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FROM THE EDITOR'S DESK

Warm greetings.

It is very heartening to see that the researches in the field of Home Science are increasing. The research culture in the institutions is being strengthened. Many papers are being sent for publication. However, the institutions of higher education need to give a training for writing the research paper under a course on Research Methods. Though many institutions do have it, a need for more practice is felt. Under the mentorship of senior teachers the young researchers can learn to write and present the papers.

*'The authors must strictly follow the guidelines of the respective publication'
Wishing the best with this line of guidance.*

-PROF. MANEESHA SHUKUL

THE INDIAN JOURNAL OF HOME SCIENCE

An official publication of THE HOME SCIENCE ASSOCIATION OF INDIA

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Vol. 35

No.1

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UTILIZATION OF WASTE FROM *ARTOCARPUS HETEROPHYLLUS* FOR DEVELOPMENT OF SUSTAINABLE NATURAL FIBERS

Aneetta V.J¹, Dr.S. Amsamani², C. Naveena Shri³

^{1&3}Research Scholar, ² Dean, School of Home Science & Professor

Dept. of Textiles and Clothing,

Avinashilingam Institute for Home Science and Higher Education for Women,

Coimbatore, Tamil Nadu, India

E-mail: aneettavj@gmail.com

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²HSAI Membership No. 09/A-11/LF

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ABSTRACT

A novel fiber was extracted from waste of *Artocarpus heterophyllus*. The researchers have shown a lot of interest in utilizing waste materials to develop sustainable fibers which can replace synthetic materials. The chemical constituents of *Artocarpus heterophyllus* fibers consist of high lignin (13.60%) and hemicellulose (17.37%) and moderate cellulose content (47.79%). The crystallinity index 36.28% of *Artocarpus heterophyllus* fibers was determined by an X-Ray diffractometer. Thermogravimetric analysis revealed that the fibers cellulose degraded at a temperature of 300°C. Alkali treatment on fibers has removed the non-cellulosic substance which is evident in the morphological analysis of fibers surface roughness.

Keywords: Natural fiber; *Artocarpus heterophyllus*; Sustainable; Crystallinity index; Thermal stability

INTRODUCTION

Tropical climate promotes the growth of fruit bearing plants. *Mangifera indica*, *Artocarpus heterophyllus*, *Carica papaya*, *Ananas comosus* is some of the main tropical fruits. A substantial percentage of tropical fruits have rind or skin and seed that are thrown out as waste. About 11-18% of *Mangifera indica* is skin and 14-22% is its seed (S. Mitra et al., 2013) and in case of *Artocarpus heterophyllus* only 30-35% is the flesh or fruit the remaining 55-62% is its rind (Saxena et al., 2011). *Artocarpus heterophyllus* is widely cultivated and the fruit or the bulb is covered with long fibrous strands which is sticky and rubbery in texture. It is an under-utilized fruit because majority of fruits are discarded due to lack of knowledge, outdated post-harvest equipment, and flaws in the supply chain management systems. Asia is the region where *Artocarpus heterophyllus* is primarily grown, with India and Bangladesh being the top two producers globally, producing an average of 1.25 million metric tonnes of fruit each year (Asia-Pacific Region-report, 2012). An average *Artocarpus heterophyllus* fruit has between 70 to 80 percent waste and by-products (Akter et al., 2019). The waste from *Artocarpus heterophyllus* are generally discarded due to difficulty in processing and are relatively flavorless some are used for animal feed and as biofuel. Disposal of these waste to the environment not only results in green-house gas emissions, but also create a suitable breeding ground for bacteria, pest and other micro-organisms leading to the spread of diseases.

Eco-friendly materials have been developed because of rising public awareness and the harmful effects of synthetic materials. From bygone days an ample amount of natural fibers is existing, and they gain due importance among the researchers due to their encouraging and attractive properties such as, low cost, wide distribution, biodegradability, and non-hazardous nature. To the best of our understanding from previous literature study there are no earlier studies on the fibers extracted from *Artocarpus heterophyllus* waste. Worldwide, agricultural waste fibres have a significant economic and cultural impact. Large volumes of biomass from agricultural waste are classified as natural fibres, but only 10% of this biomass has been utilized (Asim M et al., 2015). Due to urbanization and increase in cost, the existing natural fibers like wool, silk, cotton are becoming scarce and the need for new sustainable economic fibers gain prominence.

