patterns of people at different stages of life cycle can be researched upon. Large prospective studies are needed to evaluate the relationship of BMI and Body fat distribution to non-communicable diseases other methods to calculate the body composition can further be studied to assess health status of an individual. New appropriate and efficient intervention programmes for other age groups especially children and adolescence are needed to be developed and evaluated.

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IDIOSYNCRATIC DIETARY BEHAVIOUR OF ADOLESCENTS (15-18 YEARS) WITH AUTISM SPECTRUM DISORDER IN DELHI

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ABSTRACT

Earlier research has not yet examined the prevalence of idiosyncratic dietary behaviour in adolescents (15-18 years) with Autism Spectrum Disorder. The cross-sectional descriptive study aimed to assess the dietary behaviour of adolescents (15-18 years) with ASD in Delhi. Hundreds of adolescents with autism spectrum disorder were selected through purposive sampling. The data was collected using standardised, self-structured interview schedules. The results revealed that adolescents with autism spectrum disorder had mealtime behaviour problems as reported by their parents. It might be due to repetitive and restricted behaviour patterns of adolescents with ASD. It is recommended that free-of-cost updated nutrition programmes, seminars and workshops must be organised for the parents of children with autism spectrum disorder to manage the dietary behaviour of children with ASD as soon as possible after diagnosis.

Keywords: Autism, Idiosyncratic, Mealtime behaviour.

INTRODUCTION

There has been an increase in the frequency of occurring of autism spectrum disorder in India over time, similar to the developed countries. It is common among all developmental conditions. Worldwide, India is the second most populous country and a majority of the populace of this country is below 20 years of age. However, there is a paucity of data regarding the prevalence and incidence of autism spectrum disorder in India. It may be due to advanced parental age at conception and perinatal factors like prematurity and a high risk of infant survival have increased over the years. Nutrition is an essential component at every age particularly in adolescence because it is associated with both qualitative and quantitative development. Moreover, nutritional requirements throughout adolescence are elevated because of the increased growth rate and changes in body composition associated with puberty. A study conducted by Lockner et al., (2008) illustrated that children who are within the autism spectrum revealed peculiar diet-related and mealtime behaviour problems that interfere with their daily routine. It is more common among children with autism compared to typically developing children. Dietary behaviours include selective eating, not liking to consume new foods, particular towards the presentation of foods (e.g., particular brands or

packaging and utensils), sensitivity to the texture of food, intake of less variety of foods, interest in uniform eating, intake of more salty and sugary foods, and refusal of fruits and vegetables. These are the most essential causes of the decline in the quality of nutrition for children with autism spectrum disorder (Bandini et al., 2010). Due to such existing risky dietary behaviours, children with autism spectrum disorder tend to gain more unhealthy weight compared to typically developing children (Ahearn et al., 2001; Evans et al., 2012 & Bicer & Alsaffar, 2013). Although the most commonly reported dietary behaviour in children with autism spectrum disorder is selective eating (Williams et al., 2000). Children may be choosy by food type, temperature, texture, brand, and even food colour. Williams & Seiverling, (2010) explained some of the challenges among children with autism spectrum disorder include liquid avoidance and rapid eating, i.e., eating at an unsuitable pace that does not allow them to chew the food properly. Additionally, children with autism spectrum disorder regularly exhibit indisciplined mealtime behaviours such as crying, screaming, agitated behaviour, self-injurious conduct, spitting out food, leaving the table, and knocking food off the table, which impedes the intake of a meal, and thus nutritional status is also compromised (Ahrean et al., 2001). Factors that may affect the nutritional status of children with autism are nutritional and behavioural. Nutritional factors include food allergies, levels of homocysteine, and problems related to the gastrointestinal tract, whereas behavioural factors include sensory disintegration and diet-related behavioural problems (Geraghty et al., 2010). Thus, considering the significance of nutrition in this age group indicated a dire need to study this area.

OBJECTIVES OF THE STUDY

- To investigate the dietary behaviour and mealtime behaviour of adolescents with autism spectrum disorder

METHODOLOGY

A cross-sectional descriptive study was conducted targeting all available special schools and NGOs in Delhi city. A total of 100 adolescents with autism spectrum disorder 90 boys (including 43 of 15 years and 47 of 16-17 years) and 10 girls (out of that 3 girls of 15 years and the remaining 7 girls of 16-17 years) aged between 15-18 years were selected from different NGOs and special schools of Delhi city. The sample had a co-existence of chronic disorders like Type I Diabetes as it could affect the dietary intake and anthropometric measures of the sample were considered as exclusion criteria of the study. Dietary behaviour was studied using the Adolescents Eating Behaviour Rating Scale, and Brief Autism Meal time Behaviour Inventory. The average scores were calculated for investigating the dietary behaviours and mealtime behaviours of adolescents with autism spectrum disorder using a brief autism mealtime behaviour and adolescents' eating behaviour rating scale.

STUDY TOOLS

Adolescent eating behaviour rating scale:

Parents of the sample were interviewed to comprehend the general eating behaviour of the sample including food habits, food choices, and sensory challenges of the sample group. The self-constructed, pre-tested rating scale was based on literature (Wardle et al., 2001). It consisted of 18 items, out of which 4 items (1, 5, 9 and 16) were negatively assessed. The opinionnaire was based on 5 points Likert scale which ranged from 1=Never, 2=Rarely, 3=Sometimes, 4=Often, 5=Always. The assessment of internal consistency in the

pre-testing with this sample revealed an alpha coefficient of 0.78 for the full scale and it was found to be acceptable.

Brief autism mealtime behaviour inventory:

The Brief Autism Meal Time Behaviour Inventory (BAMBI) was developed by Lukens and Linscheid (2008). It is the first standardized tool to assess mealtime behaviours, particularly in children with ASD (Seiverling et al., 2010). The inventory was based on a 5-point Likert scale where 1=Never, 2= Seldom, 3= Occasionally, 4= Often and 5= At almost every meal, to report the frequency of behaviour.

RESULTS AND DISCUSSION

Dietary behaviour of adolescents with autism spectrum disorder:

Dietary behaviour refers to eating patterns, food choices, food habits, mealtime difficulties, sensory disintegration and general eating behaviour. The behaviour related to diet is depicted in Tables 1 & 2.

Table 1: Adolescents' Eating Behaviour Rating Scale (n=100)

S. No.	Statement	Average score *	1		2		3		4		5	
			N	%	N	%	N	%	N	%	N	%
1.	The child has an interest in eating.	3.52	26	26	20	20	34	34	20	20	-	-
2.	The child's appetite seems out of control.	2.35	55	55	-	-	-	-	45	45	-	-
3.	The child finishes his/her food speedily.	3.68	33	33	-	-	-	-	-	-	67	67
4.	The child eats while playing or watching TV.	2.53	23	23	14	14	50	50	13	13	-	-
5.	The child likes to taste new food.	1.11	-	-	-	-	-	-	11	11	89	89
6.	The child gives preference to carbohydrate-rich food (e.g. bread, pasta, rice).	4.64	-	-	12	12	-	-	-	-	88	88
7.	The child gives preference to one texture type of food (e.g. soft textures or hard/crunchy)	4.13	-	-	21	21	12	12	-	-	67	67
8.	The child only consumes food of one colour (e.g. brown)	3.88	12	12	20	20	2	2	-	-	66	66

#	Statement	Mean	Never		Rarely		Sometimes		Often		Always	
9.	The child prefers blended dishes.	1.02	-	-	-	-	-	-	2	2	98	98
10.	The child leaves food on his/her plate at the end of a meal.	1.78	34	34	58	58	4	4	4	4	-	-
11.	The child likes to eat non-food items like paper or dirt.	1.11	89	89	11	11	-	-	-	-	-	-
12.	The child prefers a liquid diet like juices and drinking water.	4.32	2	2	20	20	-	-	-	-	78	78
13.	Becoming upset, the child eats less.	3.28	24	24	-	-	-	-	76	76	-	-
14.	Even after the stomach is full, the child likes to have his/her favourite foods.	3.53	18	18	11	11	21	21	-	-	50	50
15.	Even without tasting, the child decides that s/he does not like the food.	4.22	-	-	12	12	21	21	-	-	67	67
16.	The child likes to have strong, spicy or sour flavour food.	1.02	-	-	-	-	-	-	2	2	98	98
17.	The child likes fried foods.	4.25	-	-	25	25	-	-	-	-	75	75
18.	The child eats lots of fast food.	1.33	67	67	33	33	-	-	-	-	-	-

*1= Never 2= Rarely 3= Sometimes 4= Often 5=Always

The consensus of various studies reported that children who are within the autism spectrum exhibited more mealtime behavioural problems than typically developing peers which might be due to sensory disintegration, impaired communication and social skills, and restricted and repetitive behaviours (Schreck et al., 2004; William et al., 2005 & Jonnson & Handen, 2008). Gut dysbiosis may also influence brain development and increase the severity of core symptoms of autism spectrum disorder (Li et al., 2017). Collected data from the present study indicated that 20 per cent of the sample rarely had an interest in food followed by 34 per cent sometimes, 20 per cent of them often and only 26 per cent had always shown interest in food. Most (67 per cent) of the subjects always refused to eat food even without tasting which might be associated with their stereotypical behaviour and sensory challenges. The majority (89 per cent) of the subjects were found to be neophobic

towards tasting or accepting new food items. Results of the previous studies are in line with the present study as children with autism spectrum disorder were found to be food neophobic than their typically developing peers and subclinical association occurred between food neophobia and autism spectrum disorder traits like social, communication, and restricted/repetitive behaviour (Wallace et al., 2018).

According to DSM-5th edition 2013, people with autism spectrum disorder are hypo or hyper-sensitive towards taste, texture, smell, sight and colour which were found common in the present study. Sixty-seven per cent of participants preferred the same texture (soft) food followed by 21 per cent often and 12 per cent sometimes. More than fifty per cent of the adolescents (66 per cent) were selective towards the particular colour of food whereas 20 per cent rarely preferred any particular food colour. Available literature formulated that children with autism spectrum were selective in food, accepting only pureed or low-textured food (Ahearn et al., 2001 & Schreck et al., 2004). Seventy-eight per cent of the participants preferred a liquid diet like juices and drinking water. Sixty-seven per cent of them finished their food speedily whereas 33 per cent had taken more than 30 minutes to finish their meal which was unusual compared to normaltime. This might be due to weak proprioception or difficulty in jaw movements.

A study conducted by Nadon et al., 2011 revealed that 15 per cent of children have complained about oral motor difficulties including chewing and swallowing. A maximum (98 per cent) of the participants were always found to be oversensitive toward taste and smell as they did not prefer to have food containing strong and spicy flavours. Chronic overeating is an often-found issue among people with autism spectrum disorder. Surprisingly, nearly 45 per cent of participants were often found to have an appetite out of control whereas 55 per cent of the subjects never exhibited such issues. Fifty per cent of the subjects always liked to have his/ her favourite food even after their stomach was full, which might be due to poor sensitivity to internal cues such as feeling full or lack of signals that arise from the body and are responsible for maintaining appetite. It was found that becoming upset, the majority (76 per cent) of the subjects often ate less and this might be connected with gastrointestinal problems rather than rigidity in behaviour. It was mentioned by the parents that 50 per cent of the subjects sometimes liked to eat food while playing or watching television, although no correlation was found between eating and watching television through previous research. However, research suggests that television and video help in creating a link between the internal and external environment (Richard & Noell, 2019). Previously conducted research showed that individuals with autism spectrum disorder tend to have strong preferences for carbohydrates and fast foods while rejecting fruits and vegetables which in turn leads to nutritional deficiencies and excessive weight gain particularly if there is limited activity (Autism Speaks, 2018). The findings of the present study were in line with the studies which were previously conducted as 88 per cent of the participants always gave preference to complex starchy carbohydrates including bread, pasta, white rice and potato. The majority (75per cent) of the subjects always preferred to have fried foods while 67 per cent had never eaten many fast foods followed by rarely 33 per cent. Most (98 per cent) of the subjects always preferred unmixed dishes. It might be associated with sensory sensitivity to different flavours that are mixed in the mouth (Williams et al., 2000) (Table, 1).

Brief autism mealtime behavioural inventory:

Autism spectrum disorder is manifested by poor communication, withdrawal from social interaction or having fixed behaviour or interest (American Psychiatric Association, 2000). It is a disability of the brain that may affect the nutritional management of children with autism spectrum

disorder as many of them are either picky eaters or show disruptive behaviour during their mealtimes as compared to typically developing children (Lockner et al., 2008 & Martin et al., 2008).

Table 2: Brief Autism Meal Time Behavioural Inventory (n=100)

Items	Average score *	1		2		3		4		5	
		N	%	N	%	N	%	N	%	N	%
My child…….											
Food Refusal											
Cries or screams during meal times.	1.93	67	67	3	3	-	-	30	30	-	-
Turns his/ her face or body away from food.	1.44	56	56	44	44	-	-	-	-	-	-
Expels food that he/she has eaten.	2.25	45	45	13	13	14	14	28	28	-	-
Is disruptive during meal times.	2.64	16	16	44	44	-	-	40	40	-	-
Closes mouth tightly when food is presented.	1.89	34	34	43	43	23	23	-	-	-	-
Features of Autism											
Remains seated at the table until the meal is finished.	1.55	-	-	-	-	-	-	55	55	45	45
Is aggressive during meal times (hitting, scratching, kicking others).	2.42	34	34	32	32	13	13	-	-	21	21
Displays self-injurious behaviour during meal times.	2.42	23	23	34	34	21	21	22	22	-	-
Is flexible about mealtime routines.	1.02	-	-	-	-	-	-	2	2	98	98
Refuses to eat foods that require a lot of chewing.	3.98	3	3	30	30	-	-	-	-	67	67
Limited variety											
Dislikes certain foods and does not eat them.	4.34	-	-	22	22	-	-	-	-	78	78
Prefers the same foods at each meal.	4.94	-	-	2	2	-	-	-	-	98	98
Prefers "crunchy" foods.	1.33	67	67	33	33	-	-	-	-	-	-
Accepts or prefers a variety of foods.	1.02	-	-	-	-	-	-	2	2	98	98
Prefers to have food served in a particular way.	1.11	89	89	11	11	-	-	-	-	-	-
Prefers only sweet foods.	3.57	11	11	22	22	-	-	33	33	34	34

Prefers food prepared in a particular way.	5	-	-	-	-	-	-	-	-	100	100
Is willing to try new foods.	1.11	-	-	-	-	-	-	11	11	89	89

*1= Never 2=Seldom 3=Occasionally 4=Often 5=At almost every meal

The information collected through the Brief Autism Meal Time Behavioural Inventory indicated that (Table, 2) nearly 30 per cent of the participants often scream or cry during meal times. Parents of the sample group mentioned that their children sometimes (44 per cent) avoided food by turning his/her face and body away from food. The behaviour was more frequent during their childhood. This finding of the present study is supported by the previous studies that children with autism spectrum disorder showed minimal interest in food as compared to typically developing children (Schreck et al., 2004; Johnson & Handen 2008 & Martin et al., 2008). The study showed that although the age group was different, difficulties were persistent among all age groups with increased or decreased severity. Nearly 44 per cent of the were seldom and 40 per cent often exhibited mealtime behaviour problems including pushing/throwing utensils or food but 32 per cent of the subjects seldom showed aggressive behaviour during meal times like hitting, scratching and kicking others. It was also found that the majority (55 per cent) of the participants had problems remaining seated until the meal was finished but only seldom, which might be due to vestibular difficulties or having no interest in eating. Ninety-eight per cent had a problem with flexibility in their mealtime routine at almost every meal. This might be due to the fixed and repetitive behaviour of the participants. It was suggested by one of the studies that gastrointestinal abnormalities might be associated with sudden irritability or aggressive behaviour which may increase the severity of behavioural problems during mealtimes (Horvath et al., 1999). It was exhibited that 28 per cent of the subjects often expelled food that he/ she has eaten followed by 14 per cent occasionally and 13 per cent seldom. Nearly, 34 per cent of the subjects seldom showed self-injurious behaviour followed by 22 per cent often and 21 per cent occasionally. However, the frequency of such behaviour had been reduced as time passed as reported by their parents and it was more profound during their childhood. The majority (89 per cent) of the adolescents were unwilling to try new food and 78 per cent disliked certain food at almost every meal and would not eat them. Majority (98 per cent) of the sample group did not prefer variety in food and liked to eat the same food at almost every meal. These behaviours may be associated with the repetitive and restricted interest of the participants. Evidence has suggested that food refusal with limited variety in diet or selective eating might be due to sensory difficulties and lack of communication to express their needs or feelings (Williams et al., 2000). This study also is in line with the previous studies (Ahearn et al., 2001 & Schreck et al., 2004) as the sample group of the present study preferred to have food prepared in a certain way as reported by their parents. The belief that children with autism spectrum disorder were selective in food and preferred only pureed or soft-textured food was also supported by this study. Sixty-seven per cent of the participants showed a refusal to eat food that requires a lot of chewing at almost every meal whereas 30 per cent seldom preferred crunchy food. This may be linked with poor proprioception, tactile sensitivity and abnormal response to taste, smell and sensitivity toward sound while eating. According to Autism Speaks, 2018 children who are within the autism spectrum have sugar cravings. It was found in the present study that nearly 34 per cent of the subjects preferred sweet food at almost every meal followed by 33 per cent often and 22 per cent seldom.

CONCLUSION AND RECOMMENDATION

It can be concluded from the present study that there are varieties of disruptive behaviours exhibited during mealtimes by adolescents with autism that may affect the food intake and duration of mealtime and finally lead to poor nutritional status. It might be due to improper awareness among the parents about the nutrition and management of disability or the characteristics of autism. The study further recommended that to organize updated nutrition-based intervention programmes more frequently free of cost, face to face, that gives them proper guidance to combat the adolescents' nutritional problems and for managing mealtime behaviour of adolescents.

ETHICAL CONSIDERATION

The collection of data was started after receiving approval from the Institutional Ethics Committee, Lady Irwin College, the University of Delhi on 25th May 2019. Written informed consent was taken from the parents before the selection of the participants in the current study as well as parental consent was also achieved.

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RELATIONSHIP BETWEEN ADJUSTMENT AND PERSONALITY: A GENDER PERSPECTIVE STUDY AMONG LATE ADOLESCENTS

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ABSTRACT

The present paper is to examine the relationship between adjustment and personality in late adolescents across genders. Personality and adjustment consume diverse theoretical approaches to understand individual action and interaction within their social environment. The study is designed to examine the gender perspective among late adolescents concerning their relationship between adjustment and personality as they enter a new phase of college life. In the present study, total 550 adolescents Participants aged 17-19 years were selected on the basis of random sampling technique, from the several colleges and universities in Meerut city, Uttar Pradesh, India. Investigation respondents were asked to complete the psychological test questionnaires: the Adjustment Inventory for College Students (AICS-ss) and the Personality Inventory (PI-ss). Statistical criteria (mean, standard deviation, 't' test, and coefficient of correlation) were computed to test the significance of the mean difference between male and female adolescents and to determine the relationship between adjustment and personality by using Excel and IBM "SPSS Statistics 29.0". The study suggests that gender has a significant influence on overall adjustment and its dimensions, i.e., health adjustment, emotional adjustment, and educational adjustment. Further study pointed out that gender has no significant influence on personality and its dimensions. The investigation emphasizes that an increase in social adjustment promotes the extroversion personality. A study suggests that social adjustment has a negative relationship with introversion personality. Research focuses on the negative relationship between emotional adjustment and introversion personality. A study indicates that strong positive emotional adjustment may increase the overall personality development of adolescents.
Keywords: Adolescents, Adjustment, Personality, Gender Perspective.

INTRODUCTION

Adolescence is the most irreplaceable time period in the whole human life span. It is the unique change from childhood to adulthood. These changes occur through cognitive, physical, social, and emotional development. It is an important stage that forms adolescent identity formation. (American Psychological Association, 2002)

Late adolescence is universally the age of legal maturity; it is the momentous period of life where the adolescents develop more mature patterns in their social and cognitive behavior. It is time for change and accepting new and mature relationships with other age mates. Late adolescents try to cope with the development challenges and adjustment issues. Adolescents face elementary conflicts that occur between parents and peers, create disagreement, show mood swings, and irritating behavior, etc. Well-founded and affectionate parenting helps the adolescent to tackle difficult paths and well-adjust in presenting new concepts that acquire firm relationships and success in life.

Personality development is a very vital process in the life of late adolescence, as the period refers to the search for identity. As college-going adolescents enter the new journey of life, they are very specific about their career and role in society, giving a clear definition to their goals in life. Environmental influence, peers' involvement, role model, influence of media and technology, culture, gender, physical appearance, social acceptance, self-esteem, self- concept, and behavioral pattern are the tasks that occupy the person in this phase for success in a career and clarity in goals, which leads to a mature and developed identity, but failure to achieve task originates form an identity crisis. Psychologist Carl Jung (1987) developed theoretical approaches in the direction of personalities that predicted patterns of behavior. Jung proposed that people develop over time differing degrees of introversion and extroversion i.e., Extroversion individuals focus on the social world and enjoy outward activities. Introversion reflects on one's own experiences. (Dacey & Travers, 2002)

Adjustment is not a curse, but the skill of living in such a complex civilization to stay alive. It is meaningful in the life of college youth, adolescence, and later life satisfaction and achievement to live and show enthusiasm in the different dimensions as they face transition from school life to a new career path called college life. They experience a lot more adjustment challenges along with parent's expectations from them in various fields, i.e., academic achievement, communication, settling with peer groups, vocational interest, new social interest, and changing habits.

Adjustment and personality are ever-changing processes of development that represent the traits and attributes of a human being in the context of socialization. Positive relationships and acceptance in peer groups assist adolescents to develop a sense of self- concept, self-esteem, and psychosocial adjustment, but negative approaches from peer groups, peer- rejection link to social isolation, and neglected behavior among adolescents have a bigger risk for psychosocial problems in later life. Strong positive attachment between parent-adolescents and helpful conversations, needful suggestions develop adolescents in their powerful cognitive and moral abilities and help them to perform well in academics, resolve conflicts with parents, low risk of peer pressure, and are less likely to indulge in any inappropriate behavior that generally occurs in this stage. A positive family atmosphere and a cherishing parenting style will familiarize their young generation with the real world and prepare them for the practical approach of life. (American Psychological Association, 2002)

Adolescents are more innovative, enthusiastic, challenging and socialized in our society. Gender differences among adolescents generally transpire particularly in late adolescents. Previous studies in the line of adjustment and personality with gender overview (Kaur & Gupta, 2021; Alam, 2018) drew attention to the research that male respondents show more adjustment than female. (Vyas, 2021)

overlooked that emotional adjustment is higher in male than female, female students' indeed higher degree of social and educational adjustment than male. Further data depict that educational adjustment is higher among the students than social and emotional. (Olivia *et al.*, 2017) studied the adjustment level of adolescents to check the gender difference in emotional, social, and educational adjustments. The study claims that female adolescents represent an excellent level of social and educational adjustment, and male adolescents represent an excellent level of emotional adjustment. (Bhagat, 2016) investigates that girls are found to be higher in emotion, education, and overall adjustment, whereas boys are found to be higher in their social adjustment than that of girls. (Khan and Alam, 2014) suggested that female adolescents were found to be better at overall adjustment and its dimensions, such as social, family, and financial adjustment, than compared with males, but education and emotional adjustments reflected no gender difference. (Devi, 2011) proposed that extroversion has a positive effect on social, educational, and general adjustment, and neuroticism has a negative effect on emotional, social, educational, and general adjustments. (Srivastava and Barmola, 2013) proposed that gender has a significant impact on the adjustment and personality of adolescents. The study claimed that extroverts, male and female, showed better adjustment. Personality has a correlation with home, health, social, and emotional adjustment. (Murthy, 2013) drew attention to the personality of adolescents in relation to their adjustment. The study signified an association between personality and adjustment in youth.

OBJECTIVES

1. To study the influence of gender on the personality and its dimensions of adolescents.
2. To study the influence of gender on the adjustment and its dimensions of adolescents.
3. To find out the relationship between adjustment and personality of adolescents.

HYPOTHESES

1. There is no significant influence of gender on personality and its dimensions of adolescents.
2. There is no significant influence of gender on adjustment and its dimensions of adolescents.
3. There is no significant relationship between the adjustment and personality of adolescents.

METHODOLOGY

Sampling Technique: Participants were 550 undergraduate late adolescents, including 300 males and 250 females aged 17- 19, drawn on the basis of random sampling techniques from various colleges and universities situated in Meerut city, Uttar Pradesh.

Measures:

- Personality Inventory (PI-ss) - constructed by Y. Singh and H.M. Singh.
- Adjustment Inventory for College students (AICS-ss) - constructed by A.K.P. Sinha and R.P. Singh.

Statistical Analysis: For the present study, scoring was considered by referring to the respected manuals after the data collection process. The mean, standard deviation, and 't' test were computed to test the

significance of the mean difference between male and female adolescents. The coefficient of correlation was calculated to determine the relationship between adjustment and personality by using Excel and IBM "SPSS Statistics 29.0."

RESULTS

Table 1: N, Mean, S.D and 't' value of gender on personality of adolescents.

Variable	Locality	N	df	Mean	S.D.	't'- value
Personality	Male	300	548	54.94	3.11	-0.18 NS
	Female	250	548	54.98	3.15	

Table value 1.96 at 0.05 level and 2.58 at 0.01 level; NS: Not significant at both the levels

Table 1 shows the mean, S.D., and 't' values of gender on the personality of adolescents. It is observed that mean score of male adolescents is 54.94 and SD is 3.11 the mean score of female adolescents is 54.98 and SD is 3.15. The calculated t value of -0.18 is not significant at the 0.05 level with df 548. Thus, the null hypothesis is accepted. Hence, it is stated that there is no significant influence of gender on the personality of adolescents.