OBJECTIVES

- To find natural fibers from discarded waste material
- To extract and evaluate its physical and chemical properties
- To find suitable applications of the extracted fibers

METHODOLOGY

Selection of the Source

The initial step of the study was to find a natural fiber, that is not identified. *Artocarpus heterophyllus* is a seasonal fruit in India and it is abundantly available during March to June or from April to September. The rind, rags and latex are discarded after the fruit bulbs are taken. The methodology of this study is expressed under the following heads

Utilization of non-edible portion of the Fruit after Harvest

A survey was conducted among farmers in Senjerimalai, Tamil Nadu and Thrissur, Kerala to find out the utilization of the nonedible portion of *Artocarpus heterophyllus*. The survey findings revealed that about 17% of non-edible portion of fruit is used as animal feed followed by 23% of waste used as fuel; the remaining portion is discarded without proper treatment (Fig. - 1). So, an attempt was made to extract and analyse the fibres from *Artocarpus heterophyllus* waste.

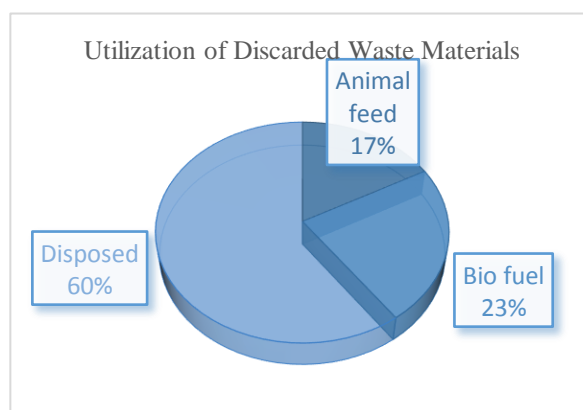


Fig. -1. Utilization of non-edible portion of the Fruit after Harvest
Procurement of Raw Materials

The non-edible parts of *Artocarpus heterophyllus* were procured from both the harvesting areas as well as from local vendors in and around Coimbatore district (Fig.2.a). The by-products of *Artocarpus heterophyllus* consist of rind, rags, latex and arils. The waste is collected raw, cleaned and sorted. These were then kept for retting process (Fig.2.b)



Fig.2.a Collection of *Artocarpus heterophyllus* waste



Fig.2.b Chemical Retting of *Artocarpus heterophyllus* rags

Extraction of Fibers

Retting is an extraction technique used to dissolve cellular tissues and pectins. There are different methods of retting-mechanical, physical, chemical, and enzymatic retting. The latter is very promising but not yet practiced on an industrial scale.

Microbiological retting: It is a long-established and widely used retting method. Dew and water retting are the two most common types of microbiological retting. Both are carried out by pectin enzymes secreted by native microflora.

Enzymatic retting: Also known as bioscouring, is a water retting modification in which degrading enzymes are directly added to tank water or in a bioreactor. (Ouajai and Shanks, 2005)

Mechanical retting: Mechanical fibre extraction consists of several steps like breaking, scutching and hackling.

Chemical retting: Chemical processes are generally preferred because they produce fibres with high-constant quality regardless of weather conditions, usually in less time. Alkalization is the most commonly used chemical process.

The collected *Artocarpus heterophyllus* byproducts showed good results in chemical retting process. Water retting and enzymatic retting was slow, and it started to decay. For chemical retting, Sodium Hydroxide (NaOH) was used (Fig.2.b). After keeping the fibers in alkaline solution, the natural impurities were removed, after which the fibres were neutralized with mild acetic acid and rinsed thoroughly with distilled water. During the alkali treatment, the hydrogen bond in the cellulose link structure is removed, which also increases the natural fibers surface roughness (Ray D& Sarkar BK, 2001). The retted fibers were dried and evaluated.

Evaluation of Fibers

The fibers were evaluated for various aspects like chemical constituents, FTIR, Scanning electron microscopy appearance, X-Ray diffraction analysis and physical characteristics.

Fiber Length and Density

The length of fibers was measured using meter scale. About 100 fibers were measured and the mean value was calculated. Density of the fibers was found using SITRA/TC/FCC/05.

Chemical Constituent analysis of fibers

By using standard test procedures, the chemical components of *Artocarpus heterophyllus* fibers, including cellulose, hemicelluloses, lignin, and ash content, were identified. The amount of cellulose was determined using SITRA/ TC/ FCC/ 01, lignin content SITRA/ TC/ FCC/ 02, wax content SITRA/ TC/ GT/ 09. IS 199 method was used to find the ash content on dry basis and moisture content. SITRA/ TC/ FCC/ 04 method for Pectin content and SITRA/ TC/ FCC/ 05 for Hemi-cellulose.

Fiber Morphology

Using FeSEM analysis, the fibres' surface morphology was examined. Due to its better resolution, field emission scanning electron microscopy (FESEM) is frequently utilised for natural fibres that provide a clear or good morphology.

Fourier Transform Infrared (FTIR) Analysis

To evaluate the chemical structure of *Artocarpus heterophyllus* FTIR analysis was carried out using FT-IR spectrometer SHIMADZU (Miracle 10). Natural fibres with different treatments have frequently been characterised using FTIR. Recently, it has been discovered that FTIR is particularly effective for examining how the chemical compositions of natural fibres vary because of inherent flaws (Dai et al., 2012).

Fiber samples X-Ray Diffraction

Using an X-Ray diffraction test, the crystallinity index of fibres from *Artocarpus heterophyllus* was evaluated. The samples were examined in an X-Pert Pro diffractometer, where the fibre analysis was performed at a current of 30 mA, a tension of 45 kV, and a measurement temperature of 250C. Peak intensities of the sample were checked with peak positions of a standard reference.

Thermo Gravimetric Analysis of fibers

Thermal stability of *Artocarpus heterophyllus* fibers was analyzed by thermo gravimetric analysis using EXSTAR/6300. TGA is an efficient method based on mass change for assessing the thermal stability of natural fibres during the heating process.

RESULTS AND DISCUSSION

Fiber Length and Density

The length of the *Artocarpus heterophyllus* fibers was measured and mean value was taken, and the length of fiber was 2.87cms. It can therefore be categorized as a short staple fibre because short staple fibres have a maximum length of 60 mm and are similar to cotton with a length of 25 to 45 mm (R Gopinath et al., 2015). The density of fiber is 1.41g /cc which was tested using SITRA/TC/FCC/03 method.

Chemical Constituent analysis of fibers

The chemical composition of natural fibers varies by its region where it is grown, soil, fertilizers used in production, maturity age of plant and method of extraction. The chemical constituents of *Artocarpus heterophyllus* fibers and other natural fibers are presented in Table 1. The *Artocarpus heterophyllus* fibers have moderate cellulose content 47.79% compared to other fibers and the lignin content is considerably high 13.60%. After common reed fibers (20.12%), *Artocarpus heterophyllus* fibers have higher hemi cellulose content (17.37%) which strongly influences the moisture absorption, bio and thermal degradation of the fiber. Compared to all other fibers, the higher wax content 3.69% depicts strong interfacial binding between fibers (Jayaramudu et al., 2010). *Artocarpus heterophyllus* fibers consist of moisture content 17.27 and ash 21.58%.

Table 1. Comparison of chemical composition of *Artocarpus heterophyllus* fibers with other natural fibers.

Fibers	Chemical Properties							References
	Cellulose (%)	Hemicellulose (%)	Lignin (%)	Wax (%)	Ash (%)	Moisture (%)	Pectin (%)	
<i>Artocarpus heterophyllus</i>	47.79	17.37	13.60	3.69	21.58	17.27	3.49	
Common reed fibers ¹⁷	51.25	20.12	12.34	-	-	-	-	Pandiarajan & Kathiresan, 2018
Jute ¹⁸	64.4	12	11.8	0.7	-	1.1	-	Indran & Edwin Raj, 2015
Lagenaria Siceraria ¹⁹	79.91	12.69	7.62	0.31	0.92	9.96	-	Saravanan et al., 2016

Fiber Morphology

The morphology of the *Artocarpus heterophyllus* fibers was examined using SIGMA HV – Carl Zeiss with Bruker Quantax 200 – Z10 EDS Detector. The FE-SEM micrograph of fibers are shown in Figure 3. In the morphology of *Artocarpus heterophyllus* fibers, most of the surface impurities were removed following the alkali- treatment resulting in higher surface roughness of fiber.