Table 2: N, Mean, S.D and 't' value of gender on the personality dimensions of adolescents

Personality dimensions	Gender	N	df	Mean	S.D.	't'- value
Introversion Personality	Male	300	548	26.75	5.06	0.11NS
	Female	250	548	26.70	4.83	
Extroversion Personality	Male	300	548	28.19	5.02	-0.22NS
	Female	250	548	28.28	4.70	

Table value 1.96 at 0.05 level and 2.58 at 0.01 level; NS: Not significant at both the levels

Table 2 shows the mean, S.D., and 't' values of gender on the personality dimensions of adolescents. It is stated from the above intervention that overall, two dimensions of personality, i.e., introversion personality and extroversion personality, shows no significant influence on male and female adolescents. Thus, the null hypothesis (2.1B) is accepted. Hence, it is stated that there is no significant influence of gender on the personality dimensions of adolescents.

Table 3: N, Mean, S.D and 't' value of gender on adjustment of adolescents

Variable	Gender	N	df	Mean	S.D.	't'- value
Adjustment	Male	300	548	48.54	13.00	-3.28**
	Female	250	548	52.17	12.86	

Table value 1.96 at 0.05 level and 2.58 at 0.01 level; **significant at both the levels

Note: as per the (AICS-ss Inventory) High score refers to low adjustment.

Table 3 shows the mean, S.D., and 't' values of gender on the adjustment of adolescents. It is drawn from the above interpretation that the mean scores of male adolescents are 48.54 and SD is 13.00 mean score of female adolescents is 52.17 and SD is 12.86. A study on the basis of the mean score reveals that male adolescents display enhanced adjustment as compared to female adolescents. Therefore, the calculated t value of -3.28 is statistically significant at both the 0.05 and the 0.01 level with df 548. Thus, the null hypothesis that there is no significant influence of gender on the adjustment of adolescents is rejected.

Table 4: N, Mean, S.D and 't' value of gender on the adjustment dimensions of adolescents

Dimensions	Gender	N	df	Mean	S.D.	't'- value
Home Adjustment	Male	300	548	7.10	2.89	-1.86^{NS}
	Female	250	548	7.58	3.20	
Health Adjustment	Male	300	548	6.8	2.83	-2.65**
	Female	250	548	7.45	2.91	
Social Adjustment	Male	300	548	8.95	2.96	-1.69^{NS}
	Female	250	548	9.39	3.12	
Emotional Adjustment	Male	300	548	15.93	4.65	-3.23**
	Female	250	548	17.29	5.10	
Educational Adjustment	Male	300	548	9.76	3.61	-2.13*
	Female	250	548	10.45	3.98	

Table value 1.96 at 0.05 level and 2.58 at 0.01 level; NS: Not significant at both the levels; *Significant at 0.05 level; **significant at both the levels

Note: as per the (AICS-ss Inventory) High score refers to low adjustment.

Table 4 shows the mean, S.D., and 't' values of gender on the adjustment dimensions of adolescents. It is drawn from the above intervention that over five adjustment dimensions three dimensions found to be significant i.e., Health adjustment reflect 't' value -2.65, Emotional adjustment reflect 't' value -3.23, Educational adjustment reflect 't' value -2.13 furthermore, it is statistically evident that health adjustment and emotional adjustment are significant at both the 0.05 and the 0.01 level whereas educational adjustment is significant at the 0.05 level. Further study suggests male adolescents indicate satisfactory in health adjustment. Interestingly, the result shows that female adolescents with a higher mean score than males tend to have unstable emotional adjustment, whereas male adolescents refers low mean score tend to be emotionally stable. Moving on to the educational adjustment males with low mean scores show more interest in educational activities and co-curricular activities. Thus, the null hypothesis that there is no significant influence of gender on the adjustment dimensions of adolescents is partially rejected.

Table 5: Relation between adjustment and personality of adolescents

Variable	Personality	Introversion Personality	Extroversion Personality
Adjustment	0.07	0.072	-0.028
Home Adjustment	0.058	0.023	0.013
Health Adjustment	0.054	0.045	-0.01
Social Adjustment	0.02	.098*	-.087*
Emotional Adjustment	-.101*	.094*	-0.031
Educational Adjustment	0.006	-0.006	0.011

Correlation for entire sample (N= 550) with Adjustment and personality; * Correlation is significant at the 0.05 level (2-tailed)

Note: The high scores of adjustments indicate poor adjustment or maladjustment. So, interpreting adjustment score with variables in this investigation, negative relationship will indicate positive association with the variable. Positive relationship would give negative association

Table 5 shows the correlation coefficient of the total and dimension-wise scores for adjustment and personality of adolescents. The investigation indicates that, adjustment and personality (r =0.07) have a markedly low and negative correlation between the two variables being compared, but it is not significant at the 0.05 level. Thus, we accepted the null hypotheses. The study sought a correlation between adjustment and introversion personality (r =0.072), but it is not significant at the 0.05 level. Therefore, the study indicates that there is no significant relationship between adjustment and introversion personality. Thus, the null hypotheses are accepted. Another correlation between adjustment and extroversion personality (r =-0.028) is a markedly low but positive relationship between the two compared variables, and it is not significant at the 0.05 level. Thus, the null hypotheses are accepted.

The study emphasizes the correlation between home adjustment and personality (r =0.058) implies a low negative and is not significant at the 0.05 level, therefore there is no relationship between the two compared variables. Thus, support the hypotheses. Further data reflects the correlation between home adjustment and introversion personality (r =0.023), which is low-negative and shows no significant difference at the 0.05 level. Therefore, there is no relationship between the two compared variables. Thus, support the hypotheses. Data investigating the correlation between home adjustment and extroversion personality (r =0.013) refers to a low negative, and it is not significant at the 0.05 level. Thus, there is no relationship between home adjustment and extroversion personality. Therefore, we accepted the null hypotheses.

The study depicts the correlation between health adjustment and personality (r =0.054) was low-negative and it indicates no significant difference at the 0.05 level. Thus, we accepted the null hypotheses. The correlation coefficient between health adjustment and introversion personality (r =0.045) is low-negative and not significant at the 0.05 level. Thus, supports the null hypotheses. The study seeks to determine the correlation coefficient between health adjustment and extroversion personality (r =-0.01), a markedly low, positive correlation between the two variables, and it is not found to be significant at the 0.05 level. Thus, supports the null hypotheses.

The present study emphasizes the correlation between social adjustment and personality (r =0.02), an almost negligible and negative relationship between the two compared variables, and it is not found to be significant at the 0.05 level. Thus, accept the null hypotheses. Study proceeds the correlation between social adjustment and introversion personality (r =.098[*]) implies a very high but negative relationship between social adjustment and introversion personality; therefore, it determines that with an increase in adolescents social adjustment, there may be a decline in the introversion personality. Therefore, it shows significance at the 0.05 level, thus rejecting the hypotheses. The study investigates the correlation between social adjustment and extroversion personality (r =-.087[*]), which represents a high positive relation between the two compared variables. (The value of r = -.087) is negative, and it is interpreted as a positive relationship involving adjustment). Therefore, with an increase in adolescent social adjustment, there may be an increase in extroversion personality. Thus, it shows significance at the 0.05 level and rejects the null hypotheses.

Data suggest the correlation between emotional adjustment and personality (r =-.101[*]) is statistically very high and positive correlation (negative correlation is indicated by a positive relation). Therefore, a positive correlation between two compared variables suggests that an increase in one variable will increase in another variable. Hence, it is stated that adolescents with a high positive emotional adjustment level will decline in personality. It is found to be significant at the 0.05 level. Thus, we rejected the null hypotheses. Further correlation depicts that emotional adjustment and introversion personality (r =.094[*]) emphasize a very high and negative correlation between the two compared variables, thus indicating that an increase in emotional adjustment may decrease in introversion personality. Therefore, the calculated value was found to be significant at the 0.05 level and rejected the null hypotheses. The study sought a correlation between emotional adjustment and extroversion personality (r =-0.031). Therefore, the study indicates that there is a positive but low relationship, which reflects that a high in one variable is an increase in another variable, but it is not significant at the 0.005 level. Thus, the null hypotheses are accepted.

The study indicates the correlation coefficient between educational adjustment and personality (r =0.006) imitates that, adjustment and personality found almost negligible negative relation and it is not significant at 0.05 level. Thus, we accepted the null hypotheses. Another correlation between educational adjustment and introversion personality (r =-0.006) is a positive and negligible relation, and statistically, it is not significant at the 0.05 level. Thus, we accepted the null hypotheses. Data suggest a correlation between educational adjustment and extroversion personality (r =0.011); therefore, the correlation between the two compared variables is not statistically significant at the 0.05 level. Thus, the null hypotheses are accepted.

DISCUSSION AND CONCLUSION

The study aimed to seeks the relationship between adjustment and personality along with the gender perspective among late adolescents. The result obtained in our sample confirm that male and female adolescents, where found not to be significant influence of gender on the personality and its dimensions i.e., introversion and extroversion. These results are aligned with those of Murthy (2013) suggests boys and girls are not significant in their personality. Results are concluding in line with previous literature (e.g. Kaur *et al.*, 2021; Gul & Ganai, 2015; Sangeeta & Chirag, 2012) that senior secondary boys and girls analysis significant difference in their adjustment. Findings initiate that, with respect to both the

genders, adolescents, male and female put forward significant adjustment dimensions, viz., health adjustment, emotional adjustment, and educational adjustment. Further investigation revealed that the male adolescents indicate satisfactory in health adjustment. Interestingly, the results show that female adolescents with a higher mean score than male tend to have unstable emotional adjustment, whereas male adolescents with a lower mean score tend to be emotionally stable. Moving on to the educational adjustment, females with low mean scores show more interest in educational activities and co-curricular activities. Findings are consistent with the result by Vyas (2021) emphasizes that male emotional, social adjustment levels are higher than those of female students, whereas females are higher in educational adjustment than male students. The result is in line with previous researchers (Sangeeta & Chirag, 2012; Gul & Ganai, 2015; Enochs and Roland, 2006) investigate the college graduate students and suggest that females show more adjustment problems in comparison to males. Researchers conclude that in the analysis of adjustment, males have a more adjusted tendency than females. Study shows the relationship between adjustment and personality of adolescents. It is being revealed that social adjustment and emotional adjustment, compared with introversion personality, have a negative correlation. Social adjustment and extroversion personality have a positive correlation. Emotional adjustment compared with personality has a positive correlation. Therefore, an increase in social adjustment may increase the extroversion personality, but with an increase in social adjustment, there may be a decline in the introversion personality. Similarly, with an increase in emotional adjustment may increase in general personality but decline in introversion personality. These results are aligned with those of (e.g. Devi, 2011; Sinha, 1988; Abraham, 1986) stated that extroversion personality has a positive effect on social adjustment and that there is no significant association between emotional adjustment and extroversion personality. The above finding is also supported by Murthy (2013) stated that personality and adjustment are significantly associated; further it recommends that adolescents' personality dynamics are influenced by their adjustment patterns. Similar results were found by Srivastava & Barmola (2013) proposed that gender has significant impact on adjustment and personality of adolescents. The study claimed that extrovert male and female shown better adjustment. Personality has correlation with social and emotional adjustment. From the above study, the researcher concluded that late adolescents are facing various issues in their day-to-day life adjustment and personality development; hence, parents and educators should encourage and counsel their young generation in building strong relationships and give them the opportunity to express themselves, try to learn, and cope with their adjustment issues. Parents must familiarize them with the real world and prepare them for the practical approach of life. Present study implication helps the academician and policy makers to create awareness and design vocational programs to paradigm the personality and adjustment of late adolescents.

RECOMMENDATION FOR FURTHER STUDY

Comparative research can be conducted on school adolescents with a wider geographical area.

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SEXUAL HARASSMENT NARRATIVES FROM SAHARANPUR (UTTAR PRADESH) AND DELHI NCR

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ABSTRACT

In a patriarchal society that is lurking with misogynistic and regressive thoughts regarding freedom of expression of individuals of different gender, caste, class, ability, religion and ethnicity; misconducts like sexual harassment grow rampant. The qualitative study explored the narratives of 30 participants within the age range of 19-35 years, from Saharanpur district of Uttar Pradesh and Delhi NCR, to represent the encounters of sexual harassment at various settings like streets, workplace, place of education, neighbourhoods, social gatherings and intimate relationships. The study also illuminated the impact of sexual harassment on the daily routine of individuals, their mobility, education, employment, socialization and leisure.

Keywords: Sexual harassment, patriarchy, well-being, narratives, intimate relationships, gender, caste, class and ability

INTRODUCTION

Sexual harassment in India cannot be talked about without addressing the prevailing misogyny, patriarchy and objectification against individuals of different gender, caste, class, ability, religion and ethnicity at play here. Sexual harassment is an unwelcome verbal, non-verbal and physical advance made to objectify, humiliate, intimidate and outrage the modesty of a person. It is also a derogatory, demeaning behaviour intended to humiliate an individual on the basis of their sex. It ranges, but is not limited to, making lewd comments, staring, stalking, groping, flashing, catcalling, whistling, deliberate touching, forcing to watch sexual acts, sexual commenting, asking for sexual favors, making sexual jokes, sexual gestures etc.

Victim blaming

Stereotypical beliefs allow society to blame the person encountering with sexual harassment instead of the harasser and trivialise the experiences of the victim (Brownmiller, 1975). This has consequently given birth to victim blaming (Kanekar & Kolsawalla, 1980). A victim may not immediately realise occurrence of sexual harassment and may find themselves partially responsible for indulging the harasser, thus, blaming themselves for the sexual harassment (Paludi et al., 1990). Thereby, when young girls and women are sexually harassed, their clothes, body language and character can be questioned with insensitivity and mistrust and ill treatment from the society through negative statements like 'if you wear clothes this short you should be harassed', 'if a girl is drunk, she is asking for it', 'why were you out so late?', 'you must be encouraging him by talking nicely' are far too common (Kanekar & Kolsawalla, 1980). Instead of taking action against the offender, victim is reflexively interrogated by the society (Vohra, 2022).

Intersectional Sexual Harassment

India is a land divided by caste, class, ability, gender and religion. Our society is known to rely on these parameters to determine the vulnerability of a person. Thus, people with "lower" status are targeted more easily. Therefore, to truly understand sexual harassment in India, it should be studied with an intersectional lens. In September 2020, a nineteen-year-old Dalit girl was brutally raped by four men of "upper caste" and killed afterwards in Hathras, Uttar Pradesh (Ara, 2023). In March 2018, UNESCO conducted a study on Sexual Orientation and Gender Identity (SOGI) based harassment, bullying and violence in Tamil Nadu (Menon, 2019). The findings suggest that 43 percent of the participants faced sexual bullying earliest in primary schools. It was also found that about 50 percent had encountered physical advances, 38 percent had encountered verbal sexual advances, and 33 percent were threatened to engage in sexual activities. In 2013, Human Rights Watch reported that a 19-year-old woman with intellectual disability was raped frequently by her brother's friend in a village in West Bengal (Goyal and Bhattacharjee, 2018).

The patriarchal views on masculinity of a man also serve poorly to the well-being of Indian men. When men encounter sexual harassment, they fail to come forward and seek help as they fear nobody will believe them. Several times, homosexual men do not report sexual harassment against them because they do not want to be outed as gay in the society in this manner (Garcia et al., 2022). There is minimal reporting of sexual harassment of heterosexual men and LGBTQIA+ community (The Guardian, 2021). The Pew Research Centre in the study 'Sexual Harassment at Work in the Era of MeToo' in 2018, surveyed sexual harassment among 18–24-year-old individuals. The study reported that 25 percent of women and 13 percent of men had experienced sexual harassment (Graf, 2018). A survey conducted in 2015 by Swasti Health Resources centre found that 55 percent of closeted homosexual men had experienced sexual abuse and the people that identified as transgender reported being exposed to sexual abuse earliest at the of five years.

Impact of sexual harassment

Sexual harassment is not only a physical attack; it also attacks the mental state and the overall well-being of the survivor. Sexual harassment often causes fear, humiliation, and intimidation in the survivor; provoking anxiety, triggers to certain places (Dhillon & Bakaya, 2014). It may also lead to low self-esteem, low self-regulation, sleeping or eating disorders, depression, and post-traumatic stress disorder (Pryor & Fitzgerald, 2003; Welsh, 1999; Willness, Steel & Lee, 2007). The 'Four Fs Model of Psychological Trauma' consist of four responses to trauma namely; fight, flight, freeze and fawn (Walker, 2013). The fight response involves self-preservation through confrontation and

standing up to the harasser. The flight response occurs when a person tries to physically escape the danger. The 'freeze' response literally causes freezing and immobility. Fawn is abundantly observed among sexual assault survivors (Khandelwal, 2022; Chapin, 2016). The fawn response entails seeking safety by pleasing and catering to demands of the harasser. The survivor who relies on fawn response believes, "If I appease this person, I will be safe from more intense danger." (Khandelwal, 2022)

Women are disproportionately affected by sexual harassment (Vohra, 2022). Girls are made to quit school and sit at home countless times costing them literacy and educational parity. Women with disability are four times more likely to be the target of sexual violence (Goyal and Bhattacharjee, 2018). In 2022, Times of India reported that a special trial court in Mumbai observed that people with intellectual disability are more susceptible to sexual assault (Menon, 2019). A survey conducted in 2015 by Swasti Health Resources centre made startling revelation of a vicious cycle where many individuals among transgender community who experienced sexual abuse had dropped out of formal education and were forced to beg on streets and become sex workers later in life (Mathur, 2023).

Several provisions are in place to protect women from sexual harassment, but even then, the tendency to blame women in our society is so high that women even internalise the actions of the offenders (Kanekar & Kolsawalla, 1980). The person who encounters with sexual harassment often limit themselves within their 'safe space', take precautionary actions, avoid going out alone and staying late outside etc.

Heterosexual men and LGBTQIA+ community desperately require legal provisions to safeguard themselves from sexual violence (Arora et al., 2022). Legal provisions are required to be modified and updated to shield all genders from sexual violence. Harassers often rationalize their actions by saying that the other person should know how to take a joke, or further attempt to tarnish their modesty instead of taking responsibility for their actions.

OBJECTIVES

The objectives of the study were
   (i)   To investigate the understanding of term 'sexual harassment' by adults living in Saharanpur district of Uttar Pradesh and Delhi NCR
   (ii)   To illuminate the acts of sexual harassment taking place at streets, workplace, place of education and social settings encountered by the participants in Saharanpur district of Uttar Pradesh and Delhi NCR
   (iii)   To study the impact of sexual harassment on well-being of the participants

METHODOLOGY

The study explored the narratives of (n=30) participants from (n=15; female=10, male=05) Saharanpur district of Uttar Pradesh and (n=15; female=10, male=05) Delhi NCR. The study represented the encounters of sexual harassment at various settings like streets, workplace, place of education, neighbourhoods, social gatherings and intimate relationships.

Sample

The sample consisted of male and female participants within the age range of 19-35 years, purposely selected from Saharanpur district of Uttar Pradesh and Delhi NCR. The sample size of 30

participants consisted of 15 participants from Saharanpur (Uttar Pradesh) and 15 participants from Delhi NCR, where 10 participants were female and 5 participants were male in both the regions. Purposive, convenience and snowball sampling techniques were used. The participants were selected irrespective of their caste, class, gender, ability and ethnicity.

Data Analysis

A semi-structured interview schedule was developed to gather data for qualitative data analysis. The semi-structured interview was conducted on the participants. The collected data was subjected to thematic analysis to develop themes for the investigation of the objectives of the study.

RESULTS AND DISCUSSION

Sexual harassment distressingly takes place in streets, workplace, schools, colleges and various social settings. It affects people in all walks of life, different gender, caste, class, religion, culture and ethnicity. It heavily impacts the day-to-day life and well-being of a person. The gathered data was transcribed, studied and analysed under the themes to provide detailed nuances from various narratives of sexual harassment that took place in different settings to illuminate and represent the distinct encounters of sexual harassment.

Perception towards the term Sexual Harassment

In the district of Saharanpur (Uttar Pradesh), (9) participants used words such as 'any sexual behaviour', 'physical', 'verbal' and 'non-verbal' behaviour, directed to 'humiliate' and 'intimidate' a person to describe the term sexual harassment. A participant shared "एक इस प्रकार का शारीरिक मानसिक उत्पीडन है जो किसी भी प्रकार का हो सकता है कोई कुछ शब्द बोलना, छूना, किसी को अपमानित करने के लिए भी किया जाता है।" (It is a kind of harassment that can be of any type, physical or mental. It can be done by saying certain words, touching, or even insulting someone someone). (6) participants also highlighted non-verbal form of sexual harassment, "Any act physical or non-physical which is unwanted and makes the person feel sexually uncomfortable". Another (3) participants pointed out that a person with higher stature exert their power by sexually harassing a person with lower stature. A participant said "Inappropriate touch or comments with foul intents, using position or power to take advantage of somebody's situation in an inappropriate way" is sexual harassment.

In Delhi NCR, (14) participants who received higher education were observed to have a deeper understanding of the term 'sexual harassment' and talked about the impact of sexual harassment on the well-being of a person. A participant shared, "sexual behaviour that makes someone uncomfortable, offended or feel harm or disgusted, affects strength and confidence". (3) participants pointed out the influence of power over vulnerable groups. A participant shared, "It is done to emotionally, mentally and physically harm the vulnerable". (4) participants said that sexual harassment especially takes place against women in India.

The participants from Saharanpur (UP) hold rudimentary understanding of the term that it is an unwelcome verbal, non-verbal and physical advance made to objectify, humiliate, intimidate and outrage the modesty of a person. The participants from Delhi NCR shared an enhanced understanding of the term. Along with describing the term, the participants also emphasized its impact on the well-being and self-esteem of a person. The acts of sexual harassment or "eve teasing" take place wantonly on the streets, in trains & buses, workplace and social gatherings; affecting the well-being of the victim (Nahar, Reeuwijk & Reis, 2013).

Narratives

Sharing narratives of sexual harassment is not an easy task. Participants faced immense difficulty in verbalizing their experiences. There was a lot of stammering, nervous laughter and long silences accompanied in (25) shared narratives. (6) male participants were reluctant to share their own encounters with sexual harassment. They shared encounters of their acquaintances (mothers, sisters, and female friends) rather easily.

(12) participants were unable to recall their encounter with sexual harassment. Narratives were drawn by revisiting these scenarios multiple times at the pace of the participants while the researcher maintained unconditional positive regard. In response to the sexual harassment, the participants experienced several emotions such as numbness, social withdrawal, confusion, and shock. While some victims take proactive actions, some dissociate themselves completely and even repress their memory of the encounter (Bernier et al., 2013).

Encounter with sexual harassment

(24) participants reported encounters with sexual harassment at streets. (19) participants encountered sexual harassment at place of education, (23) participants shared they were teased about the size of their breasts or penis, forced to engage in conversations with sexual overtones by their peers and received unwanted sexual attention at least once at the place of education. (16) participants reported encounters of sexual harassment at social setting. (14) participants reported encounters of sexual harassment at workplace.

Street sexual harassment. (18) participants shared that street sexual harassment is a part of their daily life. A participant said, "रोजाना कोई ना कोई घूर रहा होता है तो कोई तो कभी पीछा कर रहा होता है" (every now and then, somebody is always staring at me and sometimes I have also been followed). Another participant shared, "we cannot afford our own cars, we have to take the bus and metros for travel. Sometimes we are groped during rush hours and cannot even see who did it". Corbett et al. (2023) studied the normalisation of sexual violence in regional and rural areas. The study found that lack of community services, insensitive and regressive response from family and society enhance the likelihood of women to experience sexual revictimization. A participant shared her encounter with sexual harassment at the age of 11 years in a bus by an old man, she also mentioned in a hushed voice that she belongs to Dalit community. Similar findings were obtained by a body of research that person who come under certain class, caste and gender minority are increasingly susceptible to sexual harassment (McLaughlin et al., 2012).

Men in Indian society are exclusively not allowed to talk about matters that go against hegemonic masculinity. Indian society refuses to believe that men can be targets of sexual harassment (Gopinath, 2018). Majority of male participants in the current study also hesitated while sharing their own experiences. A male participant shared, "Many men comment or tease me about my looks". (5) male participants shared that they are often sexually harassed by their own male friends and other men around them during commutes and at the workplace.

Sexual harassment at workplace. Several (14) participants shared that they were often subjected to verbal sexual harassment by a colleague or superior at workplace. The acts of sexual harassment at workplace affect the physical as well as the psychological well-being of the person who encounters sexual harassment. It also negatively impacts the other male and female members of the workplace who observed or heard about the sexual harassment (Mamaru et al., 2015).

A participant from Saharanpur (UP), who works as a domestic help, shared that several old and married men of the households where she was employed commented on her physique and asked her for sexual favours whenever they found her working alone in a room. Domestic helpers are highly

prone to sexual harassment due to the unorganised business, where they work within the four walls. The migrant domestic workers are found to be particularly vulnerable to sexual harassment (Vijayalakshmi et al., 2022). Harasser exercise sexual harassment as a display of their power at individual, occupational and societal level (Popovich and Warren, 2010).

Sexual harassment at place of education. (21) participants shared they were touched inappropriately by a classmate or teacher at least once during their school years. Bonsaksen (2024) found that girls had higher chances of encountering with sexual harassment during adolescence. The study also implied that adolescents of parents who received higher education had lower chances of encountering with sexual harassment.

A male participant from Delhi NCR shared that during their 10th grade, boys of their school had the peer pressure to lose their virginity. (24) participants shared they were teased by their friend group or classmates about the size and appearances of their intimate body parts during adolescence. Researchers and educators recognize that adolescents' peer sexual harassment is a worldwide public health concern (Livingston et al., 2022).

Sexual harassment at social settings. (12) participants, especially female participants whose age ranged between 20-25 years, shared that they encountered sexual harassment by at least one friend or acquaintance in a social gathering. There is a strong relationship between inebriation, intoxication and sexual harassment (Young, 2008). The alcohol or drug related sexual harassment is likely to occur at parties, bars and informal house parties. Adolescents and young adults are more likely to encounter alcohol or drug related sexual harassment (Abbey, 2002).

Male participants only shared about their encounter with verbal and non-verbal sexual harassment in social setting such as commenting and sexual gestures they received in their social groups. (4) male participants shared that they were teased based on their physical appearances and often their fashion choices. A participant shared, "They are always making fun of my physique, my lean body and I have blue eyes so they call me gay for some reason". The sexual orientation, gender identity and context of a person influence the encounter of an individual with sexual harassment (Garcia, 2022).