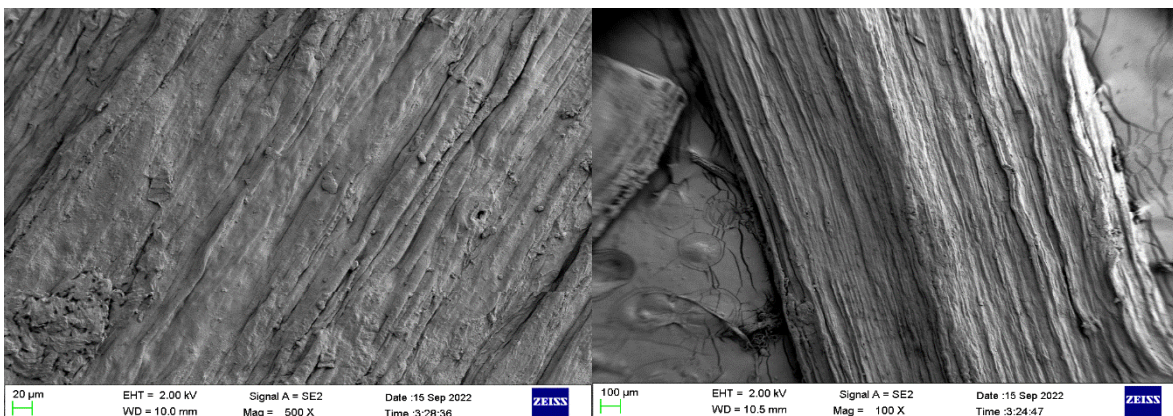
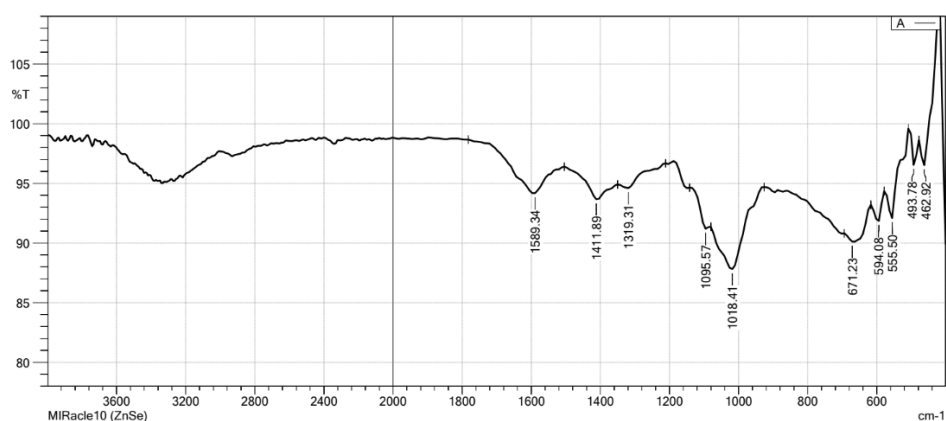


Fig.3. Surface morphology of *Artocarpus heterophyllus* fibers

Fourier Transform Infrared (FTIR) Analysis

Fourier Transform infrared spectral analyses of fibers absorption bands are observed in two wave number regions 3600-3200 cm^{-1} and 1600-500 cm^{-1} is depicted in Figure 4. The band at 3400 cm^{-1} shows the presence of cellulose, O-H stretching of α cellulose is represented (Galiwango E et al., 2019). The bands around 1500–1600 cm^{-1} i.e., 1589.34 cm^{-1} corresponding to the aromatic ring stretching was observed suggesting that the protein and lignin were present in the pectins (Liu L et al, 2010). The peak at 1411.89 cm^{-1} is due to CH_2 and CH_3 bending. The wave numbers between 1500-1000 cm^{-1} depicts the presence of functional groups -CH, -OH, and CH_2 bending which indicates the presence of hemicellulose.



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MIRacle10 (ZnSe)

Item	Value
2 Sample name	
3 Sample ID	
4 Option	
5 Intensity Mode	%Transmittance
6 Apodization	Happ-Genzel
9 No. of Scans	45

Fig.4. FT-IR spectra of *Artocarpus heterophyllus* fibers.

Fiber samples X-Ray Diffraction

The X-Ray diffraction of *Artocarpus heterophyllus* fibers is depicted in Figure 5. Two distinct peaks at $2\theta=16.8^\circ$ and $2\theta=22.5^\circ$ which correspond to crystalline and amorphous peaks of the cellulose of the natural fibers. Segal's empirical expression was used to calculate the crystallinity index, CI (%) (Kommula et al., 2013)

$$CI (\%) = \left[\frac{I_{002} - I_{AM}}{I_{002}} \right] \times 100$$

where I_{002} is the maximum intensity counter reading at 2θ angle close to 23.4° representing crystalline phase peak and I_{AM} counter reading at 2θ angle 16.8° representing amorphous phase peak. The calculated crystalline indices of *Artocarpus heterophyllus* fiber is 36.28% which is higher than *Cardiospermum Halicababum*, 32.21% (Vinoda et al., 2019) and the crystallinity index of NaOH treated fiber will be higher due to the removal of amorphous contents like lignin, hemicellulose, and rearrangement of crystalline region on the fiber surface (Arthanarieswaran et al., 2015).