Sexual harassment in intimate relationships. (8) participants shared their encounter with sexual harassment by an intimate partner. The desire to engage in instantaneous, short-term dating or casual sexual relationships often leads to unwanted sexual attention towards the recipient (Diehl et al., 2018). These participants shared subtle instances of sexual harassment by their partner(s). They shared how their boyfriend or husband 'politely' nudge them to be intimate with them even when the participants express that 'they do not want to'.

Impact on well-being Combination of emotions disgust, numbness, helplessness, humiliation, frustration and aggression were reported by (24) participants. A participants shared, "I can't handle it. It triggers me. I either cry or get very angry. It definitely makes me sad and affects my peace of mind", Fitzgerald's model suggested that people react more negatively to the harassment in their second encounter than the first time because of unprocessed trauma of their past experience that diminishes their ability to cope (Fitzgerald et al., 1997). (4) participants shared that they completely froze and were unable to process the experience for some time. (9) participants shared their frustration of carrying the onus of protecting oneself. Exposure to systemic sexual harassment is associated with negative impact on resilience, higher victim vulnerability and harassment fatigue (Ford and Ivancic, 2020).

Sexual harassment is likely to cause fear, humiliation, and intimidation in the survivor; provoking anxiety, triggers to certain places (Dhillon & Bakaya, 2014). It may also lead to low self-esteem, low self-regulation, sleeping or eating disorders, depression, and post-traumatic stress disorder (Pryor & Fitzgerald, 2003; Welsh, 1999; Willness, Steel & Lee, 2007).

CONCLUSION

The present study navigated the narratives of sexual harassment of male and female participants, from Saharanpur (Uttar Pradesh) and Delhi National Capital Region, to gain an in-depth understanding of the meaning they ascribe to the term sexual harassment and to represent their encounter with sexual harassment. Majority of the participants from Saharanpur (UP) provided basic understanding of the term sexual harassment. A larger proportion of participants from Delhi NCR who received higher education and shared their experience with multiple people, were observed to have a deeper understanding of the term. The study revealed that participants who came from low-income socio-economic status and disadvantaged background experienced sexual harassment more frequently than the gendered minorities. Intersection of gender, caste, class, religion and ethnicity heavily affected their encounter with sexual harassment at multiple settings.

India has a long history with sexual harassment. It pervasively erodes our day-to-day lives. An individual of any age, gender, ability, caste class, religion and ethnicity may encounter with sexual harassment of any form (physical, verbal and non-verbal) at any place: workplace, education and social; rural or urban. Yet, encounters with sexual harassment are hushed, overlooked and dismissed in our day-to-day lives. There is a strong need for large scale sensitization and awareness programs related to sexual harassment at community level.

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COMPARING EFFECTS OF TECHNOLOGY-SUPPORTED BRIEF MINDFULNESS MEDITATION ON STATE MINDFULNESS AND SELECTIVE ATTENTION

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ABSTRACT

Mindfulness meditation is known to be an efficient means to train human cognition and has been confirmed by several research evidences. There has been a growing interest in assessing the applications of brief mindfulness meditation using virtual reality (VR) for mindfulness training. The present experiment-based study compared the efficacy of audio-based, video-based, and VR-based mindfulness meditation practices on state mindfulness and selective attention. The pre-test and post-test experimental study was conducted on 60 school and college-going students aged 15 to 24, assigned into six groups using randomization. Findings revealed a significant difference between the scores of state mindfulness among experimental and control groups of all three intervention modalities, indicating that brief mindfulness meditation with all three modalities was quite effective in achieving mindfulness. The study reported a favorable outcome of all the technology-supported brief mindfulness meditation in inducing state mindfulness, but selective attention improved with VR-based mindfulness meditation only. The study proved the effectiveness of VR-based brief mindfulness meditation in strengthening state mindfulness and selective attention among youngsters.

Keywords: Virtual reality, Brief mindfulness meditation, State mindfulness, Selective attention, Technology-supported meditations

INTRODUCTION

Mindfulness meditation has proven its efficacy in elevating the symptoms of depression, anxiety, and stress and improving the quality of life reported in clinical (Shapero, 2018) as well as healthy participants (Khoury et al., 2015). Technology-based mindfulness interventions have demonstrated their effectiveness in reducing clinical symptoms (Deady et al., 2017). Virtual reality (VR) has been recognized to play a central role in mental health technology breakthroughs that enable users to engage with a digitally created set-up with controlled perceptual stimuli and a controlled environment. VR systems offer a higher level of immersion that stimulates many senses and creates an awareness of existence in a virtual environment where mindfulness skills may be

practiced without distraction. VR technologies could effectively tackle the issues posed by environmental distractions by offering an immersive, captivating, and regulated visual and auditory space for practicing mindfulness skills (Navarro-Haro et al., 2017), diverting focus from the actual surroundings.

Because of its positive impact on health and well-being, mindfulness meditation is becoming more widespread. It involves managing the tendency of mind wandering and shift attention from thoughts related to the task at hand to those that are not, thereby making people aware and purposeful about their actions, teaching them to respond appropriately to situations rather than reacting to them, and helping in reducing stress and bringing increased creativity and efficiency to the functioning of the human mind and body. The accelerated pace of modern life and constant social and technological changes have resulted in many psychological problems, especially stress, anxiety, and depression, that hinder memory, concentration power, making the right choices, and decision-making. Studies have demonstrated that mindfulness meditation helps in lowering stress (Bartlett et al., 2021), managing anxiety (Rasmussen & Pidgeon, 2010) and depression (Hofmann et al., 2010), thereby improving memory and attention (Pflugeisen et al., 2016).

The conventional wisdom held that meditation needed to be done consistently and for extended periods of time (Fabio & Towey, 2017). Previous studies shared contradictory findings related to long and short-duration mindfulness meditation. The benefits of brief meditation practices were well reported as it helps in increasing mindfulness as it is more convenient and time efficient (Kosunen et al., 2017). Recovery from dysphoric mood and emotional reaction to unpleasant stimuli can both be immediately improved by brief mindfulness training, whether it takes the form of guided meditation or teaching how to embrace internal experiences (Keng et al., 2016).

Mindfulness meditation demonstrates cognitive effects in that it can help with working memory and sustained attention. Zenner et al. (2014) suggested that mindfulness-based interventions have been found to induce benefits in cognition, improve cognitive flexibility and emotion-cognition interactions (Wimmer et al., 2016), and improve executive attention (Perciavalle et al., 2017). Enhancing attention control may help students succeed academically (Leland, 2015) and control the stress associated with school and personal development.

A significant inverse correlation was reported between 5-minute mindfulness and stress (Lam et al., 2015). Xua et al. (2017) found that short meditation sessions lasting ten minutes improved general attentiveness. Miller et al. (2018) reported that a short mindfulness-based intervention showed initial short-term effectiveness in alleviating stress, behavioral issues, and pro-inflammatory signaling in younger survivors of breast cancer. Kosunen et al. (2017) stated that although meditation is exercised frequently, it showed positive results on the efficacy of short-term meditation interventions.

Technology offers beneficial traits that enhance mindfulness and promote health and well-being. Goldsby et al. (2016) described the possible impacts of a singing bowl meditation on emotions, stress, anxiety levels, physical discomfort, and spiritual health. Earlier studies on guided meditation applications have indicated a greater degree of mindfulness compared to in-person delivery methods (Wylde et al., 2017), observed a decline in stress levels, and a boost in self-compassion (Huberty et al., 2019). Additionally, Shamekhi and Bickmore (2015) indicated that individuals showed a greater willingness to engage with a digital meditation instructor compared to a self-help clip. It was reported that group meditation with video guidance and individual meditation both successfully promote a state of mindfulness (Hanley et al., 2021). Navarro-Haro et al. (2017) reported that the enhanced sensory experiences in virtual reality decrease troubling thoughts or

feelings. Seabrook et al. (2020) stated that VR could increase participants' mindfulness and positive emotions.

Psychological research suggests that VR mindfulness meditation has a better impact on attention and the perception of physical sensations, along with a condition of non-evaluation and present-moment consciousness, than other modalities, such as audio or video. Villani et al. (2007) compared the efficacy of VR with DVD and audiotape in promoting relaxation and reducing anxiety. Shamekhi and Bickmore (2015) conducted a comparison between VR-based meditation and video-based meditation, finding that VR-based meditation was more successful at lowering anxiety levels. The participants felt more relaxed and improved emotionally when meditation was practiced through VR (Navarro-Haro et al., 2017).

Contrary to the above findings, Crosswell and Yun (2020) demonstrated that self-guided meditation had a higher impact on lowering heart rates and decreasing stress levels compared to VR-based meditation. Kosunen et al. (2017) observed that VR headsets elicited fewer hindrances, increased feelings of relaxation, greater self-reflection, and more non-duality feelings. Rakowski et al. (2021) suggested that VR-based meditation plays a significantly more beneficial effect than video-based intervention in decreasing pre-exam anxiety. Waller et al. (2021) indicated that VR meditation guided by video enhanced students' psychological well-being in comparison to meditation conducted on a standard 2D desktop monitor. Miller et al. (2021) also revealed that VR-based meditation positively affected higher impressiveness and egocentricity. Yildirim et al. (2021) observed that the VR-based intervention fostered a notably higher level of state mindfulness in comparison to the audio-based intervention.

OBJECTIVES

The literature review in the context of VR-based mindfulness meditation indicates a need to explore the impact of brief mindfulness meditation provided in young adults. The specific objectives stated in the present study are:

1. To investigate the impact of brief guided mindfulness meditation experiences through audio-based, video-based, and VR-based mindfulness meditation.
2. To examine the potentiality of VR, specifically 360-degree VR videos that induce greater levels of mindfulness than audio and video technology.

RESEARCH METHODOLOGY

The present study compared the impact of various technology-supported meditations on state mindfulness and selective attention. Randomly assigned six groups were formed to compare the effects of brief mindfulness meditation on experimental and control groups of Virtual Reality (VR), Video, and audio-based mindfulness meditation. The impact of technology-based mindfulness meditation was compared among audio, video, and VR groups. The effects of each technology-assisted mindfulness meditation were assessed in both the experimental and control groups. Empirical research with pre- and post-tests with a 3x2 factorial design was conducted within and between groups. Participants were randomly divided into six groups using the fishbowl method: VR-based experimental and control group, video-based experimental and control group, and audio-based experimental and control group, as illustrated in Table-1.

The present study included a quantitative method and multiple data collection points with different types of data. Data was collected using a self-constructed questionnaire to elicit responses regarding the demographic profile and technology-supported meditation experience. The State Mindfulness Scale was used to measure the levels of state mindfulness, and the Stroop Task was used to measure selective attention.

Table 1: Experimental design

Groups	VR-based group	Video-based group	Audio-based group
Experimental	Group1	Group3	Group5
Control	Group2	Group4	Group6

Note. N=60 (n=10 for each condition)

The present study utilized three short mindfulness practices: virtual reality-based, video-based, and audio-based mindfulness meditation. The three interventions were the same; only virtual reality was used in the former, a computer recording was done for the video-based intervention, and an audio recording was given to participants of the audio-based intervention. *TRIPP* app was used to create the material base of the three conditions, i.e., audio, video, and VR. Participants of the experimental group in VR watched the video with a VR headset. The VR content utilized in this study was a 360-degree video that enabled the participant to be immersed in a simulated setting, allowing them to observe the complete environment by shifting their gaze, though they could not interact with the elements. The participants in the video condition viewed the same film on a 19" LCD computer screen rather than using the head-mounted display employed in the VR condition. This two-dimensional video was generated by capturing the screen while an experimenter used the TRIPP app through the HMD. For the audio condition, the audio was extracted from the video, and participants were allowed to listen to the audio recording through a mobile device.

The participants in the control group were shown a guided tour of Paris in a VR headset. The resources for each of the three conditions (audio, video, VR) followed a 360 YouTube video, *Paris: A Guided 360 VR City Tour Experience - Part 2 of 2 - 8k 3D Video* by the YouTube channel *VR Gorilla- Virtual Reality & 360 Videos*, which shows a tour guide taking the viewer to different tourist destinations in Paris and explaining their significance. The participants in the control group who were in the video condition viewed the same film on a 19" LCD computer screen (instead of the HMD utilized in the VR condition), using a screen recording of that film. An audio version of the same film was provided to the audio control group.

RESULTS

Pretest differences in state mindfulness and selective attention between those randomly assigned to the mindfulness meditation and control groups were examined to see any pre-existing differences by applying the Mann-Whitney U test.

Table 2 Baseline measures of the experimental and control group on state mindfulness and selective attention (reaction time in seconds)

Measures	Control group	Experimental group	U value	p-value
	Median	Median		
State mindfulness				
VR Group	70	74	31.5	27
Video group	71.5	73	34.0	27
Audio group	76	73.5	47.5	27
Selective attention				
VR Group	1633.37	1411.37	35.0	27
Video group	1620.25	1581.37	40.0	27
Audio group	1436.87	1581.37	49.0	27

Note. N=60 (n=10 for each condition), p<0.05

Table-2 reveals no significant difference in state mindfulness and selective attention between the experimental and control groups in all interventions, i.e., VR, video, and audio-based interventions. This indicates that the groups matched their state of mindfulness and selective attention before the intervention.

Within-Group Effect of the Intervention on State Mindfulness and Selective Attention

A significant distinction was observed in the state of mindfulness of the experimental group following the intervention, suggesting a positive result from the brief mindfulness meditation (VR, Video, and audio-based intervention) in bringing a positive change in the mindfulness level of the participants. In the control group, a significant disparity was observed between the pre-test and post-test scores solely for the VR group. The value of U of each intervention data reveals that in the experimental condition, participants of the VR-based intervention have the lowest U scores among the three intervention groups, stating that VR-assisted mindfulness practice has the highest impact on state mindfulness levels (Table-3).

Regarding selective attention, a significant difference was observed in Stroop test scores of only VR-based intervention groups in the experimental condition, indicating that brief mindfulness meditation with VR effectively increased the selective attention of users. There was a decrease in scores of the Stroop test after intervention in all technology-based intervention groups in the control condition, indicating improvement in selective attention. However, this change did not differ significantly (Table-3).

Table 3 Within-group effect of the intervention on state mindfulness of experimental and control groups, respectively

Conditions	Experimental			Control		
	Pre Median	Post Median	U value	Pre Median	Post Median	U value
State mindfulness						
VR-based intervention	74	102.5	1.0**	70	78	4.5**
Video-based intervention	73.0	86.0	7.5**	71.5	72.5	38.5
Audio-based intervention	73.5	83.0	18.5**	76	65	27.5
Selective attention						
VR-based intervention	1411.37	1291.62	27**	1633.37	1473.5	37

Video-based intervention	1701.62	1614.12	35	1620.25	1469.37	37
Audio-based intervention	1581.37	1562	44	1436.87	1453.5	39

Between-Group Effect of the Intervention on State Mindfulness and Selective Attention

The individual effect of each technology-supported brief mindfulness meditation in achieving state mindfulness and improving sustained attention was evaluated using a U-test was applied between the scores obtained by the participants of the control group and experimental group of each technology. Table-4 depicts a significant discrepancy between the state mindfulness levels of the control group and experimental group of all three technology-based interventions, indicating that brief mindfulness meditation with all three modalities was quite effective in achieving mindfulness. There was no significant difference revealed between the Stroop scores of the control and experimental groups of all the three technology-based interventions (U=29), video-based (U=42), and audio-based interventions (U=45), indicating that brief mindfulness meditation with any of the three modalities had no effect on selective attention among the participants of the experimental condition. However, the VR-based experimental condition participants took less time responding to the Stroop task than the control group participants.

Comparative Effect of VR, Video, and Audio-based Interventions on State Mindfulness

Table-5 reveals significant differences in State Mindfulness levels of VR-assisted, video-based, and audio-based interventions in the experimental group (H=17.84, p=.00013, df = 9) as well as the control group (H=11.07, p=.003, df=9), indicating a statistically significant difference in state mindfulness among all the three groups of intervention. When we compare the mean scores of the three interventions, the highest mean scores of the VR-based intervention group indicated that VR-based mindfulness meditation induced greater mindfulness than video and audio-based mindfulness interventions. All three technology-based mindfulness interventions also included greater mindfulness than the group with controlled conditions.

Findings revealed no significant difference among the three technology-supported interventions on selective attention. Values of H=3.29, p=.221, df=9 in the experimental condition and H=0.194, p=.967, df = 9 in the control condition indicate no effect of any technology supporting brief intervention on the selective attention of the participants (Table-5). When we compare the reaction time of the three groups, findings revealed that in experimental conditions, participants of the VR-based intervention group took less time to respond to the Stroop task as compared to video-based and audio-based intervention groups, indicating that VR-based mindfulness meditation had the most significant effect in strengthening selective attention among the three technologies.

Table 4. Between-group effect of the intervention on state mindfulness and selective attention

Measures	Experimental group Median	Control group Median	U value
State mindfulness			
VR-based intervention	102.5	78.0	2.5**
Video-based intervention	86.0	72.5	0.5**

Audio-based intervention	83.0	65.0	12**

Selective attention

VR-based intervention	1211.62	1473.50	29
Video-based intervention	1614.12	1469.37	42
Audio-based intervention	1562.00	1453.5	44

Note. N=30 (n=10 for each condition), < .05**, Critical value of U= 27

Table 5: Comparison of the effect of the various technology-based interventions on state mindfulness

	Measures	Mean	SD	df	H value	p-value
State mindfulness	**Experimental condition**	101.6	6.53	9		
	VR-assistance	85.7	3.26	9	17.84**	.00013
	Video-assistance	82	5.10	9		
	Audio-assistance					
	Control condition	79.6	7.50	9	11.07**	.003
	VR-assistance	73.3	4.45	9		
	Video-assistance	68.1	14.7	9		
	Audio-assistance					
Selective attention	**Experimental group**					
	VR-assistance	1388.35	285.38	9		
	Video-assistance	1570.90	237.19	9	3.29	0.221
	Audio-assistance	1524.93	178.01	9		
	`Control group					
	VR-assistance	1521.45	190.92	9		
	Video-assistance	1495.98	199.1	9	0.194	0.967
	Audio-assistance	1513.88	278.7	9		

Note. N=60 (n=10 for each condition), p<0.05**

DISCUSSION

The present study aimed to compare the impact of various technology-assisted meditations on state mindfulness and selective attention. Results reported that the use of VR-assisted, video-assisted, and audio-based short mindfulness meditation practices resulted in notably higher levels of state mindfulness in the experimental group compared to the control group. The results from pre and post-tests showed that there was a significant difference in the state of mindfulness of the experimental group after the intervention, indicating that the brief mindfulness meditation (including VR, video, and audio-based methods) positively impacted the participants' mindfulness levels. Findings revealed that VR-based intervention induced much greater state mindfulness levels than video-based and audio-based interventions in the experimental condition. The possible explanation could be that the feeling of being present in the virtual setting and the ability to navigate

the virtual realm may have enhanced the experience of mindfulness. These findings align with the studies conducted by Rakowski et al. (2021), who also observed that 360-degree video in virtual reality had a crucial advantage over conventional videos. Seabrook et al. (2020) also stated that mindfulness increased significantly after using a VR state. Miller et al. (2021) found that meditation using virtual reality is more effective than traditional guided meditation without VR.

A significant difference was reported in state mindfulness in all the technology-supported interventions in experimental groups, whether VR, video, or audio, showing brief mindfulness meditation's efficacy. These findings align with the findings of Navarro-Haro et al. (2017), who reported that brief mindfulness meditation significantly increased mindfulness state. Another aspect of our study was the effect of a technology-supported brief intervention on selective attention. The intervention on selective attention showed that only VR-based mindfulness meditation intervention induced an effect on selective attention. Data indicated a significant reduction in pre and post-Stroop test scores of only VR-based mindfulness meditation groups, indicating that brief mindfulness meditation with VR effectively increased the selective attention of users. Previous studies also reported that longer-duration mindfulness meditation interventions resulted in the development of cognitive skills. Regular meditation improves cognitive flexibility and attentional functioning, according to studies that compare meditators and non-meditators on performance-based measures (Hodgins & Adair, 2010). Semple et al. (2010) also observed that participants' training showed improvements in attention measures after a four-week mindfulness meditation. Various studies suggested significant effects of brief mindfulness meditation on sustained attention (Anderson et al., 2007).

The decline in Stroop score was more significant in VR-based interventions than in video or audio-based intervention groups, indicating that VR technology was more helpful in improving selective attention amongst various technology-supported interventions.

Highlights of the study shed light on the importance of VR-based brief mindfulness meditation in strengthening the user's selective attention and state mindfulness. Integrating mindfulness meditation into a school or college curriculum is a crucial tactic to support students' physical and mental health and enhance their cognitive capacities because of its calming and relaxing benefits. Moreover, in the fast-paced world today, people could benefit from brief mindfulness meditation using technology-supported mindfulness meditation programs, especially VR technology-supported brief mindfulness programs, as they can distract their negative emotions and provide relaxation, thus aiding stress management amidst the challenges of everyday life.

CONCLUSION

Brief guided meditation provided through all three technology-supported interventions could improve the state of users' mindfulness. It is suggested that similar studies on brief mindfulness meditation should be conducted to compare the effect of technology-based interventions on selective attention.

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CHAKMA TRIBES: AN INVESTIGATION OF THE CAUSES AND ISSUES OF MIGRATION

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ABSTRACT

The Chakmas are one of the ethnic groups that make up the Chittagong Hill Tracts (CHTs), where 98 percent of the locals were originally of Mongoloid ancestry until Muslim infiltrators flooded the area. India is the primary country of origin for foreign migrants and accounts for the majority of domestic migration. Indigenous and tribal peoples make up around 476 million people in 90 nations, or about 6.2% of the world's population. With this background the current study is been made in order to examine the reasons for migration and problems encountered due to migration by the Chakma tribes. The study showed that among the selected indigenous population the reason for migration was associated with economic `pull factors', reported by 67 percent of the selected sample migrants and only 33 percent reported for `push factor`. ANOVAs results showed that there is strong association between the age and the reason for migration selected for the study as the variables were statistically significant (p=0.000) at one percent level of significance. The garret ranking result showed that language and housing were stated as the major problems faced by the Chakma migrants. There is need of strong government intervention for the tribes especially the migrant tribes for their better life style and social security.

Keywords: Chakmas tribe, indigenous tribes, Tiruppur, Migrant workers, garment industry.

INTRODUCTION

India is a major source of both international and domestic migration (De, 2019; UNDESA, 2020). According to the Indian Census of 2011, there were 450 million internal migrants, including those moving between and within states, marking a 45% increase from 2001 (De, 2019). The Economic Survey of India 2017 reported that there are 60 million interstate migrants in the country, with an average of 9 million people moving across state lines annually between 2011 and 2016 (Sharma, 2017). Uttar Pradesh (UP), Bihar, Madhya Pradesh (MP), and Rajasthan are the largest source states for these migrant workers, while Delhi, Kerala, Maharashtra, Gujarat, and Tamil Nadu are the top destination states (Kamal, 2018).

Globally, indigenous and tribal peoples constitute about 476 million individuals across 90 countries, representing roughly 6.2% of the world's population (UN 2020). These communities have distinct cultures, languages, knowledge systems, and customs and maintain a deep connection to their land [UN 2007]. However, they continue to face challenges from historical and ongoing colonization, racism, and discrimination, leading to socioeconomic disadvantages and disparities in various outcomes (Anderson 2016, Griffiths et al., 2016, and Axelsson 2016).

Tribes are often seen as the most primitive members of society and are primarily located in forested areas. Historically, they have depended heavily on nature for survival and, in return, have protected forests and natural resources. Over time, their traditional means of living have been affected by population pressure, changing government policies, and the influences of modernity, urbanization, and industrialization. Despite these pressures, personal issues such as family disruption, landlessness, violence, theft, crime, and political conflict also drive tribes to migrate to urban areas in search of a better life (Sahoo 2018).

The Chakmas are a significant ethnic group in the Chittagong Hill Tracts (CHTs), where historically, the population was predominantly of Mongoloid descent before the influx of Muslim settlers (Chakma, 2023). As Buddhists, the Chakmas trace their origins to King Avirath of the Sakya dynasty (Nar and Das 2018, Saha and Roy, 2022, and Paul et al., 2024). Tiruppur, known as the Dollar Town of India, is a major textile hub in Tamil Nadu, accounting for over 90% of the country's cotton knitwear exports. The city employs over 400,000 people from different parts of India in its garment industry. The COVID-19 pandemic and subsequent lockdown significantly impacted Tiruppur's textile sector, which relies heavily on Chinese inputs, leading to disruptions in exports. In India, Chakma populations are mainly found in Mizoram, Tripura, and Arunachal Pradesh, where they face various political and economic challenges as minorities. Many Chakma youth from these northeastern states migrate to Tiruppur in search of employment opportunities (Chakma and Pain 2020).

OBJECTIVES

1. To gain a comprehensive understanding of the demographic and socio-economic characteristics of Chakma tribal migrants.
2. To explore the push and pull factors that drive migration decisions among the Chakma tribes.
3. To identify the specific problems faced by Chakma migrants in their new environment, particularly in the garment industry of Tirupur.

REVIEW OF LITERATURE

According to Sahoo and Sadhual (2018), migration refers to the movement of people from one place to another, and tribal migration for employment is increasingly common in modern times. This migration has ancient roots among tribal communities. Overpopulation, deforestation, agricultural decline, and the depletion of common property resources (CPRs) often drive these communities to seek livelihoods and employment in urban areas. Tribes, often regarded as some of the oldest members of human civilization, traditionally reside in forested areas and have relied heavily on nature for their sustenance. However, modernization, industrialization, urbanization,

and changing government policies have disrupted their traditional ways of life. Additionally, social factors such as family disruptions, violence, crime, theft, and political instability also scontribute to the migration of tribes to urban centers.

Kar and Das (2018) explain that the Chakma tribe, belonging to the Tibeto-Burman ethnic group, originally migrated to the region after the Burmese destroyed the Arakan Kingdom. Arakanese dissidents opposed to Burmese rule sought refuge in the Chittagong Hill Tracts (CHT). Following the partition of India, the CHT became part of Pakistan. Many Chakmas opposed the Pakistani government's policies, leading to their persecution and eventual migration to India and Burma to escape oppression. The construction of a hydroelectric project over the Karnaphuli River by the Pakistani government further displaced thousands of Chakma families, prompting their migration to India and Burma. The Chakmas faced tensions and persecution in the CHT, leading them to seek refuge in the northeastern states of India, such as Assam, Arunachal Pradesh, Mizoram, Tripura, and Meghalaya. Many lived in refugee camps in these areas, enduring poverty, illiteracy, unemployment, and a political identity crisis, which significantly affected their traditional identity and way of life.

Roy and Mitra (2019) observe that globalization, modernization, and urbanization have led Chakma men to adopt Western-style clothing, such as shirts and trousers, instead of their traditional attire. However, Chakma women continue to wear traditional clothing, which includes a skirt-like garment called 'Pinan' and a diagonally worn stole called 'Hadi.' Typically, these garments are black or blue with red borders. The influence of globalization, Westernization, mechanized power loom products, and socio-economic factors have negatively impacted the traditional handloom weaving culture among the Chakma community in Tripura. In their study, Roy and Mitra collected data from 200 samples in Chakma-concentrated areas of Tripura using purposive random sampling and systematic schedule surveys. They also gathered secondary data from the Census of India, Panchayats, and Rural Development Blocks in various Tripura districts. The study found that traditional handloom weaving has declined in Tripura due to the social upliftment of the Chakma community in terms of education and economic status.

With this background the current study has been made with the following objective

- To study the socio-economic background of the selected chakma tribes
- To identify the factors of migration of the tribes
- To find the problems encountered by the tribes in Tirupur

METHODOLOGY

This study looks at the socioeconomic status, migration-related variables, and difficulties that the Chakma tribal migrants in Tirupur, Tamil Nadu, confront. The study uses a quantitative methodology, gathering primary data using questionnaires and structured interviews. The study's target demographic consists of Chakma tribal migrants who are employed in the Tirupur district's garment sector. Because it was hard to find an exhaustive list of this group, a non-probability snowball sampling method was used. This strategy works especially well for targeting people that are hidden and difficult to identify. One hundred Chakma migrant homes were polled in total. At least one member of every household worked in the apparel industry, guaranteeing the study's

relevance to its focus on labour migration. Based on practicality and the capacity to reach statistical significance under resource limitations, the sample size was chosen. The information was gathered during a three-month period, from January to March 2022, to capture seasonal differences in income and employment. To collect both quantitative and qualitative data, a systematic questionnaire with both closed- and open-ended questions was created. To verify clarity and reliability, a small sample of the population was used for pre-testing the questionnaire. Minor modifications were made to the question's structure and wording based on feedback from the pilot test. The process of gathering data involved conducting in-person interviews.

The respondents' socio-demographic details, such as gender, age, family structure, marital status, degree of education, country of origin, and income levels, were compiled using descriptive statistics. This gave rise to a basic grasp of the characteristics of the migrant population. Analysis of Variance (ANOVA) was used in the study to investigate the relationship between migration motives and age. The rationale behind selecting ANOVA was its ability to compare means among several groups and detect statistically significant variations in migration reasons according to age.The respondents were asked to rank a list of probable issues in order to evaluate the difficulties faced by the migrants. The respondents were asked to rank a list of probable issues in order to evaluate the difficulties faced by the migrants. In order to turn ranks into scores and enable a quantitative examination of the perceived severity of each problem, the Garrett Ranking Technique was utilised. This method allowed for focused recommendations by revealing the migrants' top concerns. The goal, methodology, and response rights were explained to the participants. To ensure voluntary participation, written informed consent was obtained before to performing the interviews. All gathered data were securely kept and anonymised to preserve the privacy of the participants. Reports contained just aggregate statistics; no personal information was revealed.

FINDINGS OF THE STUDY

This section brings out the findings made in the study on the basis of the objectives chosen,

1. Social and demographic background of the respondents

The social and demographic background of the selected respondents was studies as it will be helpful in understanding their background life.

Table 1: Social and demographic background of the respondents (n=100)

Particulars	Variables	Percentage
Gender	Male	34
	Female	66
Age (In Years)	Below 18	40
	18-28	28
	28-40	15
	Above 40	17
Type of Family	Nuclear	10
	Joint	90
Marital Status	Married	95
	Unmarried	05

Education	Illiterate	78
	Schooling	12
	Graduation	01
	Others	09
Place of Origin	Manipur	45
	Arunachala Pradesh	55
Monthly Income (In Rs.)	Less than 10000	07
	10001 – 15000	45
	15001 – 20000	38
	Above 20000	10

Source: Primary Data (2022)

The age wise classification of the selected Chakma migrant workers showed that about 66 percent were female and 34 percent were male whereas in case of their age distribution nearly 40 percent were below the age of 18years followed by 28 percent being in the age between 18 years to 28 years and others were above 18 years of age. The type of family of the tribes showed that about 90 percent were belonging to joint family and 10 percent were from nuclear family. The marital status showed that 95 percent were married. The education detail of the sample showed that about 78 percent were illiterate and others have undergone primarily or secondary level of education. As Cahkwa tribes were found only in two region the researcher has identified the place of origin of the selected tribe and it showed that 55 percent were from Arunachala Pradesh abd 45 percent were from Manipur. The monthly income classification of the sample showed that about 45 percent were earning between 10,001 to 15,000 followed by 38 percent being in the income group between 15,001 to Rs.20,000.

Factors of Migration

Migration has been a part of human history for millennia, with its causes and characteristics changing according to the specific circumstances of a given time and place. The factors influencing the decision to migrate are varied and complex, differing not only between countries but also within regions of a single country. These factors often include social, economic, demographic, and cultural elements at the place of origin, as well as the way migration is understood and analyzed. In this study, Chakma tribal migrants were surveyed about the reasons behind their decision to migrate, as shown in Table 2.

Table 2: Reasons For Migration (n=100)

S.No	Reasons	Percentage
1	For family development	25
2	To earn additional income	19
3	For environmental reasons	18
4	To raise standard of living	16
5	For social security	15
6	To remove poverty	7
	Total	100

Source: Primary data, 2022

Table 2 clearly shows that the largest portion (25 percent) of respondents cited "family development" as their primary reason for migration. Additionally, 19 percent migrated to earn additional income, and 18 percent cited environmental reasons. Notably, 16 percent moved to improve their standard of living, 15 percent for social security, and only 7 percent to escape poverty. These findings are illustrated in the following diagram. The reasons for migration were predominantly associated with economic "pull factors," as reported by 67 percent of the respondents, while 33 percent cited "push factors."
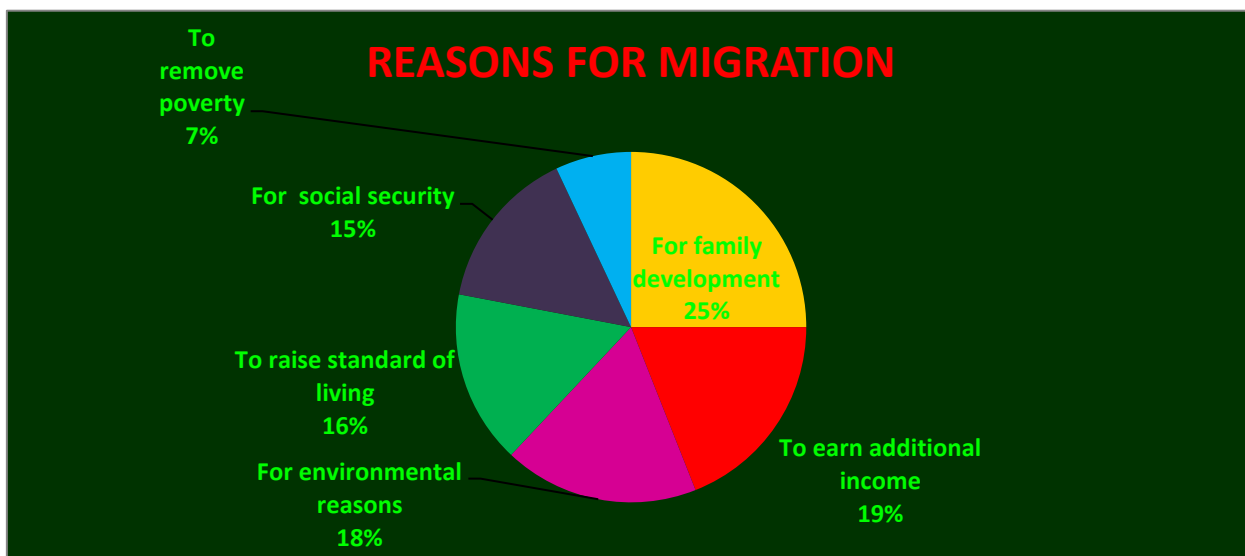
Source: Primary data, 2022   **Fig 1**

The association between reasons for migration according to the age of the tribal respondents was examined and the finding is given in table 3.

Table-3: Association between reasons for migration according to their age

Variable		Mean	SD	SE	F – value	P - value
Age	For family development	4.53	.51	.09	13.890	.000**
	To earn additional income	4.64	.51	.09		
	For environmental reasons	3.90	.30	.06		
	To raise standard of living	4.30	.50	.09		
	For social security	3.33	.48	.09		
	To remove poverty	4.37	.49	.09		

Source: Estimated **=Significant at 1% level

The ANOVA results indicated a strong association between age and the reasons for migration selected for the study, as the variables were statistically significant at the 1% level of significance (p=0.000). This finding suggests that age plays a crucial role in influencing the migration decisions of the respondents.

Problems of Migrants

Migrants are driven to relocate by a combination of pull and push factors. Understanding the extent to which migration has improved their standard of living is essential and requires a thorough investigation. In this study, migrants were asked to rank the various problems they face both at work and in their living environment. Several challenges faced by migrants and their families have been identified and are outlined here. The most severe problem was ranked as '1,' with subsequent problems ranked in descending order.

Table 4: Problems of Migrants

S.No	Problem	Scores	S.No	Problem	Scores
1	Language	71.81	6	Availability of health provision	48.37
2	Housing	55.78	7	Children education	46.69
3	High cost of living	54.58	8	Health	42.73
4	Away from relatives	53.91	9	Job promotion	41.56
5	Poor living condition	50.79	10	Finding shelter	39.73

Source: Primary data, 2022

Among the 100 sample respondents surveyed, the highest percent score (71.81) was attributed to the issue of language. This can be explained by the fact that about 65 percent of the migrants was from different states, where language barriers can significantly impact their daily lives. The next significant challenge faced by migrants was housing, highlighting the need for administrators to effectively monitor living conditions and housing shortages, especially as the number of internal migrants continues to rise. This was closely followed by the issue of high **cost** of living. Additionally, about 57 percent of migrants reported migrating alone, which contributed to the problem of being "away from relatives." For other identified issues, the assigned scores ranged between 40 and 50. Overall, language and housing were identified as the major challenges faced by the Chakma migrants.

CONCLUSION

Migration is one of the important aspects of development of the economy. As recently internal migration is found to be happening in wider range in India which has made even tribal people to take part in it. As studying about the migration of tribal people is the need of the hour the current study is been made in order to examine the factors of migration and problems of migration encountered by the Chakma tribes employed in garment industry of Tirupur district. The study showed that among the selected indigenous population the reason for migration was associated with economic `pull factors', reported by 67 percent of the selected sample migrants and only 33 percent reported for `push factor`. anova results showed that there is strong association between the age and the reason for migration selected for the study as the variables were statistically significant (p=0.000) at one percent level of significance. The garret ranking result showed that language and housing were stated as the major problems faced by the Chakma migrants. There is need of strong

government intervention for the tribes especially the migrant tribes for their better life style and social security.

SUGGESTIONS

1. The results show that economic "pull factors" account for a considerable amount of migration. The government and non-governmental organisations should prioritise economic empowerment programs including skill development courses, business training, and financial literacy seminars in order to assist the Chakma migrants. In metropolitan environments, this can improve their employability and earning potential.

2. The Chakma migrants' top concern now appears to be language hurdles. Improving their communication abilities and facilitating their absorption into the community can be accomplished by putting in place language training programs and cultural integration workshops. These courses should be designed to meet the language requirements of the workplace as well as everyday communication.

3. An overview of the Chakma migrant experience in Tirupur is given by the current study. Longitudinal studies, which follow migrants over time and provide greater insights into their adaption processes and long-term effects, may be beneficial for future research. Studies that compare migratory populations with one another can also reveal particular difficulties and common experiences, guiding the development of more all-encompassing policy solutions.

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COUNSELLING CHILDREN IN INSTITUTIONAL HOMES OF DELHI: PERSPECTIVES OF CAREGIVERS AND SUPERVISORS

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ABSTRACT

In 2020, 2.56 lakh children resided in 9589 Child Care Institutions across India (NCPCR, 2020). However, these institutions often lack adequate mental health facilities, counselling services, and trained staff, adding to the pre-existing vulnerabilities of these children. Using a qualitative approach, the study delved into the perspectives of caregivers and supervisors of these homes regarding the role, necessity, and efficacy of counselling for children aged 4-11 years through semi-structured interviews. The study comprised a total of eight participants, including one caregiver and one supervisor from four non-profit NGO-run institutional homes across Delhi. The main findings highlighted that the caregivers and supervisors held a rehabilitative and remedial approach towards counselling. They recognized the criticality of counselling for children's mental well-being, addressing issues like restoration with family, anger, behavioural problems, academic concerns, POCSO cases, and traumatic experiences. They elaborated on the challenges pertaining to counselling children which were limited cooperation from the CWC, bad influences from external agents like schools, and difficulties in managing POCSO cases and cases requiring psychiatric aid. Recommendations for improved training and monitoring of counselling services are discussed.

Keywords: Counselling, Child Care, Institutional Homes, Alternate Care, Mental Health, POCSO, Psychiatric Child

INTRODUCTION

Child Care Institutions (CCIs) in India are mandated to provide holistic care, including mental health support, to vulnerable children. However, a significant gap exists between policy and practice, particularly in counselling services (NCPCR, 2020). With over 43.1 crore children in India, the disintegration of joint families has weakened traditional support systems, increasing children's vulnerabilities (UNICEF, 2022; Udayan Care, 2017). Consequently, 2.56 lakh children now reside in 9,589 CCIs across the country (NCPCR, 2020). These institutions strive to provide shelter, education, and emotional support, highlighting the need for enhanced child welfare services to safeguard the future of the nation's youngest citizens.

Children entering institutional homes often have faced traumatic experiences, making them susceptible to socio-emotional, psychological, or mental health issues. Post-institutionalization, they continue to face adversities like inadequate care, neglect, and unresponsive caregiving, adding to their pre-existing vulnerabilities (Sagar et al., 2017). The absence of adequate mental health services,

trained staff, and compliance with legal guidelines further limits effective interventions, emphasizing the need for better staff training, preventive measures, and stronger legal enforcement.

Caregivers and supervisors play a vital role in fostering a safe, nurturing environment for institutionalized children, addressing emotional needs, and facilitating access to counselling (Levey, 2017). Studies highlight that integrating play-based approaches aids psychosocial development (Taneja et al., 2002) and that psychological support for caregivers is essential, given the stressful nature of their role (Kumar et al., 2017).

Caregiving practices in such homes, when mindful and effective, can further provide emotional support to children, help them develop coping skills, and facilitate attachment (Modi et al., 2014). This draws attention to the prominent gap between the needs and availability of counselling services in institutional homes as some institutes like Udayan homes have strong intervention models while many even fail to fulfil the basic needs of children (Sagar et al., 2017).

JUSTIFICATION OF THE STUDY

The children in institutional homes undergo various emotional and psychological problems due to their unfavourable circumstances and structural issues. For children living in institutions, counselling is therefore a necessary service for their optimal development and better future outcomes. The role of caregivers and supervisors is integral to the daily lives of children in these homes. Their perspectives on counselling are crucial because they directly influence the implementation and effectiveness of counselling. Understanding their views can help tailor counselling approaches to be more effective and individualized to the needs of children (Levey, 2017).

OBJECTIVE

To examine the perspectives of supervisors and caregivers within selected institutions in Delhi concerning the role, necessity and efficacy of counselling with reference to children in the age group of 4-11 years.

METHODOLOGY

The present study follows a qualitative approach to investigate the perspectives of caregivers and supervisors on the role of counselling in fostering the overall development and wellbeing of children in institutional homes. Purposive sampling was used to select the participants. A list of NGO-run institutional homes in Delhi was formulated. These institutions were contacted through visits and telephonic conversations to obtain permission for the study. Out of these homes, four institutions namely Home A, Home B, Home C and Home D were included in the sample after signing Child Protection Policy and Code of Conduct[1]. One caregiver and supervisor from each of these institutions were recommended by the home's management. Thus, for this study, the sample of the study was eight.

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[1] The research was approved by Technical Review Board along with Institutional Ethics Committee of Lady Irwin College, University of Delhi.

Tools for Data Collection

For the data collection, two semi structured interview schedules were constructed for caregivers and supervisors. The following themes were taken into account for developing these interview schedules:

- Role of counselling in an institutional home;
- Needs of children addressed through counselling;
- Access of children to counselling services;
- Collaboration with counsellors;
- Training and capacity building regarding counselling;
- Effectiveness and impact of counselling on children;
- Consideration of suggestions/feedback from counsellor; and
- Challenges faced by children and institution in the counselling process.

RESULTS AND DISCUSSION

Role of counselling in institutional homes for children aged 4-11 years

All the caregivers and supervisors recognized that counselling was important because of its rehabilitative and remedial approach in an institutional setting. Among the caregivers, three out of four saw counselling as integral for children's mental wellbeing. They shared that the children came from diverse backgrounds and difficult circumstances in the home and this affected their behaviour, mental state and academics. Their difficult life trajectories led to "mental disturbances" and "depression". Thus, they viewed counselling as a crucial means for these children to overcome such emotional distress and improve their overall well-being. One of the caregiver perceived counselling as a means of monitoring of their work as caregivers as she said "वो इसीलिये करते हैं कि हम लोग care करते हैं या नहीं करते और कैसे करते हैं वो पूछने के लिए।".

All supervisors shared that the past experiences impact the child in numerous ways stemming from traumatic and abusive situations, living on the streets in harsh conditions, reluctance to open up, lack of maternal love, behavioural and anger issues. The manifestation of these issues created a void in the children's well-being, which was filled through counselling.

By inculcating measures of rapport formation and creating a friendly environment, counselling helped children by catering to their emotional needs, moving on from past experiences, aiding them to adjust in the home, giving a space for them to open up, share information about their background and decide goals for their future. This was further emphasized by supervisor of Home B as she stated "Rapport build करके उस बच्चे के अंदर क्या है वो निकल सके और उसे बच्चे के welfare के लिए आगे use कर सके जैसे कि उसका घर ढूंढना है, उसे adoption के लिए तैयार करना है या schooling के लिए।".

In addition to traumatic experiences, supervisor of Home D included children's geographical (rural or urban), socioeconomic (underprivileged) and family (orphan) background as integral to their emotional needs, which were addressed through counselling. She also viewed the children's growing age as a reason for children to benefit from counselling as it helped them understand their changing bodies, cope with hormonal changes, deal with feelings of attraction, and focus on academics. This finding showed similarity with study of Sagar et al. (2017) as it delineated improvement in emotional issues, behaviour problems and development of coping strategies through counselling.

Necessity of counselling in institutional homes

Based on the responses of caregivers and supervisors, it was inferred that the necessity of counselling came from catering to a diverse range of needs of children as shown in Fig.- 1. Three out of the four caregivers saw fights (verbal and physical) between children, at the home and school, as prominent issues addressed through counselling. The caregiver of Home C identified stress as another key need that was fulfilled through counselling.

Figure 1
Needs of Children Addressed through Counselling According to Supervisors and Caregivers in Institutional Homes

At Home D, the caregiver shared that "Main issue तो anxiety और depression का ही होता है जो काफी हद तक solve हो जाता है क्योंकि यहाँ पे इन्हे अच्छा care मिलता है staff से और बाकी बचा हुआ counselling से solve हो जाता है। और लगता है ज्यादा ही दिक्कत है तो उन्हें medicine भी provide कराई जाती है।". It was also shared that children are in need of counselling for issues like nightmares. In Home B, the caregiver's understanding of necessity of counselling was quite broad as she added that children went for counselling services for issues like physiotherapy, speech delays and speaking inappropriate things.

Two of the four supervisors felt that the necessity of counselling was grounded in aiding children to resolve their anger, behavioural and academic problems. Supervisors from Home A and D also shared that counselling was required for dealing with POCSO cases that come to the CCIs.

The supervisor from Home A further emphasised that through counselling, children received individual attention from the counsellor, which they did not receive even from caregivers due to their workload. Additionally, Home B's supervisor shared that children were most familiar with the counsellor and thus could open up with them about their experiences, wants and needs. She recognized group counselling sessions as an integral part of what made counselling necessary. Likewise, DCPCR (2014) also mentioned group counselling as integral for addressing collective issues for children.

Referring to the context of her institution, the supervisor from Home D highlighted that children learned about maintaining personal hygiene, which they were not aware of beforehand due to their lives on the street. She shared that counselling was needed to inculcate a sense of belongingness within the children so that they understood their rights and duties pertaining to the home. She revealed that as many staff members were involved in looking after the children, these children were often found manipulating the staff for their personal gains, which was also resolved through counselling.

Collaboration with counsellors

Three out of four caregivers reported limited interaction with the counsellor, mainly receiving caregiving suggestions and discussing children's background details or problematic behaviour. Caregiver from Home C shared that counsellor conducted meetings on childcare practices, advising caregivers to approach them rather than directly addressing issues with children.

All supervisors noted frequent communication between the counsellor and caregivers regarding children's preferences, behavioural and anger issues, and caregiver sessions on stress management. Two supervisors mentioned that counsellors also addressed conflicts among children, physical abuse incidents, unmet needs, requests for outings, and complaints about caregivers. Additionally, counsellors helped supervisors understand home management decisions. The supervisor from Home C highlighted that children often voiced concerns about confidentiality, feeling betrayed when counsellors shared their issues with stakeholders for informed decision-making about their well-being.

Efficacy of counselling

The efficacy of counselling was seen in the various examples that were shared by supervisors and caregivers. They reported that children from ages 4 to 11 years benefitted from counselling in the areas of school readiness, personal hygiene, restoration with family, behavioural issues, anger problems, stealing and managing emotions like jealousy along with dealing with traumatic and abusive past experiences.

Access and understanding of counselling among children

All supervisors and caregivers stated that children received timely counselling, with those having behavioural issues attending more frequent sessions. However, the caregiver from Home B highlighted the absence of counselling due to the lack of a counsellor, sharing insights based on past experiences when a counsellor was present.

Three caregivers associated children's understanding of counselling with their ability to share concerns independently, while one emphasized that children opened up only after building rapport. Two supervisors noted that children were unaware they were receiving counselling, as sessions were framed as play or talking sessions, focusing on encouraging self-expression. The supervisor from Home C added that new children initially lacked awareness of counselling but gradually recognized the counsellor and counselling space through individual and group sessions.

Additionally, supervisor from Home D emphasized a development-based approach to children's understanding of counselling as she said "बहुत young age पे तो नहीं होती है by 10-11 they start understanding it. They know कि अगर कोई emotional need है या drained out feel हो रहा है so

they need to go to the counsellor. उन्हें लगता है हमारे पास एक 'कान' है जो हमें सुनके guide कर सकता है।".

Training related to counselling

Three out of four caregivers reported receiving no training related to counselling, while the caregiver from Home C mentioned attending sessions with counsellors every month or fortnight based on their schedule. Supervisors had mixed responses, two acknowledged receiving counselling-related training and agreed that caregivers were trained, while the other two denied such training.

A notable discrepancy emerged in Home D, where the supervisor claimed training was provided, but the caregiver disagreed, highlighting gaps in staff training. Consistent with Sagar et al. (2017), this highlighted the need for sensitization and training to help staff identify and address children's issues.

The supervisor from Home A stated that while no formal training was given, she guided caregivers on appropriate interactions with children. Supervisors from Homes C and D attributed training to their "Mental Health Programme" (MHP), an independent unit covering crisis and team management, stress handling, and addressing children's demands. Mehta & Gupta (2016) also found that MHPs in Delhi's institutional homes played a crucial role in early identification and timely intervention for children's mental health issues, ultimately enhancing positive mental health in daily life.

Monitoring effectiveness of counselling

Three caregivers shared that they did not have a role in monitoring the effectiveness of counselling as it was not part of their work. Caregiver from Home C reported that the counsellor guided them to look after behavioural changes in certain children and then they reported the observed behaviour to the counsellor. All supervisors mentioned the critical role of counselling reports in tracking the progress of the child pertaining to counselling. They elaborated that these reports were made monthly or quarterly for long stay children while for short stay children weekly reports were made and were sent to the Child Welfare Committee (CWC).

It was further added that these reports were assessed to track the child's progress along with identifying inhibiting factors of their progress so that those factors could be addressed. Supervisor from Home D shared that these measures for monitoring were supplemented with assessment and feedback of the children's report from an external institution comprising of a multidisciplinary team of mental health professionals providing services for children's and adolescent's mental health. She elaborated that the progress report of the child was also taken from caregivers and counsellors. However, the respective caregiver did not report sharing any such report with the stakeholders.

Challenges in counselling

The caregivers did not mention any challenges related to counselling in the home except caregiver from Home B, who cited the absence of the counsellor as a challenge in counselling. A common challenge that was shared by supervisors from Home A and D was lack of support and consideration from CWC while dealing with children. It was reported that even if the home sends recommendations to CWC based on the counselling reports they do not take those suggestions into consideration and do not provide timely responses which affected the child's wellbeing. They shared that CWC was rigid in their approach because of which the best interest of the children may be

compromised. There were also challenges in procuring orders for emergency medical checkups from CWC leading to delay in accessing mental health services for a child with suicidal tendencies.

Other challenges that were shared related to counselling were bad influence of other socialisation agents like school on children, use of abusive words and increased frequency of problematic behaviour despite regular counselling sessions. Another challenge was the intensity of abuse, especially in POCSO cases as such cases require more prolonged and frequent counselling sessions with the child. The last challenge discussed pertained to managing cases requiring psychiatric assistance that arrived at the home, as they lacked the resources to address such cases. Additionally, the home faced difficulty in acquiring emergency mental health services for these children from mental health institutions. In order to cater to these challenges, participants gave the recommendations listed in Table 1.