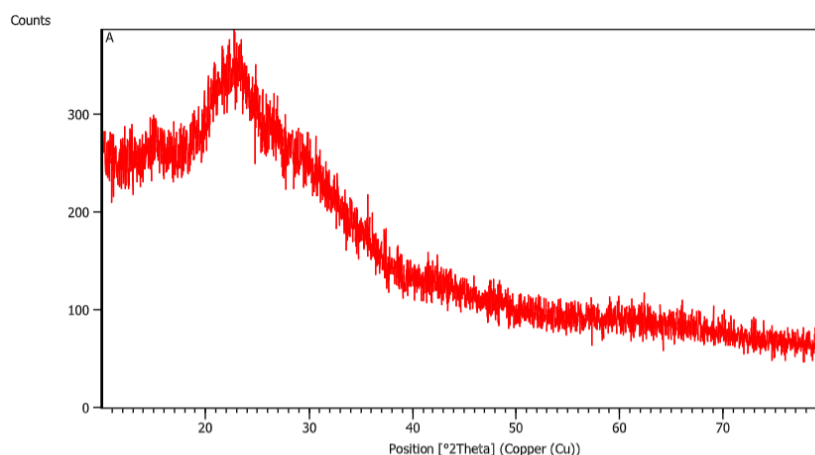


Fig. 5. X-Ray diffractogram: *Artocarpus heterophyllus* fibers

Thermo Gravimetric Analysis of fibers

The weight loss curve (TG) and the derivative curve (DTG) acquired from thermogravimetric assessment of *Artocarpus heterophyllus* fibers is depicted in TGA graph, Figure 6. Three clearly defined steps that correlate to the temperature degradation of the fibre are depicted in the TGA graph. Due to water molecules evaporating from the fibre at temperatures between 20°C and 288°C , a preliminary weight loss of 5.1% was observed. When hemicellulose started to thermally depolymerize at 290°C , there was an immediate loss of weight. Cellulose decomposition (49%), which began at 300°C and ended at 740°C , is the second significant decomposition. The last decomposition progressed from 750°C and disappeared at 925°C , resulting with a 35% weight loss, and involving components like lignin and wax. The sample still contained 11% of the residual weight at 940°C . At 295°C , a noticeable peak indicated a significant weight loss of 49% caused by cellulose degradation. Similar findings were also observed for hemp, jute, and kenaf fibres at 308.2, 298.2, and 309.2°C (Manimaran Pet et al., 2016).

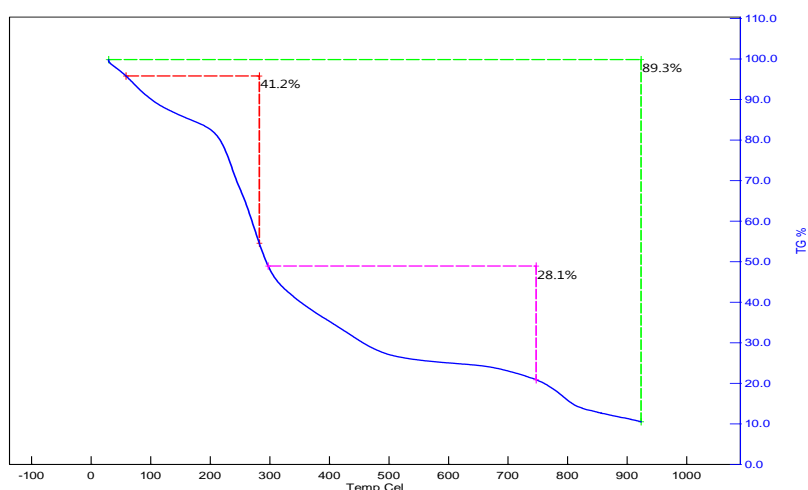


Fig. 6. Thermogravimetric analysis of *Artocarpus heterophyllus* fibers

SUMMARY AND CONCLUSION

Increased environmental awareness has resulted in the utilization of waste materials to develop natural fibers. Recycling is one of the most essential methods for turning agricultural waste into new products like organic fertiliser, raw materials for the paper industry, textile industry etc. People are switching back to natural fibres because of their bio renewable properties and eco-friendly practises in replacement of synthetic and hazardous materials. The present study highlights the utilization of discarded waste materials into raw materials for the production of fibers and based on their property's products will be designed. The major functional groups of *Artocarpus heterophyllus* fibers were identified by FTIR analysis. The moderate thermal degradation stability of *Artocarpus heterophyllus* fibers indicates their applications in composites like panel boards, particle boards, molded products, reinforcements, architectural structures and non-wovens. The high lignin (13.60%) and hemicellulose (17.37%) content in fibers increase the strength of fibers [16]. Therefore, *Artocarpus heterophyllus* fibers can be considered a safer and sustainable natural fiber.