Table 1
Recommendations by Caregivers and Supervisors for Improvement in Counselling in Homes

Type of Personnel	Recommendations Related to Counselling
Caregivers	Appointment of Counsellor in Home B as the post was vacant
	More outdoors visits should be organised by the counsellor so that children do not feel trapped within the boundaries of the home
Supervisors	More group counselling sessions should be conducted to address common issues
	Incorporate play-based approach to make counselling an immersive experience for younger children
	Use of media aids for counselling
	Counsellors should foster collaboration with caregivers through workshops and counselling sessions for equipping them to sensitively deal with children and promoting caregiver's mental health
	Promoting healthy relationship between children and caregivers by inculcating empathy among children for positive home environment for their optimum development

CONCLUSION

The study sheds light on the varied perspectives of caregivers and supervisors on counselling children in non-profit NGO-run institutional homes in Delhi. Counselling, as a support service, was viewed as rehabilitative and remedial by caregivers and supervisors. It was further mentioned that counselling services were tailored to the individual needs of children aged 4-11 years. They stressed the importance of counselling in resolving mental health concerns stemming from difficult upbringings and past experiences before coming to the home. The necessity of counselling was

rooted in facilitating restoration with family and addressing behavioural, academic, and emotional challenges, particularly in cases involving children under the Protection of Children from Sexual Offences (POCSO) Act. Further, it was mentioned that counselling helped in resolving conflicts among children and personal hygiene issues.

The efficacy of counselling was evident in the success stories shared by supervisors and caregivers. They shared positive outcomes of counselling in school readiness, personal hygiene, restoration with family, behavioural management, and emotional regulation. While caregivers expressed limited involvement in monitoring counselling effectiveness, supervisors highlighted the critical role of counselling reports in tracking progress. The reported inhibitors of the efficacy of counselling were limited cooperation from CWC, bad influence from external agents like schools, managing POCSO cases and cases requiring psychiatric assistance.

These challenges highlight the need for systemic improvements to enhance the efficacy of counselling services. Recommendations from the participants were increasing group counselling sessions, adopting play-based approaches for younger children, and fostering better collaboration between counsellors and caregivers through workshops and counselling sessions.

RECOMMENDATIONS

The positive outcomes from counselling can be enhanced by mandating training of staff members by counsellors. This training would sensitize staff towards the issues faced by children and equip them to handle daily functioning effectively. Additionally, supervisors and counsellors shared challenges related to the cooperation and nature of the members of the Child Welfare Committee. Hence, it would be beneficial to consider implementing sensitization and awareness programmes for them. Lastly, there should be stringent monitoring of the fulfilment of counselling provisions in institutional homes to prevent situations like the absence of a counsellor in Home B, ensuring that children have access to quality care and support.

SUGGESTIONS FOR FUTURE RESEARCH

The research areas that can be further explored are:
- Comparative analysis of perspectives of supervisors and caregivers in governmental and non-governmental CCIs; and
- Impact of different training and sensitization programs related to mental health of children for caregivers and supervisors.

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MARITAL SATISFACTION AND ATTITUDE REGARDING MENOPAUSE AMONG WORKING AND NON-WORKING MIDDLE-AGED WOMEN IN NORTH KARNATAKA

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ABSTRACT

The study explores the prevalence, knowledge, attitudes, and experiences related to menopause among working and non-working women in the Dharwad and Bagalkote districts of Karnataka, India. Conducted between 2017 and 2019, the research involved 480 working and non-working menopausal women from rural and urban areas. Menopause Rating Scale (Berlin., 1992), Marital Satisfaction Scale, Menopausal Attitude Scale and self-structured Scale were used to gather the information on, menopausal symptoms, attitude, marital satisfaction. socio-demographic information respectively. The findings of the study revealed that, 2/3rd of respondents experienced joint and muscular discomfort while nearly half (37-50%) of them had hot flushes along with these somatic problems 40-60 per cent of them suffered from irritability and mental exhaustion and significant associations between occupational status and the severity of menopausal symptoms, with working women generally exhibiting more favorable attitudes towards menopause and higher marital satisfaction compared to non-working women. Additionally, socio-economic status, education, and number of children were also influential factors. Regression analysis identified menopausal attitude, well-being, and marital satisfaction as key predictors of menopausal problems. The findings highlight the need for increased awareness and targeted health interventions for menopausal women, particularly in rural areas, to improve their quality of life during this stage.

Key words: Menopause, Prevalence, Symptoms, Attitude, Marital Satisfaction

INTRODUCTION

The World Health Organization (WHO) defines natural menopause as the permanent cessation of menstruation following the loss of ovarian follicular activity. Menopause can lead to severe health complications. Firstly, it damages bone tissue, increasing the risk of osteoporosis. Secondly, it raises the likelihood of cardiovascular diseases due to age-related hypertension, weight gain, and elevated cholesterol levels. Some women experience mild symptoms that significantly disrupt their personal and social functioning, as well as their quality of life. Symptoms of menopause can begin 2-8 years before its onset. The mental symptoms of menopause include stress, mood changes, panic attacks, depression, irritability, anxiety, sleep disturbances, concentration problems, feelings of fatigue, confusion, decreased decision-making ability, impaired motor coordination, poor memory, insomnia, poor concentration, impatience, tension, and loneliness. Physical changes associated with menopause include hot flashes, cold sweats, dizziness, nausea, vomiting, breast tenderness, bloating, weight gain, skin and hair disorders, eating disorders, edema, inflammation, headaches, changes in bowel habits, and decreased coordination. Menopausal women may also exhibit changes in behavior, such as avoiding social events, decreased work performance, and spending more time at home and in bed (Gupta and Kumar., 2022).

According to India's 2011 census, there were 96 million women aged 45 years and above, with this number projected to increase to 401 million by 2026. With a life expectancy of around 30 years after menopause, on average, women in India could live a significant portion of their lives in the postmenopausal stage. Current national programs on reproductive health in India mainly focus on women between 15-45 years of age and do not extend beyond the reproductive age group. Menopausal women are often not considered until their conditions worsen. In many developing countries, menopause and its symptoms are perceived as a natural process that does not require treatment (Singh and Arora., 2021). There is a lack of awareness about the health-related complications of menopause among women in these countries. Additionally, there is a lack of policies or health programs specifically addressing the health needs of elderly women, which could help alleviate the burden experienced after menopause.

Therefore, it is necessary to raise awareness about menopausal symptoms and their management among menopausal women. Having good knowledge and a positive attitude towards menopause is important for effectively managing the associated problems. Considering the complications related to menopause and the lack of comprehensive studies on this topic in India. Hence the study was conducted with the following objectives.

OBJECTIVES
- To assess the menopausal problems, marital satisfaction and attitude towards menopause among middle-aged working and non-working women.
- To know the predictors of menopausal symptoms.

HYPOTHESES
- There is no significant association between menopausal problems with occupation of middle-aged women.
- Attitude towards menopause and marital satisfaction do not predict menopausal symptoms.

METHODOLOGY

The study was carried out in the Dharwad and Bagalkote districts of Karnataka, India, between 2017 and 2019. Cross-sectional research design was used to examine the prevalence of menopause among women in both rural and urban areas within these districts. The study participants included women in middle adulthood who had experienced menopause for at least one year. Random sampling technique was used to select 480 working and non-working middle-aged women with an equal distribution of 240 women from rural areas and 240 from urban areas. The sample included both working and non-working women, providing a comprehensive view of menopausal prevalence across different demographics.

Tools used for the study

- MRS developed by Berlin (1992) was used to know the age-related decline of physical and mental capacity. Scoring and interpretation: The tool consists of 11 questions about the menopausal symptoms. The scale has three categories such as somatic (1, 2, 3 and 11), psychological (4, 5, 6 and 7) and urogenital (8, 9 and 10) problems. The statements were rated on five-point likert scale depending on the severity of symptoms as '0' for 'none' ……. '4' for 'very severe'.

- Marital Satisfaction Scale, the scale developed by Haynes *et al,* (1992) scale with 24 items is used to know marital satisfaction. The scores ranged from 23-141 as rated by 6 point likert scale. For items 1 to 21, a score of 1, 2, 3, 4, 5 and 6 is for responses 'very dissatisfied', 'dissatisfied', 'somewhat dissatisfied', 'somewhat satisfied', 'satisfied' and 'very satisfied' respectively. The 22 and 23 have four alternative responses and the scoring follows as 4, 3, 2, and 1 from upper to lower end. For 24 items there are six alternative responses and scoring of 5, 4, 3, 2, 1 and 0 respectively. The scores obtained from each of the statements were summated to obtain the total score of marital satisfaction with a range 23-141.

- Menopause Attitude Scale (MAS) developed by Shahwar and Khalid (2003), consists of 19 items which assess the menopausal attitude. It scores as agree (1) and disagree (2). The score ranges between 19-38.

Statistics applied

a) Frequency and percentage: were used to describe the respondent's demographic characteristics, severity of menopausal problems, level of marital satisfaction and levels of attitude towards menopause.

b) Chi-square: Non-parametric test was used to find out the association between menopausal problems, attitude towards menopause and marital satisfaction with occupation of the women.

c) Correlation: Karl Pearson's correlation co-efficiency analysis was carried out to assess the degree of relationship between menopausal problems, marital satisfaction and attitude towards menopause with occupation of the women.

RESULTS AND DISCUSSION

Table 1. Prevalence of menopausal women in rural and urban area of Dharwad and Bagalkote districts

Districts	Locality	No. of women contacted (9512)	Type of menopause		Total menopausal women (n=4225)
			Natural (n=3648)	Surgical (n=577)	
Dharwad	Rural	2020	853 (92.52)	69 (7.48)	922 (100)
	Urban	1600	1199 (88.30)	159 (11.70)	1358 (100)
Bagalkote	Rural	3290	639 (91.81)	57 (8.19)	696 (100)
	Urban	2602	957 (76.62)	292 (23.38)	1249 (100)

Figures in the parenthesis indicates percentage

Table 1 depicts the prevalence of menopausal women in Dharwad and Bagalkote districts. Total 9512 women were contacted in which 4225 women had menopause. Among them 92.52 per cent acquired menopause due to cessation of menstruation naturally in rural area. Similar trend was observed in Bagalkote rural area. In urban area of Dharwad district, 88.30 per cent and 11.70 per cent of the women had natural and surgical menopause due to removal of uterus. But in Bagalkote district, 23.38 per cent of the respondents underwent hysterectomy. Similar results were found by Bhat., 2018 where 81 per cent of the women had natural menopause and 19 per cent of them underwent hysterectomy in rural area of Manglore district. Similar finding observed by Patel *et al.* (2017) revealed that 75-80 per cent had natural menopause while 18-21 per cent of the women underwent surgery in urban area.

Table 2: Demographic characteristics of menopausal women

n=480

Characteristics	Variables	Dharwad		Bagalkote	
		Rural (n=120)	Urban (n=120)	Rural (n=120)	Urban (n=120)
Age (years)	35-39	20 (16.67)	16 (13.33)	23 (19.17)	14 (11.67)
	40 – 45	31 (25.83)	28 (23.33)	36 (30.00)	34 (28.33)
	46 – 50	38 (31.67)	37 (30.84)	32 (26.67)	41 (34.17)
	51 – 55	31 (25.83)	39 (32.50)	29 (24.16)	31 (25.83)

Occupation	Non-working	Housewife	60 (50.00)	60 (50.00)	60 (50.00)	60 (50.00)
	Working	Farm laborers	31 (25.83)	22 (18.33)	36 (30.00)	13 (10.83)
		Self employed	11 (10.00)	15 (12.50)	10 (8.33)	20 (16.67)
		Daily wagers	18 (15.00)	23 (19.17)	14 (11.67)	27 (22.50)
Education		High school	10 (8.33)	20 (16.67)	15 (12.50)	18 (15.00)
		Primary	45 (37.50)	68 (56.67)	35 (29.17)	49 (40.83)
		Illiterate	65 (54.17)	32 (26.67)	70 (58.33)	53 (44.17)
Caste		Upper caste	35 (29.17)	30 (25.00)	17 (14.17)	12 (10.00)
		OBC	47 (39.17)	66 (55.00)	53 (44.17)	59 (49.17)
		Dalits	25 (20.83)	15 (12.50)	31 (25.83)	28 (23.33)
		Tribals	13 (10.83)	9 (7.50)	19 (15.83)	21 (17.50)
No of children		1 – 2	19 (15.83)	46 (38.33)	13 (10.83)	34 (28.33)
		3 – 4	61 (50.83)	47 (39.17)	87 (72.50)	62 (51.67)
		5 – 6	40 (33.33)	27 (22.50)	20 (16.67)	24 (20.00)
SES of the family		Upper High	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
		High	9 (7.50)	20 (16.67)	11 (9.17)	17 (14.17)
		Upper Middle	32 (26.67)	42 (35.00)	26 (21.67)	57 (43.33)
		Lower Middle	51 (42.50)	39 (32.50)	48 (40.00)	25 (20.83)
		Poor	28 (23.33)	19 (15.83)	35 (29.17)	21 (17.50)
		Very poor	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)

Figures in the parenthesis indicates percentage

The socio-demographic characteristics of the sample are presented in the Table 2. The age ranged between 35 to 55 years. About (26-34%) of the women aged between 46-50 years while 24-32 per cent of them were aged between 51-55 years followed by 40-45 years (23-30%) and 35-39 years (11-19%). Half of the respondents (50%) were homemakers while 10-30 per cent were involved in farm activities and 11-22 per cent of them worked as daily wagers and 8-16 per cent of the women were self-employment. More than half (54-58%) of the rural women were illiterate while 37-40 per cent of the rural women completed primary school and 8-15 per cent had not attended school. Whereas among urban area, 40-56 per cent were completed primary school and 15-16 per cent of them had high school and 26-44 per cent of them had not attended school. With respect to caste, 39-55 per cent of the women from Dharwad district belonged to Other Backward Class (OBC) followed by 25-29 per cent upper caste. Whereas in Bagalkote district, majority (44-49%) of the women belonged to Other Backward Class

(OBC) followed by 23-25 per cent who were dalits. On an average 50-70 per cent of a rural women had 3-4 children in their family, in contrast 28-38 per cent of them had 1-2 children, 39-50 per cent of them had 3-4 children in their family but 16-33 per cent of the respondents had 5-6 children in their family both in urban and rural area. Socio-Economic Status (SES) of the family assessed by Aggarwal tool according to score obtained showed that, majority (35-43%) of the respondents belonged to lower middle SES status followed by upper middle class (20-32%) and 15-29 per cent of them were in poor SES category in both rural and urban area of Dharwad and Bagalkote district. In all the demographic characteristics did not differ much in the two districts. The study was conducted by Batool *et al.* (2017) the respondents were aged between 40-55 years and 53 per cent of the rural women were illiterate. Another study conducted by Goktas *et al.,* 2015 majority (43.30%) were aged between 40-45 years, 39 per cent were illiterate and 52 per cent were working and 43 per cent were non-working menopausal women.

Table 3: Distribution of working and nonworking women by menopausal problems

n = 480

Area	Occupation	Problems	Category			χ^2	r-value
			Mild	Moderate	Severe		
Rural	Non-working (n=120)	Somatic	25 (20.83)	61 (50.83)	34 (28.33)	38.12**	0.53**
		Psychological	50 (41.67)	48 (40.00)	22 (18.33)		
		Urogenital	73 (60.83)	32 (26.67)	15 (12.50)		
	Working (n=120)	Somatic	26(21.667)	57 (47.50)	37 (30.83)		
		Psychological	31 (25.83)	48 (40.00)	41 (34.17)		
		Urogenital	61 (50.83)	36 (30.00)	23 (19.17)		
Urban	Non-working (n=120)	Somatic	28 (23.33)	52 (43.33)	40 (33.33)	40.17**	0.43*
		Psychological	20 (16.67)	46 (38.33)	54 (45.00)		
		Urogenital	55 (45.83)	38 (31.67)	27 (22.50)		
	Working (n=120)	Somatic	39 (32.50)	57 (47.50)	24 (20.00)		
		Psychological	19 (15.83)	53 (44.17)	48 (40.00)		
		Urogenital	78 (65.00)	29 (24.17)	13(10.83)		

Figures in the parenthesis indicates percentage   *significant at 0.05 level

**Significant at 0.01 level

Distributions of working and non-working women by menopausal problems are presented in the Table 3. Among non-working rural women half (50%) of the respondents were had moderate level of somatic problems followed by severe (28.33%) and mild (20.33%) level of somatic problems. Whereas among psychological problems, 41.67 per cent of them had mild level of problems while 58.33 per cent were had moderate and above moderate level of problems. Surprisingly 60 per cent of them had mild urogenital problems. Similar trend was observed in urban working women. Among working rural

women, majority (47.50%) of the women had moderate level of problems while 30.33 per cent severe and 21.67 per cent had mild level of somatic problems. In psychological problems, 40 per cent had moderate level of problems followed by severe (34.17%) and mild level of problems (25.83%). Half (50.83%) of them experienced mild level of Urogenital problems. Similar trend was observed in urban non- working women. There was significant association observed between occupational status and menopausal problems in both localities. Similarly, there was significant relationship with occupation and menopausal problems of both working and non-working women. The study conducted by Salik and Kamal (2015) reported that 56-60 per cent of the both working and non-working women from had somatic problems and 40 per cent of working Panjab urban women had psychological problems as against 15 per cent of non-working women. The similar results were found by Ali *et al.* (2015) reported that age at menopause and education levels were independent risk factors predicting more severe menopausal symptoms.

Table 4: Menopausal attitude among working and non-working women

Nn= 480

Area	Occupation	Menopausal attitude		χ^2	r- value
		Low	**Favorable**		
Rural	**Working (n=120)**	51 (44.17)	69 (55.83)	61.11**	0.53**
	Non-working (n=120)	69 (57.50)	51(42.50)		
Urban	**Working (n=120)**	56 (46.67)	64 (53.33)	56.34**	0.48**
	Non-working (n=120)	78 (65.00)	42 (35.00)		

Figures in the parenthesis indicates percentage   *significant at 0.05 level
**significant at 0.01 level

Menopausal attitude among working and non-working women are represented in Table 4. More than half (53-55%) of working women of rural and urban area expressed favorable attitude as against 35-42 per cent of non-working women. Majority (57-65%) of non-working women of rural and urban area had low menopausal attitude than 44-46 per cent of working women. There was highly significant association and relationship between working status and menopausal attitude and there was significant association and relationship observed between non-working status and menopausal attitude in both rural and urban area. The study conducted by Akoijam *et al.* (2015) also indicated that 80.00 per cent of the women had positive attitude were aged between 45-55 years against 20.00 per cent of women who attained early menopause (<40 years).

Table 5: Distribution of working and non-working menopausal women by marital satisfaction

n = 480

Area	Occupation	Marital satisfaction			χ^2	r- value
		Low	Average	High		
Rural	Working (n=120)	28 (23.33)	52 (43.33)	40 (33.33)	35.86*	0.29*
	Non-working (n=120)	37 (30.83)	54 (45.00)	29 (24.17)		
Urban	Working (n=120)	25 (20.83)	48 (40.00)	47 (39.17)	29.03*	0.21*
	Non-working (n=120)	42 (35.00)	56 (46.67)	22 (18.33)		

Figures in the parenthesis indicates percentage   *significant at 0.05 level

Distribution of working and non-working women by marital satisfaction is represented in Table 5. Among rural women, 43-45 per cent of them had average level of marital satisfaction while 23-30 per cent had low and 24-33 per cent had high level of marital satisfaction in both the districts. There was significant association and relationship found between occupational status and marital satisfaction. Whereas among urban women, 40- 46 per cent of both working and non-working women reported average level of marital satisfaction while 39.17 per cent of the working women had high satisfaction as against 18.33 per cent of non-working women and 20.83 per cent of working and 35 per cent of non-working women expressed low marital satisfaction. Similarly, Jamali *et al.,* 2017 revealed that marital satisfaction was higher in working than non-working women. Late age at menopause and better education level gave scope to women know about menopausal problems and remedies. The working women reported that there was a significantly negative relationship between menopausal symptoms and marital satisfaction (Sis and Turkan in 2013).

Table 6: Predictor variables (Stepwise regression) with menopausal problems of working and non-working women

Model		Unstandardized coefficients		Standardized coefficients	t	Sig.	F	Sig
		B	Std. error	Beta				
1	(Constant)	59.384	1.276		17.472	0.000	96.121	0.000ᵃ
	Attitude	1.205	0.327	0.103	-1.987	0.014		

2	(Constant)	78.306	5.670		11.403	0.000	61.402	0.000[c]
	Attitude	.796	0.098	0.372	9.153	0.000		
	Marital satisfaction	0.616	0.734	1.152	2.980	0.000		

Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the
1	0.295[a]	0.155	0.148	5.17
2	0.654[b]	0.378	0.372	9.622

a. Predictors: (Constant), attitude
b. Predictors: (Constant), attitude, marital satisfaction

The predictor variables of menopausal problems of non-working rural women are presented in Table 6. A step wise multiple regression analysis with predictor variables included are menopausal attitude and marital satisfaction with menopausal problems among non-working women. Model 1 shows menopausal attitude alone predicts upto 15 per cent, model 2 indicates that menopausal attitude and marital satisfaction influence upto 37 per cent. Thus, menopausal attitude and marital satisfaction are the significant predictors of menopausal problems of working and non-working rural and urban middle-aged women.

CONCLUSION

The study conducted across the Dharwad and Bagalkote districts of Karnataka, India, between 2017 and 2019, provides insightful conclusions regarding the prevalence and impact of menopause among women in rural and urban areas. The findings indicate a higher prevalence of natural menopause among women in rural areas compared to urban areas, where a significant proportion of women experienced surgical menopause. The study also highlights the socio-demographic factors influencing menopausal experiences, with notable differences in education levels, occupational status, and socio-economic status between rural and urban women. The analysis revealed a significant relationship between occupational status and the severity of menopausal symptoms, with working women generally reporting more severe psychological and somatic symptoms than non-working women. Moreover, the study found a significant association between menopausal attitudes and marital satisfaction, suggesting that positive menopausal attitudes and higher marital satisfaction are linked to fewer menopausal problems. Overall, the study underscores the importance of addressing socio-cultural and occupational factors in managing menopausal health and improving the quality of life for menopausal women in both rural and urban settings.

IMPLICATIONS

The study's findings have several important implications for public health and social interventions in Karnataka. The significant prevalence of menopause, especially natural menopause, across both rural and urban areas highlights the need for targeted health services to support women during this transition. The association between occupational status and menopausal symptoms suggests that working women might have better coping mechanisms or access to resources, emphasizing the need for increased awareness and support for non-working women. Furthermore, the strong relationship between menopausal attitude, marital satisfaction, and the severity of menopausal symptoms indicates the importance of psychosocial factors in managing menopause. Therefore, comprehensive programs that include health education, psychological support, and marital counseling could greatly enhance the well-being of menopausal women, particularly in rural areas where educational and economic opportunities are limited.

SUGGESTIONS FOR FUTURE RESEARCH

- Investigate the long-term effects of menopause on overall health and well-being in both rural and urban populations.
- Explore the role of cultural attitudes, social norms, and support systems in shaping women's menopausal experiences.
- Evaluate the effectiveness of educational programs, psychological support, and lifestyle interventions in managing menopausal symptoms and improving quality of life.
- Study the relationship between menopause and other health conditions like cardiovascular disease or osteoporosis to develop integrated healthcare strategies.

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THE INTERRELATIONSHIP BETWEEN EGO STATES AND IDENTITY STATUSES OF TRANSGENDERS

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ABSTRACT

Adams and Flitch's (1981) study suggested that awareness of ego stage development could determine identity statuses as competently as identity statuses could be used to determine ego stage development; thus, indicating that awareness about either one (ego stage or identity status) was equally good in determining the other, though literature on the topic was scarce to prove or disprove the finding. To address this gap, a study focused on understanding the relationship between ego states and identity statuses in transgender youth. Using a descriptive research design, 95 transmen and 105 transwomen were randomly selected. Standardized tools, the Ego State Questionnaire (ESQ) by Loffredo and Omizo, and the Identity Status Scale by Bennion and Adams were employed. Canonical correlation analysis revealed a significant relationship between ego states (adult, child, nurturing, controlling parent) and identity statuses (ideological and interpersonal domains) among transgender individuals. Adult ego state emerged as the primary influencer, followed by the child ego state, particularly impacting interpersonal moratorium status. Thus, facilitating a smooth transition between adult and child ego states appears crucial for fostering positive identity statuses in transgender individuals. Additionally, transgender individuals were identified to exhibit a Rationalised Social Inclination based on the labelled canonical function.

Keywords: Transgender, Ego States and Identity Statuses

INTRODUCTION

Every human is a social being and lives in a society, wherein a great amount of the energy is spent on psychologically engaging with others living in that society. There is a need for everyone to receive validation from others for who they are and want to see themselves mirrored in others' eyes. If every process goes well, a person would feel validated and confirmed. Is it the case for transgenders?

They do receive negative messages back from society as it does not match their internal experiences/feelings. Hence, they are psychologically distressed leading to maladaptive behaviours.

"In India, there exist multitudes of socio-cultural groups of transgender people like hijras, and other transgender identities like – *Aradhis, Sakhi, Jogtas, Jogappas, Aravanis, Kinnar,* etc." (Chatterjee, 2018). Members of these subgroups face extreme discrimination, ostracization, and harassment even today. The transgenders experience unfair treatment, gender-based violence, and abuse of all forms – verbal, sexual, economic, physical, psychological, emotional, etc. They are sidelined and treated as untouchables, due to which they are omitted from actively partaking in socio-cultural life; economics, politics, and decision-making processes. One of the many challenges faced by transgenders is identity conflict. "Due to the intersection of minority identities that they hold, transgenders are at higher risk for mental health issues than the general population (LaMartine, Brennan-Ing, and Nakamura, 2018)".

"Transgender identity development as described by Levitt and Ippolito in 2014, is a process of balancing the desire to be one's true self with considerations of consequences to transition, coping skills, and available resources. Self-awareness about the transgender identity often occurs around the onset of puberty". "Self-identification with others and expression in public occur later in adolescence and young adulthood" (Doyle, 2022). For transgender people, "internally recognizing and externally expressing an identity can be a complex shifting process, requiring careful navigation of potentially supportive or hostile social circumstances" (Brumbaugh-Johnson & Hull, 2018; Lewis *et al*., 2022). Hence there is every possibility for the transgender to have a marked deviation in the sense of self-identity, leading to role confusion.

As the current literature lacks a model to theorise the process of identity development among transgenders, the investigator explored every psychological construct related to identity development in general. One such construct is ego state development. Soldatovaa and Shlyapnikovaa, (2013) said that the "achievement of ego identity is a necessary component, and condition for the achievement of personality maturity".

Again, the literature pertaining to the association between identity development and ego state are scarce and dated to the olden days. This in turn instigated the curiosity of the investigator to explore its relationship in the current scenario with a vulnerable population – the transgenders. A few studies carried out several years ago related to the area of current research are as below.

Adams and Shea (1979) studied the correlation between identity status and ego state development. Among the 249 students, identity-achieved respondents were found to be much more advanced in their ego stage development, whereas, the students in identity diffusion were comparatively less advanced in their development.

A study by Adams and Flitch, (1981)**,** with a Cross-Lag analysis presumed that awareness about ones' ego development might be used to determine his or her identity status as competently as identity status could be used to determine ego stage development. The results indicated that awareness about either one (ego stage or identity status) was just as good in determining the other.

With the realization that an individual needs to have a positive identity and that identity development could be predicted by their ego state, the current research gains importance in identifying the

predictive role of identity status and ego state among transgenders. Also, the study is deemed to be important to fill in the research gap of fewer studies on identity status and ego states.

OBJECTIVES

- To explore the relationship between ego states and identity statuses of transgenders.
- To determine the contributing ego state toward a positive identity status among transgenders.

HYPOTHESIS

- H_o1: There is no significant relationship between ego states and identity statuses

METHODOLOGY

A simple random sampling method was adopted. A total sample of 200 transgenders (95 transmen and 105 transwomen) within the age ambit of 18 to 24 years was identified from the state of Manipur. A set of 2 tools were used to secure adequate information required for the study

i) Ego State Questionnaire (ESQ) by Loffredo and Omizo: It had 61 items distributed within three scales – adult (calm, rational, analytical, unemotional, logical, and reasonable); child (impulsive, spontaneous with feelings, needs, and wants) and parent ego state having two subscales namely - nurturing parent (protectiveness, caring, indulgent) and controlling parent (organizing, monitoring, and critical). Each of the statements has to be marked with either a '+' (agree) or a '–' (disagree) sign in the space provided. To arrive at the total score on all four ego states, a score of '1' is to be given for all statements marked with '+'. Statements answered with '–' or not answered need not be scored. The lowest score for each ego state was 1 and the highest score would be as per the number of questions in each ego state: 12 for the nurturing parent, 13 for the controlling parent, (which makes it, 25 in total for the parent ego state), 17 for child and 19 for the adult ego state. Though there is no time limit for the questionnaire, the respondents could complete the scale in twenty minutes.

ii) Identity Status Scale by Bennion and Adams: The scale comprised 64 close-ended items. The items were equally distributed within two dimensions i) ideological identity and ii) interpersonal identity, and each dimension had items on the four paths of identity development - achievement, foreclosure, moratorium, and diffusion. Altogether, the scale has eight categories with eight items in each category. The scale has to be scored on a five-point rating scale with 1 - 5 allotted for strongly disagree, disagree, neutral, agree, and strongly agree. The minimum score for each state will be 16 and the maximum score was 80.

After the initial arrangement of acquiring permission, and consent from the concerned authorities and participants the data collection was carried out. The data was analyzed statistically using Canonical Correlation Analysis (CCA) as the present study had two sets of variables – ego states and identity statuses of transgenders. Moreover, CCA was used to ascertain and measure the relationship between two sets of intercorrelated outcome variables, CCA analysis determines a set of canonical variates, orthogonal linear combinations of the variables within each set that best explain the variability both within and

between sets. The first set of the variable is the ego state (latent variable 1) comprising 4 variables namely –nurturing and critical parent, adult and child ego-state (observed variables of latent variable 1) and the second set of variables is the identity status (latent variable 2) that has 8 observed variables namely - diffusion, foreclosure, moratorium, achievement in the ideological domain and diffusion, foreclosure, moratorium, achievement in the interpersonal domain. Hence two latent variables with 4 and 8 observed variables respectively become the data set to analyze the variability of the first latent variable over the second latent variable.

RESULTS

Majority of transgender were graduates (37.5%). While analyzing the age of realization of being a transgender 53.2% of them had their realization were between 8-10 years. It was also noted that 60% of the selected respondents are employed in job such as teaching, media-related and beautician.

The canonical correlation analysis was performed using the four ego states as predictors and the eight Identity Statuses of the transgenders as outcomes. The multivariate and shared relationships among the two variable sets (i.e. ego states and identity status) were displayed in Table 1.

The table shows a statistically significant complete model with Wilk's λ of 0.778, $F(32,694)=1.532$, $p=.032$. Accordingly, the hypothesis H_o1 stating there was no relationship between the

Table 1: Multivariate test of significance between ego states and identity status of transgenders

Test Name	Value	Approx. F (df1, df2)	Sig.
Wilks	.778	1.532 (32, 694)	.032

Ego States and Identity Statuses was rejected. Hence, it can be concluded that there was probably a relationship between ego states and identity status. This statistical significance does not share the information regarding the magnitude of the relationship, as Wilk's λ indicates the variance unexplained by the model. As 1- λ yields the full model effect size in an R^2 metric, the R^2 type effect size was 0.222, which indicated that the full model explained about 22% of the variance shared between the ego states and identity statuses of the transgenders.

The results of the dimension reduction analysis, carried out to test hierarchical arrangement of functions for statistical significance was shown in Table 2.

Table 2: Eigenvalues and canonical correlations of the four functions

Root No.	Eigen value	Pct.	Cum. Pct.	Canon Cor.	Sq. Cor	F (df1, df2)	Sig.
1 to 4	.15742	59.27007	59.27007	.36880	.13601	1.532(32,694)	.032
2 to 4	.06867	25.85518	85.12525	.25350	.06426	.966(21,543)	.505
3 to 4	.03678	13.84838	98.97363	.18835	.03548	.621(12,380)	.825
4	.00273	1.02637	100.00000	.05214	.00272	.104(5,191)	.991

Canonical correlation analysis generates as many canonical functions/variates as there are variables in the smaller set. Here in this case the ego state is smaller variable set with four variables. Accordingly, the output gave four functions with squared canonical correlations (R_c^2) of 0.136, 0.064, 0.035, and .003 for each successive canonical variate (function). The first function alone was significant with $F(32,695)=1.532$, $p=.032$. Though the entire model was statistically significant with R^2 explaining a 22 percent variance, the effect size in an R^2 metric for functions 1 to 4 was only 13.6, which indicated that function 1 could explain 14% of the variance shared between the ego states and the identity status of transgenders. The subsequent functions named 2 to 4, 3 to 4, and 4 by itself with $F(21,543)=0.966$, $p=.505$; $F(12,380)=0.621$, $p=.825$; and $F(5,191)=0.104$, $p= .991$ did not explain a statistically significant amount of shared variance between the ego states and identity status of transgenders after the extraction of the prior functions.

Table 3 presents the standardized Canonical function coefficients (Coff.) and Structure coefficients (R) for function 1. The Squared structure coefficients ($R^{2)}$ and the communalities (h^2) across this function for each variable were also computed.

Table 3: Canonical solution for predicting ego states and identity status of transgenders for function 1 and function 2

VARIABLES	Function 1			$h^2(r^2\%)$
	Coef.	r_S	r^2	
Ideological Diffusion	-.308	.307	9.42	9.42
Ideological Foreclosure	.211	**.505**	25.50	25.50
Ideological Moratorium	.065	.429	18.40	18.40
Ideological Achievement	.333	**.646**	41.73	41.73
Interpersonal Diffusion	-.104	.383	14.67	14.67
Interpersonal Foreclosure	-.442	.077	0.59	0.59
Interpersonal Moratorium	1.049	**.861**	**74.13**	**74.13**
Interpersonal Achievement	-.217	.387	14.98	14.98
R_c^2			**13.6%**	
Indulgent Parent	.331	**.576**	33.18	33.18
Critical Parent	-.320	.055	0.30	0.30
Adult	.605	**.798**	**63.68**	**63.68**
Child	.480	**.717**	**51.50**	**51.50**

Note: Structure coefficients(rs) greater than|.45| are highlighted. Communality coefficients(h^2) greater than 45% are highlighted. Coef=standardized canonical function coefficient; r_s=structure coefficient; r^2= sruared structure coefficient; h^2= communality coefficient.

To identify the contributing variables, the structure coefficients more than .45 are highlighted based on the thumb rule of canonical analysis.

Concerning the criterion variable set in Function 1, the interpersonal moratorium status (.861) and ideological achievement status (.646) were the primary contributors to the synthetic criterion variable with a secondary contributor being the ideological foreclosure (.505). Moreover, the structure coefficient (r_s) for all of the contributing criterion variables was positive indicating a direct relationship between these variable structures. These identity statuses with the exception of Interpersonal achievement did not have larger canonical function coefficients. Nevertheless, the squared structure coefficients (r^2) based on the thumb rule of canonical analysis support only interpersonal moratorium status.

Looking at the structure coefficients (r_s) of the predictor variable in Function 1, the relevant predictor variable was primarily the adult ego state (.798) and child ego state (.717) with indulgent parent ego state (.576) making the secondary contribution to the predictor synthetic variable. Furthermore, with the exception of the indulgent parent ego-state, all of these variables' structure coefficients had the same sign, indicating that they were all positively related. The indulgent parent ego-state was inversely related to the other ego-states. These ego states also tended to have larger canonical function coefficients. However, the conclusion was supported only for the adult (64%) and child (51%) ego states through squared structure coefficients (r^2).

As the current analysis had only one statistically significant function/variate, the squared structure coefficient (r^2) explaining the percentage of variance explained by that particular variable was equal to the communalities (h^2). Accordingly, the table has the highlighted values of communalities that are greater than 45%. Accordingly, two ego states - adult (63.68%) and child ego state (51.27%) – and one path to identity belonging to the interpersonal dimension – interpersonal moratorium (74.132%) explain a significant relationship with each other. Moreover, the table also provides a picture of a lot of variables not useful to the whole model. Consequently, it can be seen that the indulgent (33%) and critical parent (.3%) made a marginal and meagre contribution respectively as predictor, hence indicating that it may not have been strongly related to the identity status. In terms of the criterion variables, it can be seen that only the interpersonal moratorium made contributions as the criterion variable to the whole model and none of the variables made any contribution towards the model as a criterion, thereby suggesting that it might not have been strong connected to the ego states.

Looking at the function 1 results as a whole, it was seen that the transgenders had a dominant adult ego state (predictor 1) and were switching over to the child ego state (predictor 2) and hence on the path of interpersonal moratorium (criterion). Moreover, it was also established that there was direct relationship between the contributing ego states and the identity status of the transgenders.

DISCUSSION

In sum, figure 1 portrays that there was probably a relationship between the ego states and the identity status of transgenders. Altogether a transgender is set to lead a path of an interpersonal moratorium when they have a dominant adult ego state explaining the communalities of 64%. However, the child ego state also becomes the next contributing factor explaining the 51% variance to the interpersonal moratorium status.

A study by Tiwali (2020) on Veronika's Ego-States from the book "Veronika Decides to Die" by Paulo Coehlo was concordant with the present finding. The analysis of the character showed that the adult ego state was the dominant one, and that provides proof that individuals with a dominant adult ego state are independent enough to decide life for themselves and determine what is right and wrong for their personal and psychosocial development. Following which, another study (Bargavi, 2021) adds to the evidence stating that early millennial leaders (elder), i.e., people who are born between 1980 -2001 are said to be high in the adult ego state, showing they have attained maturity through experience, and late millennial (1991- 2001) are said to display child ego state, where they lack experience in terms of comparison between the two generations. Furthermore, the parent ego state (both the critical and indulgent) does not contribute to better identity statuses for both the early and millennial leaders.

The present study showed that transgender youth are in a place of the interpersonal moratorium, which has been highly influenced by the adult ego state, followed by the child ego state. Individuals with a dominant adult ego state are the ones who are objective, rational, with high problem-solving capacity, and have precise decision-making ability. They think and act based on the present situation. Based on the structural model of ego states, the child ego state explains the adaptive behaviours that can act as a survival instinct within a person. These are said to be old memories that cannot be remembered at the conscious level. Identity-moratorium path of the transgenders in the interpersonal domain indicates an emergent/exploratory identity in terms of social inclination that they perceive and the moratorium path is said to be a positive state as it is believed that the crisis at this stage helps them to cross the period of exploration and could make an obligation to the choice that they have picked as the result of exploration.

To enable the transgenders to overcome the odds that they face, identity achievement in both domains becomes imperative. As the interpersonal identity statuses are predicted by a smooth transition shift between adult and child ego states, the transgenders need to be trained on the same. The flexibility in shifting between the two ego states - adult and child - by incorporating the present and tapping into past experiences could create an avenue for the transgender youth to make full use of their potential in life, thus, making them fall in the path of identity achievement.

Altogether, the results imply that a transgender would be able to step into the emergent identity status with rational thinking (Adult ego state) along with survival instincts (Child ego state). However, the R^2 metric clearly depicts that the survival instincts of transgenders should not overpower their rational thinking for a better interpersonal identity. With this theoretical background and the expected relationships between rationalized thinking and social inclination as perceived by oneself, function 1 could be labeled as Rationalised Social Inclination.
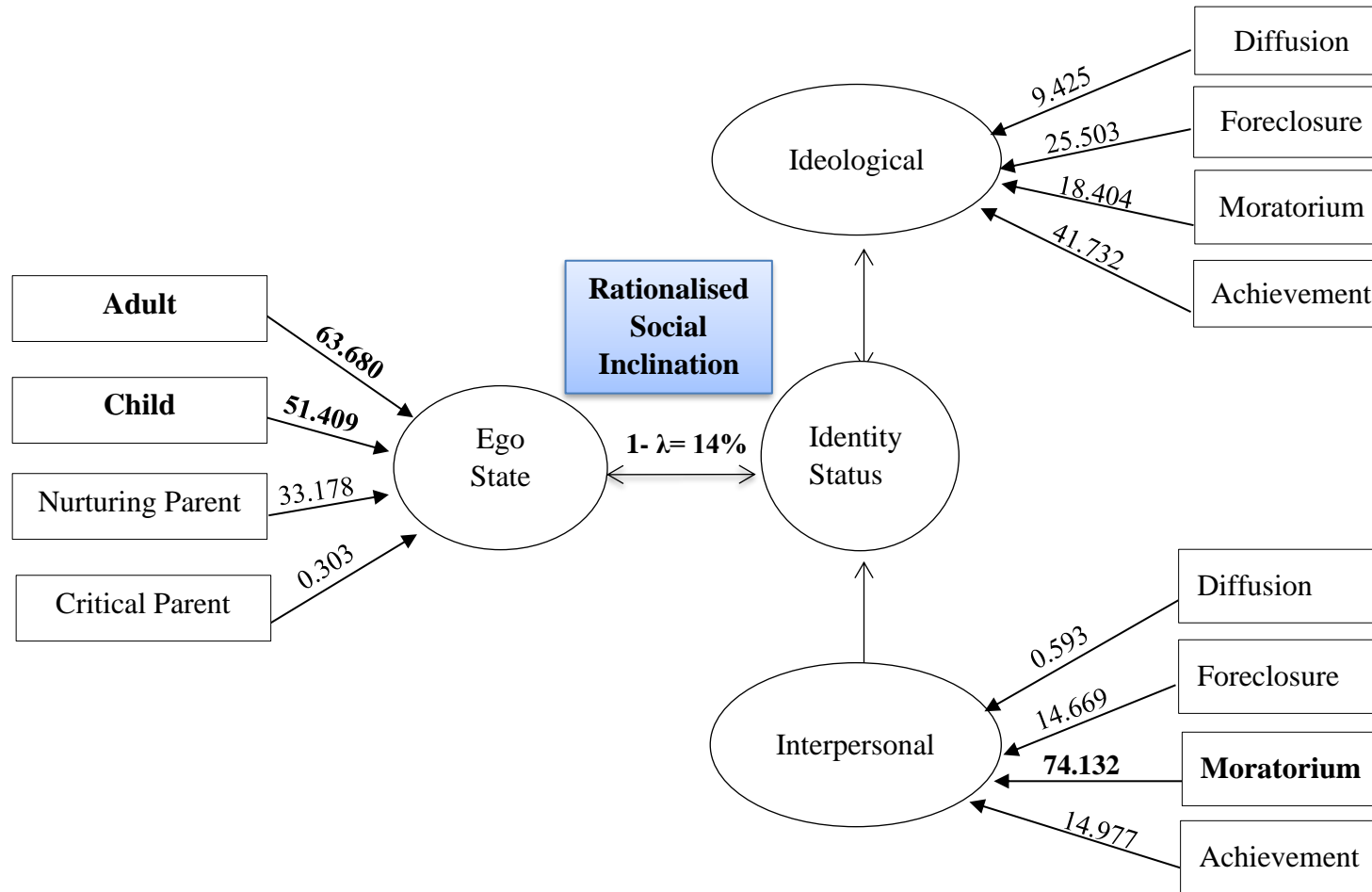
Figure: 1 Canonical model showing the relationship between the ego states and the identity statuses of transgenders for Function 1-Rationalised Social Inclination

RECOMMENDATIONS

Previous literature has provided ways in which the identity statuses of adolescents and youth from the non-transgender population can be improved using Transactional Analysis. Keeping this in mind, the investigator takes the support of the studies mentioned below to implement the same on the transgenders to help improve their positive identity status.

Petruzzi (2023) says that the vital objective of Transactional Therapy (TA) is to move clients closer to their adult ego state. This ego has a secure frame of mind with a mature perspective. The adult ego state is said to have access to all sorts of information, be it internal or external, which is why it is the ultimate goal of TA to strengthen the adult state.

According to the result of a Syrian study (Morad, 2020), it shows that the training provided to increase the adult ego state proves to be beneficial with regard to emotional stability after the 45-day training period where the effect remains 95% above its level. Hence, the intervention TA with the transgender would help them to sustain in the adult ego state and to develop the ability for personal change as well as growth.

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Annexure -1

SPSS output on Canonical Correlation Analysis of Ego states and Identity Statuses of Trangenders

Statistical significance Test for the Full Canonical Correlation Model

Effect... Within Cells Regression Multivariate Tests of Significance (S = 4, M = 1 1/2, N = 93)

Test Name	Value	Approx. F	Hypoth. DF	Error DF	Sig. of F
Pillais	.23847	1.51359	32.00	764.00	.035
Hotellings	.26561	1.54798	32.00	746.00	.028
Wilks	.77767	1.53237	32.00	694.90	.032
Roys	.13601				

Eigenvalues and Canonical Correlations

Root No.	Eigenvalue	Pct.	Cum. Pct.	Canon Cor.	Sq. Cor
1	.15742	59.27007	59.27007	.36880	.13601
2	.06867	25.85518	85.12525	.25350	.06426
3	.03678	13.84838	98.97363	.18835	.03548
4	.00273	1.02637	100.00000	.05214	.00272

Dimension Reduction Analysis

Roots	Wilks L.	F	Hypoth. DF	Error DF	Sig. of F
1 TO 4	.77767	1.53237	32.00	694.90	.032
2 TO 4	.90009	.96591	21.00	543.26	.505
3 TO 4	.96190	.62104	12.00	380.00	.825
4 TO 4	.99728	.10414	5.00	191.00	.991

Standardized canonical coefficients for DEPENDENT variables

Variable	Function No.			
	1	2	3	4
Indulgen	.33069	-.42685	.29880	.89278
Critical	-.31966	-.86919	-.41553	-.34293
Adult	.60534	-.07826	.61834	-.68207
Child	.47987	.49645	-.89662	.06829

Correlations between DEPENDENT and canonical variables

Variable	Function No. 1	2	3	4
Indulgen	.57589	-.50215	.07894	.64028
Critical	.05479	-.84454	-.45889	-.27049
Adult	.79802	-.22581	.26458	-.49211
Child	.71687	.06832	-.69386	-.00064

Standardized canonical coefficients for COVARIATES

Covariate	Canonical Variable 1	2	3	4
IDD	-.30807	-.60400	.95877	-.04026
IDF	.21078	-.18287	-.75772	.04073
IDM	.06526	.26910	-.05347	.15333
IDA	.33309	.95612	.28952	.11105
IND	-.10430	-.16241	-.24559	1.08896
INF	-.44162	-.08124	-.09866	-.26765
INM	1.04883	-.02832	-.04066	-.62289
INA	-.21679	-.93613	.15651	-.01481

Correlations between COVARIATES and canonical variables

Covariate	Canonical Variable 1	2	3	4
IDD	.30736	-.45399	.57890	.23583
IDF	.50548	-.42504	-.35203	.14094
IDM	.42882	-.33232	.08256	.04952
IDA	.64637	.16976	.33548	.21404
IND	.38254	-.29547	-.11621	.79553
INF	.07671	-.39588	-.38520	-.24100
INM	.86058	-.38414	-.02070	-.06529
INA	.38733	-.51719	.11585	-.06197

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PERCEPTION ABOUT MOOCS AMONG COLLEGE TEACHERS (GOVERNMENT, PRIVATE, AND SEMI-GOVERNMENT INSTITUTIONS) IN BIHAR

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ABSTRACT

The study titled *" Perception About MOOCs Among College Teachers (Government, Private, and Semi-Government Institutions) in Bihar"* aims to explore the perceptions of Massive Open Online Courses (MOOCs) among college teachers from government, private, and semi-government institutions in Bihar. This study analyzes the awareness, usage, perceived effectiveness, and challenges associated with MOOCs. A sample of 150 college teachers (50 from each type of institution) was selected using a random sampling method from Muzaffarpur District, Bihar. A self-developed interview schedule was used to collect the required information for the study, covering all aspects outlined in the objectives.

The study reveals that private college teachers in Bihar show the most favorable perception and integration of MOOCs, while government and semi-government teachers face infrastructural challenges and limited institutional support. Adoption varies, with private institutions leading in usage, while barriers like technology access and low student engagement affect all institutions. Enhancing institutional support and overcoming these challenges is key to maximizing MOOCs' potential in Bihar's higher education system.

 Keywords - Awareness, College teachers, MOOCs, Perceptions

INTRODUCTION

Massive Open Online Courses (MOOCs) have gained notable recognition as an innovative approach to learning in the digital era. Their flexible, scalable, and often free nature makes them appealing to both educators and learners. In India, the use of MOOCs has grown in recent years, driven by initiatives such as SWAYAM, a government-backed MOOCs platform. However, the perception and adoption of MOOCs among college teachers remains a critical area of exploration, especially as the landscape of education continues to evolve post-pandemic.

MOOCs present vast opportunities for countries like India, enabling access to education in areas where traditional systems may not reach. In recent years, several Indian platforms have been launched to support this initiative. One of the earliest efforts was the NPTEL project, introduced in 2003 by the MHRD with the support of IITs and IIScs, offering courses in fields such as Computer Science, Engineering, Management, and Humanities.

In 2012, IIT Kanpur introduced MOOKIT, followed by IIT Bombay in 2014, which enables blended learning by allowing leading Indian universities to offer MOOCs to local college students. SWAYAM, launched in 2016, is a key initiative aiming to integrate MOOCs with the formal education system, allowing students to earn 40% of their course credits through online courses as per UGC guidelines. Another unique platform is the agMOOCs consortium, India's first MOOCs platform focused on agriculture, developed by IIT Kanpur in partnership with the Commonwealth of Learning, Canada.

In addition to these, private entities have also introduced profit-driven MOOCs platforms like Apna Course and MyBSchool. These initiatives reflect the growing recognition of the potential of MOOCs by Indian academics, who are actively working to expand and develop this form of education.

Advancements in information and communication technologies have influenced individuals globally, including within the academic sphere. Educators and scholars are examining how technology can enhance the impact and productivity of education, thus promoting learning (Hew & Brush, 2007). One form of innovation that has gained traction is MOOCs. MOOCs are delivered in a digital format but differ from earlier methods of digital learning (Alraimi, Zo, & Ciganek, 2015). Massive Open Online Courses are accessible to anyone and are complementary, often leading to significantly larger enrollments than conventional digital learning (Voss, 2013). A survey by Statista found that faculty around the world rank MOOCs lower compared to other digital learning platforms (Statista, 2015).

The term "MOOC" was coined in 2008 by Dave Cormier of the University of Prince Edward Island and Bryan Alexander of the National Institute for Technology in Liberal Education (Nisha & Senthil, 2015). MOOCs had existed for several years in the tech community as a collaborative learning experience.

MOOCs represent a new form of online education, allowing an infinite number of individuals from across the globe to access course content, usually provided for free by renowned instructors (Durksen et al., 2016). MOOCs are classified into three types: Connectivist MOOCs (cMOOCs), Extended MOOCs (xMOOCs), and Hybrid MOOCs (hMOOCs) (Lugton, 2012). Originating from the theory of Connectivism in 2008, MOOCs gained attention in 2011 with the xMOOC model, which aligned with a university-based teaching approach (Fidalgo-Blanco et al., 2016). cMOOCs were initially designed based on Connectivist pedagogy, aiming to foster connections among learners through online environments (Siemens, 2012). Kop (2011) noted that cMOOCs are associated with social learning theories, such as social constructivism. xMOOCs typically provide teaching materials, such as notes or pre-recorded video content, facilitate discussions via forums or boards, and assess student learning through quizzes or tests (Clark, 2013). The cMOOCs and xMOOCs models attract different types of learners, adopt various approaches to education, and utilize different teaching methods.

India is the second-biggest consumer of MOOCs after the U.S., with high participation in institutions like IITs and IIMs. However, many other Indian universities remain unfamiliar with the concept. Muzafarova (2014) found that despite the availability of necessary tools, awareness and use of MOOCs at a university in Georgia were very low. Similarly, Shaikh (2017) reported that student teachers in Bachelor of Education programs had limited awareness of MOOCs, but with proper guidance, they could effectively utilize them. In Hyderabad, Shaikh (2017) found low awareness and negative perceptions of MOOCs, though this may change with greater exposure. A study noted that teachers' awareness of MOOCs is gradually increasing, though it varies based on factors like location, faculty, and gender.

PURPOSE OF THE STUDY

The aim of this study is to analyze the perception of MOOCs among college teachers in Muzaffarpur district of Bihar, India. It examines their awareness, usage, perceived benefits, and challenges in integrating MOOCs into their teaching practices. The study also explores the role of institutional support in assisting or hindering the use of Massive Open Online Courses (MOOCs).

OBJECTIVES

This paper focuses on the perceptions of different types of college teachers (government, private, and semi-government) regarding MOOCs in Bihar. The following objectives are set:

1. To compare the perceptions of government, private, and semi-government college teachers about the effectiveness and relevance of MOOCs in enhancing students' learning experiences.
2. To investigate how educators from various types of institutions integrate MOOCs into their teaching methods.
3. To explore whether college teachers from various types of institutions view MOOCs as useful for their own professional growth and skill enhancement.
4. To identify specific barriers faced by government, private, and semi-government college teachers in utilizing MOOCs, such as access to technology, administrative support, or student engagement.

METHODOLOGY

Research Design
This research utilizes a descriptive quantitative approach, using a survey to collect data from government, private, and semi-government college teachers in the Muzaffarpur district of Bihar. The survey questionnaire covered five sections: demographic information, awareness and usage of MOOCs, perceptions of MOOCs, challenges, and personal attitudes toward MOOCs.

Sample

The study was conducted with a sample of 150 college teachers from public, private, and semi-government institutions. Participants were chosen using a stratified random sampling method to ensure representation from various types of institutions.

Data Collection

A structured questionnaire was used to gather data on teachers' perceptions of MOOCs. The questionnaire included Likert-scale questions to gauge attitudes.

Data Analysis

To extract significant and relevant conclusions, the gathered information was organized and categorized based on the research objectives. Frequencies and percentages were calculated to assess the perceptions of different types of college teachers regarding MOOCs.

RESULT AND DISCUSSION

The data was statistically analyzed and subsequently used to interpret the results, which were organized and discussed under the following categories.

Section A:
1. Demographic information

Section B:
1. Comparative Analysis of Perceptions.
2. Adoption and Usage Patterns.
3. Influence of Institutional Support.
4. Perception of MOOCs for Professional Development.
5. Barriers and Challenges by Institution Type.

SECTION – A

Demographic information

Table 1 - Presents demographic information about a group of individuals, categorized by gender, age group, type of institution, and teaching experience.

Demographic Profile

Variable	Category	Frequency (n=150)
Gender	Male	85
	Female	60
	Other	5
Age Group	20-29 years	20
	30-39 years	50
	40-49 years	45
	50-59 years	25
	60 and above	10
Type of Institution	Public College	60
	Private college	55
	Semi Government College	35
Teaching Experience	Less than 5 years	20
	5 - 10 years	45
	11- 15 years	35
	More than 15 years	50

Gender of Respondents

Out of the total respondents, 85 individuals are male, 60 are female, and 5 identify as others.

Age of Respondents
Table 1 shows that among the total respondents, 50 individuals fall within the 30–39 years age group, while 45 are in the 40–49 years age range, and 25 are aged 49–59 years. Similarly, 20 respondents are aged 20–29 years, and 10 fall into the 60+ years age range.

Type of Institution
Regarding the type of institution, 60 respondents belong to government colleges, while 55 are from private colleges, and 35 are from semi-government colleges.

Teaching Experience
A closer look at the data on respondents' teaching experience reveals that 50 individuals have more than 15 years of teaching experience, 45 have between 5 - 10 years, 35 have between 11 - 15 years

SECTION - B

Comparative Analysis of Perceptions

Table 2 - Percentage distribution of teachers from different institutions who perceive MOOCs as effective in enhancing students' learning experiences.

Institution Type	Very Effective		Moderately Effective		Low Effective	
	Count	Percentage (%)	Count	Percentage (%)	Count	Percentage (%)
Government college	25	50	20	40	5	10
Private college	30	60	12	24	8	16
Semi- Government college	20	40	20	40	10	20

Table 2 - Percentage Distribution of Teachers' Perceptions of MOOCs (Massive Open Online Courses) in Enhancing Students' Learning Experiences

The study examines the percentage distribution of teachers from various types of institutions—Government Colleges, Private Colleges, and Semi-Government Colleges—who perceive MOOCs as effective in enhancing students' learning experiences. Teachers' perceptions are categorized into three levels: Very Effective, Moderately Effective, and Low Effective, based on both frequency and percentage.

In Government Colleges, 50% of teachers (25 teachers) consider MOOCs to be very effective in improving students' learning, indicating that half of the government college teachers hold a highly positive view. Meanwhile, 40% (20 teachers) see MOOCs as moderately effective, suggesting a significant portion finds them useful but not outstanding. A small minority, 10% (5 teachers), believe MOOCs have low effectiveness.

Private Colleges demonstrate the highest percentage of teachers (60% or 30 teachers) who perceive MOOCs as very effective, reflecting a strong positive attitude toward MOOCs. Another 24% (12 teachers) find MOOCs moderately effective, while 16% (8 teachers) rate them as low effective, a slightly higher proportion than in government colleges.

In Semi-Government Colleges, 40% of teachers (20 teachers) view MOOCs as very effective, while an equal percentage (40%) finds them moderately effective. However, these institutions also have the highest percentage of teachers (20% or 10 teachers) who see MOOCs as having low effectiveness, reflecting a more varied perspective compared to other institution types.

Overall, teachers in private colleges have the most favorable view of MOOCs, with a majority considering them very effective. Government colleges also exhibit positive perceptions, though to a slightly lesser extent. Semi-government colleges present a more mixed outlook, with teachers more evenly divided between high and moderate effectiveness, and a greater proportion expressing scepticism about MOOCs' usefulness.

Adoption and Usage Patterns

Table 3 -   Illustrates the percentage distribution of teachers utilizing MOOCs in their teaching practices across various types of institutions.

Institution Type	Frequently use		Occasionally use		Rarely use		Never use	
	Count	Percent (%)	Count	Percent (%)	Count	Percent (%)	Count	Percent (%)
Government college	16	32	20	40	5	10	9	18
Private college	18	36	22	44	6	12	4	8
Semi- Government college	14	28	22	44	7	14	7	14

Table 3 - The data highlights that in government colleges, 32% of teachers frequently use MOOCs, while 40% use them occasionally. In private colleges, 36% of teachers frequently

integrate MOOCs, with 44% using them occasionally. In semi-government colleges, 28% of teachers frequently use MOOCs, and 44% use them occasionally.

The "never use" category shows that private colleges have the lowest percentage (8%) of teachers who do not use MOOCs, compared to 18% in government colleges and 14% in semi-government colleges.

Influence of Institutional Support

Table 4 - Shows how teachers perceive institutional support for using MOOCs.

Institution Type	High support		Moderate support		Low support		No support	
	Count	Percent (%)	Count	Percent (%)	Count	Percent (%)	Count	Percent (%)
Government college	30	20	60	40	45	30	15	10
Private college	55	36.67	65	43.33	22	14.67	8	5.33
Semi- Government college	38	25.33	70	46.67	30	20	12	8

Table 04 Shows that in government colleges, 20% of teachers perceive a high level of institutional support for using MOOCs, while 40% experience moderate support. Additionally, 30% report low support, and 10% feel they receive no support at all.

Among private college teachers, 36.67% believe they receive high institutional support for MOOCs, whereas 43.33% report moderate support. Only 14.67% feel they receive low support, and 5.33% indicate no support.

In semi-government colleges, 25.33% of teachers perceive high institutional support for MOOCs, while 46.67% experience moderate support. Meanwhile, 20% report low support, and 8% state they receive no support.

Perception of MOOCs for Professional Development

Fig 1: Percentage of teachers who view MOOCs as useful for their own professional development.
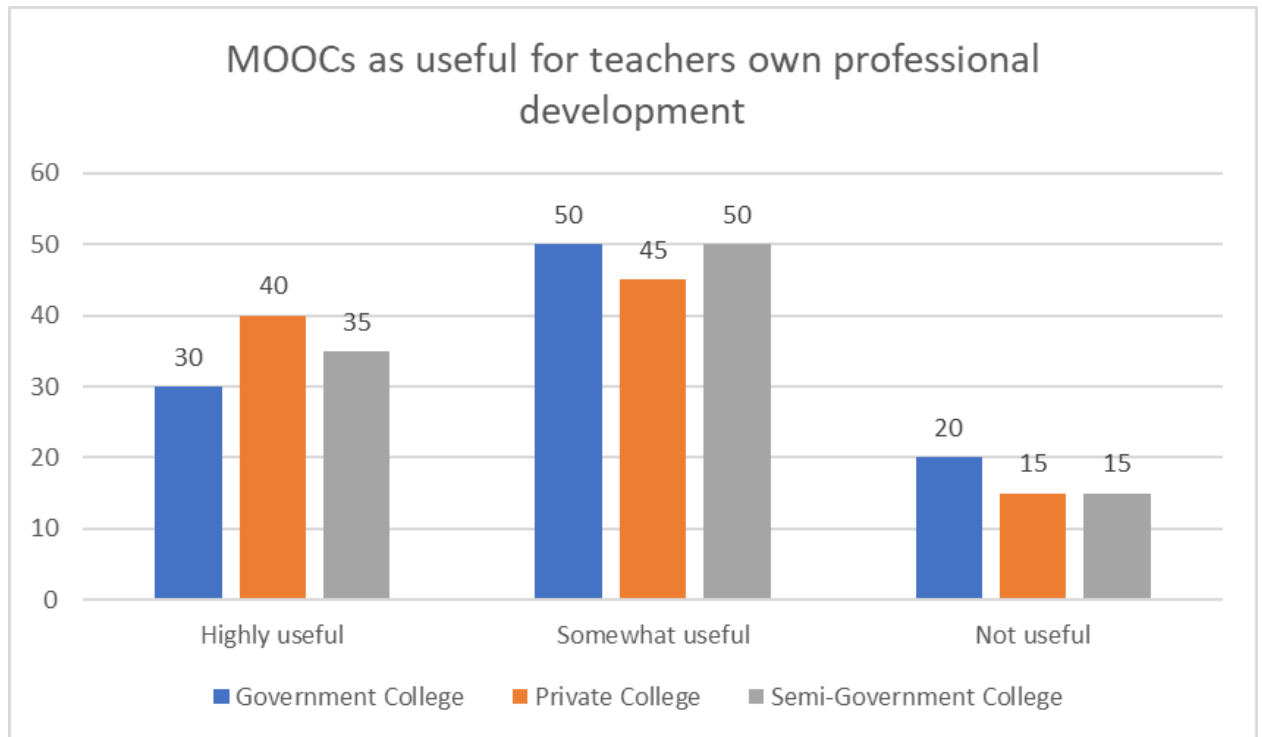
Fig 1   This analysis highlights the perceived effectiveness of Massive Open Online Courses (MOOCs) for teachers' professional development across three types of educational institutions: Government Colleges, Private Colleges, and Semi-Government Colleges.

Teachers from Private Colleges are the most likely to view MOOCs as highly useful, with 40% sharing this belief, followed by 35% from Semi-Government Colleges and 30% from Government Colleges. This indicates stronger confidence in MOOCs among private and semi-government educators compared to their government counterparts.

Meanwhile, a large proportion of teachers in the "somewhat useful" category comes from Government and Semi-Government Colleges, both at 50%, with Private Colleges close behind at 45%. This suggests that many teachers across all institutions see some value in MOOCs, though perhaps not as strongly as those who find them highly beneficial.

Only a small percentage of teachers consider MOOCs not useful, with Government Colleges having the highest proportion at 20%, while Private and Semi-Government Colleges report lower disinterest, with just 15% of their teachers viewing MOOCs as not useful.

Barriers and Challenges by Institution Type

Fig 2: The percentage of teachers who face various barriers in using MOOCs, by institution type.
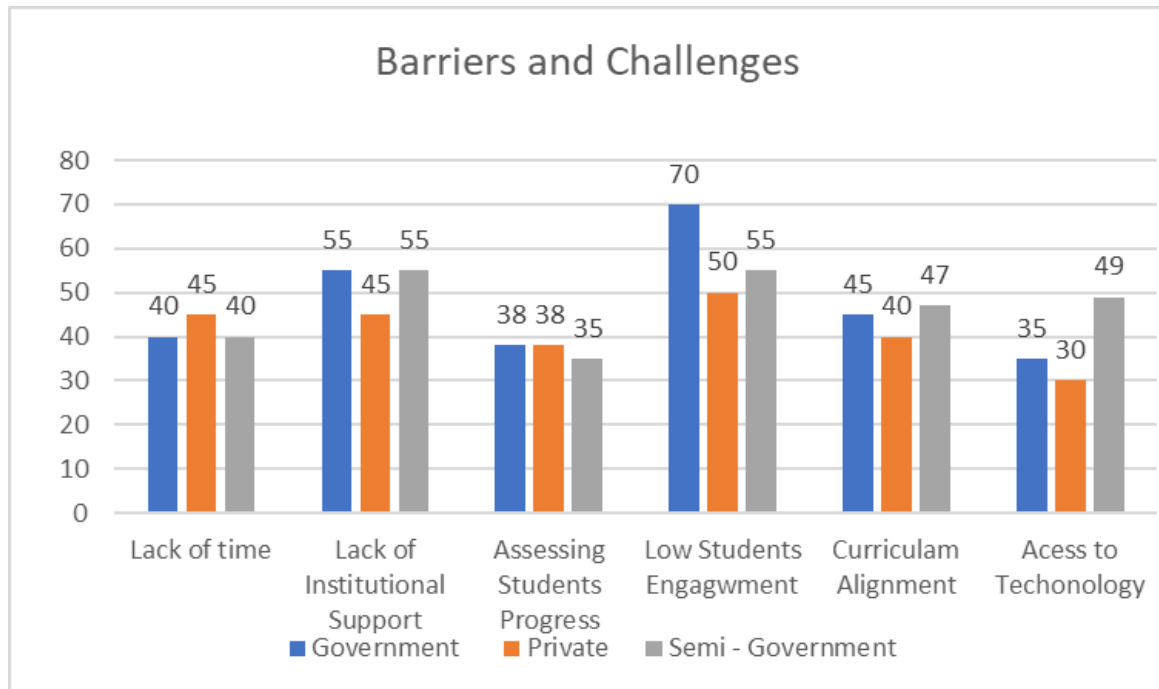
Fig 2: Titled "Barriers and Challenges" compares the percentage of teachers from different types of institutions (Government Colleges, Private Colleges, and Semi-Government Colleges) who face specific barriers when integrating Massive Open Online Courses (MOOCs) into their teaching.

The lack of time to integrate MOOCs is a notable barrier across all institution types. Government Colleges report 40% difficulty in incorporating MOOCs, while Semi-Government Colleges face the same level of challenge at 40%. Private Colleges experience slightly more difficulty, with 45% citing time constraints as a barrier. This issue appears to be fairly consistent across all institution types, although Private Colleges encounter it to a slightly greater extent.

The lack of institutional support poses a significant challenge, particularly for Government and Semi-Government Colleges, both reporting 55%, while Private Colleges face slightly fewer issues at 45%. Assessing student progress is perceived similarly across all institution types, with Government and Private Colleges both at 38%, and Semi-Government Colleges slightly lower at 35%.

Low student engagement with MOOCs emerges as the most significant barrier, especially for Government Colleges, where 70% highlight this issue, in contrast to 50% in Private Colleges and 55% in Semi-Government Colleges. Regarding curriculum alignment, Semi-Government Colleges report the highest level of difficulty at 47%, while Private Colleges face fewer challenges at 40%.

Lastly, Government Colleges struggle the most with access to technology, with 49% identifying it as a barrier, compared to 35% in Private Colleges and just 30% in Semi-Government Colleges.

CONCLUSION

This study on the perception of MOOCs among college teachers in government, private, and semi-government institutions in Bihar provides valuable insights into awareness, usage patterns, perceived effectiveness, and barriers to adopting MOOCs.

Key findings indicate that private college teachers are the most favorable toward MOOCs, with a higher proportion finding them very effective in enhancing students' learning and professional development. Government and semi-government college teachers, while also recognizing the potential of MOOCs, show comparatively less enthusiasm, largely due to infrastructural challenges and limited institutional support.

The adoption and usage patterns reveal that while most teachers are open to using MOOCs, the frequency of use varies, with private colleges demonstrating higher integration into teaching practices. Government and semi-government institutions lag behind, reflecting issues such as limited access to technology and low student engagement.

Institutional support plays a crucial role in the adoption of MOOCs, and teachers from private colleges report receiving the most support compared to their counterparts in government and semi-government institutions.

Barriers such as time constraints, lack of institutional support, and low student engagement significantly impact the effective use of MOOCs across all types of institutions. Government colleges face additional challenges like limited access to technology, which further hampers the integration of MOOCs into their teaching methods.

RECOMMENDATIONS

Based on the findings of this study, the following recommendations are proposed to enhance the adoption and effectiveness of MOOCs among college teachers in Bihar:

- Increase Institutional Support: Institutions, particularly government and semi-government colleges, should provide stronger support for MOOC integration. This can include offering technical assistance, professional development opportunities for faculty, and incentivizing the use of MOOCs in teaching.
- Improve Access to Technology: Address the technology gap in government institutions by upgrading digital infrastructure, providing reliable internet access, and ensuring that both teachers and students have access to the necessary devices for online learning.
- Curriculum Alignment and Customization: Institutions should work on aligning MOOCs with their academic curriculum to ensure that courses are relevant and applicable to local educational contexts. This can make MOOCs more attractive for both teachers and students, increasing engagement.

- Promote Faculty Development Programs: Organize workshops, training, and orientation programs to familiarize teachers with MOOCs and online teaching methodologies. This can enhance their confidence and ability to effectively use MOOCs in their teaching practices.

- Enhance Student Engagement Strategies: To address the issue of low student engagement with MOOCs, institutions should develop strategies to motivate students, such as integrating MOOC completion into assessments or offering credits for MOOC-based learning.

- Time Management Support: Faculty members often cite a lack of time as a major barrier to using MOOCs. Institutions should offer flexible work schedules or reduce administrative workloads to allow teachers more time to integrate MOOCs into their teaching plans.

- Encourage Peer Learning and Collaboration: Teachers should be encouraged to share best practices and experiences related to MOOCs through inter-institutional collaborations and peer networks. This can help in overcoming challenges collectively and promoting innovative teaching strategies.

- Leverage Government Initiatives: Encourage the use of government-backed MOOC platforms like SWAYAM by raising awareness about their benefits, offering training, and integrating these platforms into the institutional teaching framework.

- Regular Feedback and Monitoring: Institutions should implement a system of regular feedback from both teachers and students regarding their experiences with MOOCs. This will help identify issues early and allow for timely interventions to improve the overall learning experience.

By addressing these areas, institutions can create a more conducive environment for the adoption of MOOCs, thereby improving the quality of education and fostering continuous professional development for teachers.

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LEPROSY IN OLD AGE: PROBLEMS FACED BY SUFFERERS AND CAREGIVERS

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ABSTRACT

Leprosy is an infectious disease mainly causing skin lesion and nerve damage. It is caused by mycobacterium laprae. Leprosy is one of the oldest diseases. It is transmitted from person to person and has a long incubation period between two to six years. Leprosy is mainly of two types namely Paucibacillary (PB) and Multibacillary (MB). Paucibacillary means a case of leprosy with 1 to 5 skin lesions, without demonstrated presence of bacilli in a skin smear. Multibacillary (MB) is a case of leprosy with more than five skin lesions; or with nerve involvement (pure neuritis, or any number of skin lesions and neuritis); or with the demonstrated presence of bacilli in a slit-skin smear, irrespective of the number of skin lesions. Common medicine prescribed by the doctor for leprosy affected person is MDT (Multi Drug Therapy) tablets. Leprosy affects the upper and lower limb which restricts the person in doing their normal activities of daily living. If this disease occurs in old age, it becomes more problematic for the affected person as well as the care giver. In light of this, present study focuses on the problems faced by leprosy affected person aged 60 years and above and their care givers. Incidence of leprosy has always been greater among the elderly than younger population. Leprosy care is more important for affected person when there is a delay in early diagnosis and treatment of leprosy which may cause nerve damage and subsequently disabilities. Leprosy affected person also suffering from social stigma and mental pressure. Giving care to aged leprosy person is very challenging and major problems for care givers were difficulty in lifting, moving, toileting, and feeding the affected aged person. Through proper wound management techniques and other technological help, leprosy patients may learn to manage their impairments and prevent disabilities.

Keywords: Activities of daily living, Aging, Care-giving, Cure, Leprosy.

INTRODUCTION

Mycobacterium leprae is an acid-fast, rod-shaped bacillus that causes leprosy, an infectious disease. Leprosy can damage the skin, hands, feet, peripheral nerves, upper respiratory tract mucosa, and eyes, among other regions of the body. Patients with leprosy may experience immune-mediated nerve inflammation that damages their hands and feet's nerves. Individuals with

leprosy require appropriate medical attention and personal hygiene. Other names for this illness are Hansen's illness and bad disease.

Although this condition can strike at any age, it can cause greater problems if it does so in later life. The age of dependency is old age. In one study, Costa *et al*. (2003) examined how aging affects an individual's functional ability and biological response to sickness. Aging itself brings about a variety of physical, physiological, and psychological changes. In addition, the elderly experience difficulties because of altered social roles, decreased economic engagement, reliance on others for everyday needs, and the incidence of disabilities, particularly those related to movement, which have an impact on their psycho-social health.

Population of elderly is growing day by day as Barreto *et al.* (2014) in their study stated that, globally, there were 703 million people aged 65 years and above in 2019 and this figure is likely to be more than double over the next three decades reaching above 1.5 billion in 2050. Elderly people are either dependent on their family or other available technologies for performing their day-to-day activities. Leprosy in old age is much more problematic for the sufferers as it affects their normal functioning. Hence, it becomes highly important to protect the elderly from the infection of Leprosy.

Family members are at a higher risk of catching leprosy from the afflicted individual since they have daily, prolonged physical contact with the patients. Even though providing care for family members can be a truly fulfilling experience, the caregivers frequently encounter typical difficulties that make them feel overburdened, uneasy, and afraid of their responsibilities. Researchers that have studied caregiving's issues have recommended finding a balance between providing care and one's own life. In order to focus on their own needs, such as their own health or other interests, caregivers require time off from their caregiving responsibilities. Caregiving entails pushing big trolleys, pushing patient beds, lifting patients to sit up straight or in a lateral position, moving patients from one surface to another, bending over to provide bed making and feeding, moving patients from the bed to the wheelchair and back, giving personal hygiene, etc. The caretakers must put in a lot of physical effort to complete each of these demanding chores.

Early treatment for leprosy can avoid disability as it is a curable disease. Leprosy is a long-standing illness that can cause impairment if people are unaware of it. Families affected by leprosy may experience financial, social, or a combination of issues. Individuals who have long-term leprosy-related disabilities find it extremely difficult to carry out their regular daily tasks. Assistive gadgets are a useful tool for those who provide care for others and for those who suffer from certain conditions.

Mathew *et al.* (2023) noted that "the higher the degree of disability, the poorer the quality of life and psychological well-being" in one of their research on the context of disability in leprosy patients. Leprosy patients' psychological health and quality of life are impacted by their age, occupation, and educational attainment. All impacted persons should have access to social and psychological support since it can aid in their recovery. Early detection and intervention can reduce the risk of deformity, promote mental health, and improve quality of life.

One of the main tools in the fight against leprosy is food. In his research, Anantharam*et al.* (2021) examined food insecurity and undernutrition in leprosy patients. They proposed that nutrition and diet play a significant role in leprosy risk factors. Additionally, they emphasized a few key points about diet during leprosy. The primary cause of leprosy in households is the availability of nutrient-dense diet. The main causes of dietary deficiencies in proteins, vitamins, and minerals are poverty and ignorance. clinical leprosy develops as a result of a prolonged dietary deficit that impairs immune response. More investigation is needed into the relationship between leprosy and nutrition.

Considering the aforementioned considerations, it is imperative to conduct research using suitable sample sizes, diverse disease profiles, and various socio-cultural and geographic contexts. Ultimately, a meta-analysis of the results from various studies will be crucial for making decisions at the public health level.

The study's significance lies in identifying the difficulties faced by elderly individuals afflicted with leprosy. Getting older comes with a number of issues. As people age, leprosy can cause a number of additional issues that make life miserable. The lives of both sufferers and care givers could be made simpler with the use of effective disease management approaches.

OBJECTIVES

1. To identify the problems faced by aged leprosy affected person.
2. To identify the challenges in giving care to the aged leprosy affected person.

METHODOLOGY

The present study is of qualitative nature. The information for this article has been congregated from primary sources. The data was collected between May to June 2024. Survey method and observation technique was used to collect the data. The sample of the study was 10 leprosy affected persons aged 60 years or above as well as their care-givers.

Sample was selected from Muzaffarpur district of Bihar, using snow-ball technique. Data was collected from hospitals and home visit. Nurse was taking care of the patient admitted in the hospitals whereas, family members were taking care of the patients who were living at home.

Primary data was collected with the help of self-structured interview schedule and activity of daily living (ADL) scale developed by Katz et al. (1963). Purpose of selecting activity of daily living (ADL) scale was to identify how many of them are able to perform their household activities independently. Body Mass Index (BMI) was calculated using Quetelet's index developed by Adolphe Quetelet during the 19th century and its classification was used to identify the health status of the respondents. Obtained data were analyzed by calculating frequency and percentage.

RESULT AND DISCUSSION

Present study focuses on identifying the aging challenges for leprosy affected person. It includes the basic problems faced by the sufferers and the problem faced by care givers to take care of leprosy affected person. In this study main purpose is to identify the issues which is faced by the leprosy affected old aged person and care-givers. Obtained results are presented as follows:

o Problems related to performing the activities of daily living
o Age related problems of the sufferers
o Diet related information of the sufferers
o Accidents faced by the sufferers
o Physical challenges of care-givers
o Problems of care-givers due to the behaviour of sufferers
o Tools and assistance used in serving aged leprosy affected person.

Table 1. Activities of daily living performed independently by aged leprosy affected person

Activities of Daily living	Number of respondents (n=10) f(%)
Walking	3 (30)
Housework	4 (40)
Grooming	3 (30)
Dressing	2 (20)
Medication	1 (10)
Personal hygiene	2 (20)
Washing	5 (50)
Shopping	3 (30)
Toilet/commode	1 (10)
Telephone	7 (70)
Bathing	3 (30)
Feeding	6 (60)
Combing hair	1 (10)

*Multiple responses

Table 1show the activity of daily living performed independently by aged leprosy affected people assessed using ADL scale. The activities that maximum of them were able to perform independently were use of telephone (70%), followed by feeding (60%), washing clothes (50%) and performing housework (40%). Around only one third of them were able to walk (30%), groom (30%), go shopping (30%) and take bath (30%) on their own. It was seen that out of 10 respondents, only one was able to take medicine, go to toilet, and comb hair without any help. Only two of them were able to dress themselves and take care of their personal hygiene. Therefore, it can be said that leprosy has directly affected the activities of daily living of the aged leprosy affected person. Although old age itself brings dependency but leprosy may be another reason for having dependency on others.

Table 2. Age related problems faced by leprosy affected person

Bodily challenges	Number of respondents* (n=10) f (%)
Weak immunity	2 (20)
Bone problems	1 (10)
Poor digestion	5 (50)
Nerve problems	9 (90)
Muscle pain	8 (80)

*Multiple responses

Table 2 presents the age-related problem faced by leprosy affected aged person due to wear & tear of their body. It was seen that out of 10, maximum of them were facing nerve problems (90%), followed by muscle pain (80%), poor digestive system (50%), weak immunity (20%) and bone problems (10%). Nerve problem is the only direct consequence of the disease as the bacterium directly affects the nerves of the sufferer. Other problems are basically the problems of old age which is not the direct consequence of the disease. But disease may be a reason for development of the problem.

Table 3. Diet related information of the aged leprosy affected person

Diet related information	Category	Number of respondents* (n=10)f(%)
Food consumption	Vegetarian	3 (30)
	Eggitarian	2 (20)
	Non vegetarian	5 (50)
Food pattern	Poor	6 (60)
	Healthy	4 (40)
Number of meals per day	2	3 (30)
	3	5 (50)
	4	2 (20)
Food allergy*	Brinjal	1 (10)
	Mutton	1 (10)
Disliked food	Bitter gourd	1 (10)

*Multiple responses

Table 3 exhibit the food related information of aged leprosy affected person. Regarding food choice it was observed that half of the respondent were non vegetarian (50%), followed by vegetarian (30%) and eggetarian (20%). Food pattern was checked on the basis of type of food consumed, food pattern, number of meals, food allergy if any and food dislikes. It was assessed that 60 percent had poor food pattern and only 40 percent had healthy food pattern. Half of the respondents took 3 meals a day (50%). Whereas, around one third of them (30%) consumed two meals a day. Some of them also consumed four meals in a day (20%). Food allergy was observed in two respondents. One of them had allergy from consuming mutton (10%), whereas, one had allergy from consuming Brinjal (10%). One of them did not like bitter gourd. Food related information was collected to check whether food has any direct effect on the development of disease. It was observed that food directly did not cause the disease. But, due to poor food pattern people may have reduced their body's resistance towards the disease which may be a major reason for the development of disease. Type of food being vegetarian, non-vegetarian or eggetarian does not affect the development of disease as the people consuming all the three types of food were encountered with the disease.

Table 4. Accidents faced by aged leprosy affected person

Nature of accident	Number of respondents* (n=10)f(%)
Fall	2 (20)
Slip	3 (30)
Cut	4 (40)
Burn	1 (10)

*Multiple responses

Table 4displays the type of accidents faced by the respondents in last one year. Maximum number of respondents had faced cuts (40%), followed by slip (30%), fall (20%) and burn (10%). Most of them faced cut and burn accident while performing kitchen activities. Whereas, slips and fall was most commonly recorded while using bathroom.

Table 5. Physical challenges for caregivers

Physical challenges	Number of respondents* (n=10)f(%)
Lifting the patient	4 (40)
Moving the patient from one place to another	3 (30)
Feeding	2 (20)
Toileting	1 (10)
Changing clothes	2 (20)
Bathing	3 (30)

*Multiple responses

Table 5 displays the type of physical problems faced by the care-givers of leprosy affected aged person. Maximum number of care givers faced problem in lifting the sufferer (40%), followed by moving the sufferer from one place to another (30%), bathing (30%), feeding (20%), changing clothes (20%) and helping them in toileting (10%).

Table 6. Problems of care givers due to the behavior of the sufferer

Behavior of sufferer	Number of respondents* (n=10)f(%)
Irritability	2 (20)
Scolding	1 (10)
Aggressive	1 (10)
Provoking	5 (50)

*Multiple responses

Table 6 reveals the problems faced by care givers due to the behavior of the leprosy affected aged person. Maximum number of caregivers felt problem due to the provoking behavior (50%), followed by irritability (20%), aggressiveness (10%) and scolding (10%) of the sufferers. These problems de-motivated them in giving care to the person. These behaviors of sufferers were generally in response to the hygienic practices used by the care givers. Due to advancing age the sufferer usually loses their patience and are short-tempered due to which they start scolding and doing provoking activities.

Table 7. Tools and assistance used in serving aged leprosy affected person

Tools and assistance	Number of respondents * (n=10)f(%)
Walker	2 (20)
Wheel chair	4 (40)
Standing stick	3 (30)
Modified shoes	6 (60)
Gloves	5 (50)
Eye glasses	2 (20)

*Multiple responses

Table 7 unveils the type of tools and assistance used by the sufferers for their well-being. Maximum numbers of respondents used modified shoes (60%), followed by gloves (50%), wheel chair (40%), standing stick (30%), walker (20%) and eye glasses (20%). All the caregivers generally used gloves and mask during dressing and taking care of the sufferer for their protection.

CONCLUSION

Affected individuals with leprosy experience nerve difficulties that make it difficult for them to perform any tasks correctly. Older adults affected by leprosy require appropriate care to carry out the majority of their everyday tasks. Caregivers find it extremely difficult to provide the extra care that an elderly leprosy patient requires. Ten individuals affected by leprosy who were 60 years of age or older were interviewed for this study. In order to determine the challenges faced by them in providing care, caregivers for the 10 leprosy-affected individuals were also questioned. It was found that every one of them need some level of family assistance to carry out their daily tasks. Due to their lack of training and experience, family caregivers are frequently more susceptible to illnesses. Moreover, they have to spend more time with the leprosy affected individual. Care-givers frequently lose out on social interactions outside of the home since caring for others takes up so much of their time. Because of the sufferer's behaviour and the degree of difficulty of providing care, the caregivers reported a number of mental and physical issues. Problems of sufferers and care givers can be tackled by technological intervention. Some of them were already taking the help of tools and technologies. Awareness may be generated about the available technologies. Technological help is always better than the human help as it maintains the dignity of the affected person and it is all time available to them.This study highlights the significant improvements that are required in healthcare and social support systems for elderly leprosy patients, leading to better patient outcomes, enhanced caregiver well-being, reduced stigma, and increased societal acceptance. One of the key implications is that the improvement of the quality of life for elderly individuals living with leprosy, including better access to medical care, mobility aids, and mental health support will lead to reduction in societal stigma as well. Training to care givers will enhance the acceptability, convenience and wellbeing of all the stakeholders.

SUGGESTIONS FOR FUTURE RESEARCH

Some suggestions for future research are as follows:

- Role of diet on the diseased person can be checked by introducing various nutritious diet and further analyzing its effect on them.
- Advanced help aids can be introduced and its effectiveness can be checked.
- Environmental impact on the disease can be studied.
- Similar study can be conducted in different regions to identify the problems of sufferers and care-givers.
- Awareness can be generated for early diagnosis of the disease.

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STRESS AND ACHIEVEMENT MOTIVATION OF ORTHOPAEDICALLY IMPAIRED AND NON-IMPAIRED ADOLESCENTS

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ABSTRACT

The study aims to explore the impact of stress and achievement motivation among orthopedically impaired adolescents and their non-impaired peers. Utilizing a sample of 130 adolescents aged 15-20 (65 orthopedically impaired and 65 non-impaired), the study employs standardized tools to assess four forms of stress and achievement motivation. The findings indicate that orthopedically impaired adolescents experience significantly higher levels of stress, primarily due to physical limitations, social exclusion, and academic challenges related to their disability. Orthopedically impaired adolescents displayed lower levels of achievement motivation compared to their non-impaired counterparts, suggesting that their physical challenges and associated stressors may dampen their drive to succeed academically. These results emphasize the need for interventions that address the unique stressors faced by orthopedically impaired adolescents to enhance their achievement motivation and overall quality of life.

Key words- achievement motivation, adolescents, orthopaedic impairment, stress

INTRODUCTION

Adolescence is a crucial stage of development marked by profound changes in physical and socio-emotional domain. For orthopedic impaired adolescents, these challenges can be compounded by additional stressors related to their physical condition.

In medicine and biology, the term "stress" is used in various contexts. It can describe external factors or conditions affecting an organism, as well as the organism's response to those factors. Anything that poses a threat to the organism's biological integrity- either through its physical or chemical properties, or through its symbolic significance- can be considered stress. Stress typically refers to negative emotional experiences accompanied by physiological, biochemical, and changes in

behavioral aspects, which arise in response to perceived acute or chronic challenges. Whether an event is stressful depends on how an individual assesses the situation and their ability to cope with it. **In 1984**, Lazarus and Folkman defined stress as a process that arises as a reaction to situations or events known as stressors. The present research work has focussed on the following four forms of stress-

Academic Stress (Arthur N., 1998) refers to the stress experienced in relation to educational activities. Common causes include exams and assessments i.e. pressure to perform well in tests and achieve good grades, time management I.e. balancing coursework, deadlines, and study routines, expectations i.e. high expectations from teachers, parents, or self to excel and competition i.e. feeling overwhelmed by academic competition among peers.

Social Stress arises from interactions with others and concerns related to social dynamics. key contributors include peer pressure i.e. the need to conform or fit in with social groups, social comparison i.e. feeling inadequate when comparing oneself to others, interpersonal conflicts i.e. the arguments or misunderstandings with friends, family, or coworkers and loneliness- the feelings of isolation or exclusion from social circles.

Family Stress involves tension within family relationships and can be triggered by parental expectations like pressure from family members to meet certain standards or life goals, family conflicts like disagreements, arguments, or unresolved issues between family members or financial problems like economic challenges within the family that lead to stress or any stress from caring for sick or elderly family members.

Role stress among adolescents refers to the stress experienced by young people due to the conflicting or overwhelming demands of different roles they are expected to fulfill during this developmental stage. Adolescents often face multiple of transitions and are expected to manage various roles, such as being a student, family member, friend, and potentially part-time worker. This period of life involves navigating increased responsibilities, social expectations, and identity formation, which can lead to stress when the demands of these roles become conflicting or overwhelming.

All these forms of stress are interconnected and can influence each other, potentially leading to a cycle of increased anxiety and emotional burden.

Orthopedic impairment is a broad and varied disability category. It incorporates – impairments in neuromotor mechanism, musculoskeletal functioning thereby leading to degenerative diseases. Impact of orthopedic impairment on academic performance can be illustrated as follows-
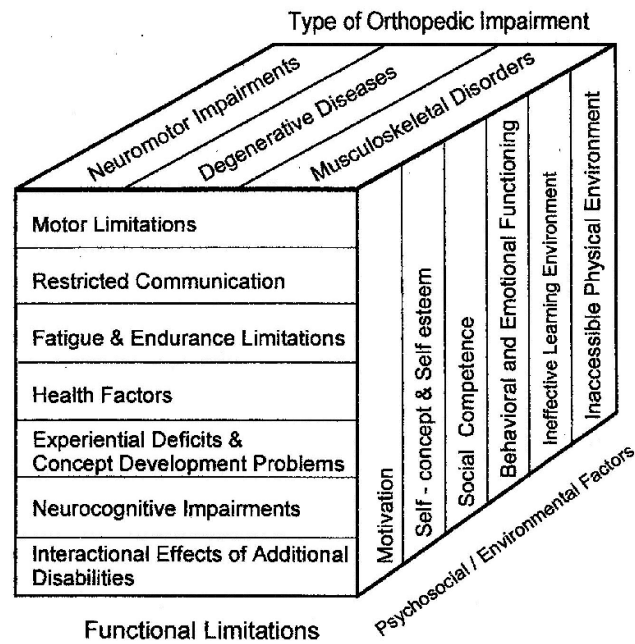
Source- Model by Heller and Jones in 2003 that depicts the impact of orthopaedic impairments on academic -educational performance.

Achievement motivation refers to an individual's internal drive to set and accomplish goals, overcome obstacles, and persist in the face of challenges. It is the desire to achieve success and demonstrate competence in a given task, often driven by personal satisfaction or external rewards. How much achievement motivation the adolescents have is very interesting to know. They have normal IQ level with regular school curriculum, how much they are interested in studies depend upon their health, social environment, peer group, parental support, self-concept, and their own need for achievement. For orthopaedic impaired adolescents, following are few of the factors influencing their achievement motivation (Meng, Y., Deng, B., Liang, X. *et al.*, 2022 and Kang, D., Lee, S. & Liew, J., 2024):

- Self-Efficacy: Belief in their ability to succeed in specific situations or tasks plays a crucial role. Higher self-efficacy is associated with greater motivation and academic success.
- Support Systems: The attitude of parents toward a child with impairment shapes the child's future. Family, teachers, and peers can provide essential encouragement and resources that reinforce motivation.
- Adaptive Strategies: Developing effective coping mechanisms and problem-solving skills can help manage stress and maintain motivation.
- Educational Accommodations: Access to individualized educational resources and accommodations can facilitate a more conducive learning environment.

Achievement Motivation and Stress

The relationship between achievement motivation and stress in orthopaedic impaired adolescents is complex and bidirectional.

- Negative Impact of Stress: High levels of stress can negatively impact cognitive functions such as attention, memory, and executive function, thereby reducing academic performance and motivation.
- Moderating Factors: The presence of supportive relationships and adaptive coping strategies can mitigate the adverse effects of stress and sustain motivation.
- Resilience and Motivation: Despite increased stress, many orthopaedic impaired adolescents exhibit resilience and a strong drive to overcome obstacles, which can enhance their achievement motivation.

REVIEW OF LITERATURE

Reynolds and Miller (2003) investigated the sources of stress and coping mechanisms in orthopaedically impaired adolescents. The researchers found that these adolescents experienced higher levels of stress due to physical limitations, social isolation, and academic challenges. Studies have shown that high levels of stress during adolescence can lead to various negative outcomes, including anxiety, depression, and lower academic performance (Seiffge-Krenke, 2011). Adolescents with disabilities, such as orthopaedic impairments, often experience even higher stress levels due to physical limitations, social stigma, and exclusion (Anderson et al., 2010). Furthermore, according to McClelland's theory of motivation, adolescents who have high achievement motivation tend to set challenging goals and work diligently to attain them (McClelland, 1987). However, adolescents with physical disabilities, such as orthopaedic impairments, may struggle with lower levels of achievement motivation due to perceived or actual limitations (Naglieri & Bornstein, 2003). Research also indicates that adolescents often experience lower self-esteem and feelings of inadequacy due to their physical limitations (Shields et al., 2006). These challenges may also influence their achievement motivation, as they might perceive themselves as less capable of achieving success compared to their non-disabled peers (Dunn & Dunn, 2006). The interaction between stress, achievement motivation, and orthopaedic impairment creates a complex dynamic for adolescents with disabilities. Research has shown that stress often acts as a mediator between physical impairment and achievement outcomes. Adolescents with orthopaedic impairments experience heightened stress due to mobility restrictions, which can negatively affect their motivation to achieve academically or socially (Wagner et al., 2010). Furthermore, lower achievement motivation can result in a cycle where stress exacerbates feelings of inadequacy, leading to decreased academic performance and self-worth.

This brief review of literature had highlights extensive studies conducted on orthopaedic impairment among adolescents and thus, the present study aimed to give a new dimension by conducting a study of stress and achievement motivation among orthopaedic impaired and normal adolescents.

SIGNIFICANCE OF THE STUDY

The stress level of general population is increasing day by day affecting the quality of life. Hence, it has become inevitable to know the stress level and achievement motivation of orthopaedic impaired adolescents too. What type of stress they undergo, how they manage what measures they should adopt to adjust with the stress. Furthermore, adolescents today are highly ambitious and possess a wide array of talents. However, the question of how they utilize their opportunities arises, as they are often under significant stress from continually striving to achieve the best.

Aim: The present study aimed to compare and investigate the impact of orthopaedic impairment on stress and achievement motivation of adolescents.

OBJECTIVES
- To study the stress level of orthopaedic impaired and non-impaired adolescents.
- To assess the achievement motivation of orthopaedic impaired and the non-impaired adolescents.
- To compare stress and achievement motivation of orthopaedic impaired and non-impaired adolescents.

HYPOTHESES

1. There exists a significant difference between the level of academic stress among orthopaedic impaired and non-impaired adolescents.
2. There exists a significant difference between the level of social stress among orthopaedic impaired and non-impaired adolescents.
3. There exists a significant difference between the level of role stress among orthopaedic impaired and non-impaired adolescents.
4. There exists a significant difference between the level of family stress among orthopaedic impaired and non-impaired adolescents.
5. There exists a significant difference between orthopaedic impaired and non-impaired adolescents with respect to achievement motivation.

LIMITATIONS

- Data was limited to only 130 samples.
- Only two variables, stress and achievement motivation were studied.
- In stress, only four types viz- academic, social, role and family stress were considered.

METHODOLOGY

Sample: The effective sample for the study comprised of 130 adolescents of age range 15 to 20 years of Nagpur region. Of 130 samples 65 were orthopaedic impaired and 65 were normal adolescents. They belonged to VIII to XII class. They were selected from various schools and special schools viz Snehangan and Jeevoday of Nagpur city.

Tools used: For the present investigation Deo Mohan Achievement Motivation Scale (1985) and Bisht Battery of Stress Scales (BBSS- 1987, Hindi) were used. The Deo-Mohan Achievement Motivation Scale, developed by Prof. Prathibha Deo and Dr. Asha Mohan in 1985, is a self-rating questionnaire with 50 items (37 positive and 13 negative). It assesses achievement motivation based on three factors: academic, general interest, and social interest, using a five-point response scale. The test-retest reliability ranges from 0.67 to 0.78, and its validity was established with correlations of 0.54 (projective test) and 0.75 (Aberdeen Academic Motivation Inventory). The Bisht Battery Stress Scale (BBSS), developed by Dr. Abha Rani Bisht in 1987, measures exclusive stress types having all the four components of stress, i.e., frustration, conflict, pressure and anxiety in them. This battery consists of thirteen scales which measures thirteen types of stresses. The battery of scale is in Hindi and the internal consistency reliability coefficient of SAS is 0.88

Procedure of data collection: Prior appointment was taken from the subjects. First, the subjects were told the importance of the study and the purpose of the data collection. A rapport was built with them. A convenient time was taken. The investigator assured them of confidentiality of their responses. The data was collected individually. Initially the achievement motivation scale was given to the sample. Instructions were imparted as per the directions given in the manual. Doubts were clarified. Once the answers were given, then the second standardized test- Bisht Battery of Stress Scales was given followed by the instructions to answer the scale. The filled in questionnaire were collected. The subjects were thanked for their cooperation. Similar procedure was adopted to collect data from other subjects.

Variables under study:

Dependent variable- Stress and Achievement Motivation

Independent variable- Orthopaedic impaired vs Normal adolescents

Statistical Treatment: Initially, the data was treated with mean and standard deviation. For further analysis the data was treated with 't' test to find the significance of difference.

FINDINGS AND DISCUSSION

Stress is one of the most common problem the students are facing due to increasing academic competition and striving for achieving the best. The results are displayed as follows:

Table No.1 Mean, SD and 't' Values with respect to academic stress

	Orthopaedic Impaired	Normal Adolescent	t-value
Mean	287.3	245.5	
SD	49.6	52.1	**4.5***

*Significant at 0.05 level

Table no. 1 reveals that mean value for academic stress for orthopaedic impaired is 287.3 and for normal adolescents is 245.5. The calculated value of 't' is **4.5** highlights that the difference between the academic stress of orthopaedic impaired and normal adolescents is significant. Thus, the hypothesis "there exists a significant difference between the level of academic stress among orthopaedic impaired and non-impaired adolescents" is accepted. This significant difference can be attributed to the changing syllabi as well as the expectations of the parents from their children and the impairment of the child. The orthopaedic impaired have to make lot many adjustments so their stress level gets aggravated. In integrated education, the orthopaedic impaired may compare himself with other students and therefore pressure may build up to achieve high.

Table No.2 Mean, SD and 't' Values with respect to social stress

	Orthopaedic Impaired	Normal Adolescent	t-value
Mean	288.9	232.5	
SD	66.3	77.1	**4.2***

*Significant at 0.05 level

Table no 2 reveals that the mean value of social stress among orthopaedic impaired is 288.9 with a SD of 66.3 and that of normal adolescents is 232.5 with a SD of 77.1 respectively. The computed value of 't' = **4.2** which is more than the relevant value given in the table. Thus, we can say that the two groups differ significantly and the hypothesis "there exists a significant difference between the level of social stress among orthopaedic impaired and non-impaired adolescents" is accepted. The

social stress experienced by the orthopaedic impaired is more than that of normal children. Appearance plays an important role in society. People generally judge others on the basis of first impression. Orthopaedically impaired adolescents either are rejected, ridiculed or sympathized thereby causing more social stress as compared to normal children.

Table No.3 Mean, SD and 't' Values with respect to role stress

	Orthopaedic Impaired	Normal Adolescent	t-value
Mean	199.9	159.9	**4.9***
SD	40.03	47.5	

Significant at 0.05 level

Examination of table no. 3 reveals that mean value of role stress among orthopaedic impaired is 199.9 with a SD of 40.03 and that of normal adolescents is 159.9 with SD of 47.5. The calculated value of 't' is **4.9** indicating the difference between the two groups is significant. Thus, the hypothesis "there exists a significant difference between the level of role stress among orthopaedic impaired and non-impaired adolescents" is accepted. Every individual plays many roles in life. When one has to change the role, one experiences stress. So also, an individual who is having an impairment has to play many roles. Society certain times has sympathetic outlook and certain times it does not care. An impaired adolescent requires lot of help, guidance and direction when he/she has to play different roles. When the adolescent does not get this help his/her stress level increase. Due to their disability, certain parental expectations like fulfilling day to day chores and to be a helping hand to parents are not reached leading to increased stress level.

Table No.4 Mean, SD and 't' Values with respect to family stress

	Orthopaedic Impaired	Normal Adolescent	t-value
Mean	295.6	233.5	**4.4***
SD	58.6	93.8	

Significant at 0.05 level

As is evident from table no.4, the mean value of family stress for orthopaedically impaired adolescent is 295.6 and SD is 58.6 and for normal adolescents' mean is 233.5 and SD is 93.8 with a 't' value of **4.4.** The computed value is more than the table value indicating that the groups differ significantly. Thus, stated hypothesis "there exists a significant difference between the level of family stress among orthopaedic impaired and non-impaired adolescents" is accepted. The reason for this significant difference could be that an orthopaedic impaired adolescents are already limited by their impairment and has to learn to adjust with different individuals of the family. Their parents might be paying more attention to them but their siblings might resent this. Sometimes due to financial constraints an impaired might be considered as a burden by the family members. The family members might also resent giving continuous attention. Also, sometimes if the parents are uneducated, they may not understand child's needs and ambitions. All this adds up the stress level and therefore they might experience more stress levels as compared to normal adolescents.

Table No.5 Mean, SD and 't' Values with respect to Achievement Motivation

	Orthopaedic Impaired	Normal Adolescent	t-value
Mean	144.1	152.4	**2.93***
SD	16.05	14.63	

Significant at 0.05 level

Table 4.5 reveals that the mean value of achievement motivation for orthopaedically impaired adolescent is 144.1 and SD is 16.05 and for normal adolescents M=152.47 and SD=14.63. The

computed value of t =**2.93** is more than the table value indicating that the groups differ significantly. Thus, the hypothesis "there exists a significant difference between the level of achievement motivation among orthopaedic impaired and normal adolescents" is accepted. The difference in achievement motivation could be because due to their disability; orthopaedic impaired adolescents might not get enough opportunities to perform better. In society, the chances given to them might be less as compared to normal adolescents. The rewards they should get, the recognition or appreciation for their work might not be given in schools or colleges. The type of motivation or encouragement needed may not be provided by parents or teachers. The drive for achievement is not ignited in them by their parents / caretakers. As a result of all these their achievement level could be low.

CONCLUSIONS

The findings from the research work revealed the below mentioned facts.

- The academic stress is found to be more in orthopaedic impaired adolescents than normal adolescents.
- In orthopaedic impaired adolescents the social stress is higher than normal adolescents.
- The role stress is much high in orthopaedic impaired adolescents than normal adolescents.
- Family stress is found to be more in orthopaedic impaired adolescents than normal adolescents.
- The achievement motivation is less in orthopaedic impaired adolescents than in normal adolescents.

IMPLICATIONS AND SUGGESTIONS

- This study could have been conducted on hostellites.
- A large representative sample may be taken for more reliable results.
- A comparative study with respect to gender and socio-economic status can be conducted.

RECOMMENDATIONS

To support orthopaedic impaired adolescents in managing stress and enhancing achievement motivation, following recommendations can be given:

- Integrated school should welcome special children and equal opportunities should be given to them.
- Schools and institutions must arrange for the psychological counsellors so that individual or group counselling of adolescents can be carried out so that their stress level decreases.
- Stress is closely related to mental health and physical health. Therefore, it is recommended that parents should provide a healthy home environment and positive encouragement with a nutritious diet, exercise and meditation.
- Teaching adaptive skills and coping mechanisms can empower adolescents to handle stress more effectively and stay motivated.

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I, Prof. Maneesha Shukul, hereby declare that the particulars given above are true to the best of my knowledge and belief.

Sd/-

Prof. Maneesha Shukul

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