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Orchid ID

Aneetta V.J <https://orcid.org/0000-0002-7710-3564>

Dr. S. Amsamani <https://orcid.org/0000-0002-6595-3895>

C. Naveena Shri <https://orcid.org/0000-0001-9915-8753>

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A NEW LEASE OF LIFE TO SELECTED INDIAN PAINTED CRAFTS: SOME INITIATIVES

Ashima Anand¹ and Dr. Seema Sekhri²

¹Research Scholar, Department of Home Science,

²Professor, Department of Fabric and Apparel Science,

Lady Irwin College, University of Delhi, New Delhi, India

Email: ashima.anand@lic.du.ac.in ; seema.sekhri@lic.du.ac.in

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ABSTRACT

Indian crafts are a magnificent resource of its culture and traditions. These have a long narrative that describes how they have had integrated into society. Skilled craftspeople work day and night to produce creative and unique products that cannot be compared to mass produced mechanised products. This activity helps them to make a living so that they can live a contented life besides providing them tranquillity. Traditional crafts in several countries around the world have either lost their charm or are on the verge of losing their identity. Indian crafts are even in this state. Due to predominance of urbanised, western culture in youth's lifestyle, lack of awareness among them regarding Indian traditional crafts, their inclination for buying cheaper machine-made commodities, and severe impact of pandemic has made situations worse for craftspeople who have been working tirelessly for preserving crafts. All these issues have had a significant impact on the demand for and pattern of consumption of craft-based products. Hence, a need was felt to reduce the gap between the type of products demanded by young consumers and kind of products supplied by craftspeople practicing selected traditional Indian painted crafts. To make their products timeless and appealing to youthful consumers in twenty-first century, this research was carried out. For development of products in an effective manner a model was created, evaluated, and applied. Based upon the analysis of data collected two painted Indian crafts namely, Madhubani paintings from Bihar and Gond paintings from Madhya Pradesh were chosen. The results showed that Madhubani painting products were preferred above Gond art among the target group.

Keywords: Indian crafts, Painted, Product diversification

INTRODUCTION

India has a long history of producing and supplying some of the most beautiful traditional Indian crafts worldwide (Gillow and Barnard, 1991). It has a nearly 5000 years old narrative that explains the embellishment of textiles in various forms viz. weaving, dyeing, printing, and painting. Of these, painting has evolved as the most artistic expression on textiles by a craftsperson. Different regions of India could be seen practicing definite painting forms. Traditionally *kalam* or indigenously produced brushes were used by craftspeople to adorn humble-looking textiles. Textiles were painted using mordants or pigments that were obtained from natural resources like minerals and plants. Since pigment-printed textiles used binders and adhesives in their application, it rendered them very stiff, hence making them unsuitable for apparel purposes. Such textiles were mainly used as temple hangings or religious scrolls (Karolia, A., 2019). This problem however was solved with the use of mordants.

In the earlier days like any other craft, painted crafts were mainly used for the gratification of personal needs. Slowly and gradually, these became products of trade. Since it brought monetary benefits for earning their living, craftspeople evolved products made with their skilful hands as per society's demands. Hence, they maintained a continuous equilibrium between demand and supply. Moreover, inhabitants of the Indian society had an awareness and desire to adorn their wardrobes with hand-painted traditional work crafts. To reach the masses, craftspeople explored a variety of channels, including direct supply, annual fairs, and exhibitions, which are still a part of society's marketing system. Direct sales to consumers have been the most traditional method of making a product part of consumers' lifestyles. Using local vendors as channels of distribution is a crucial marketing strategy used by craftspeople. Earlier direct sales either were done through vendors in the local market or by selling products door-to-door in the neighbourhood. Vendors then went to urban areas to market their goods at increased prices. This strategy is still being used today, albeit through master craftsmen, traders, and retailers in a slightly improvised manner. To address the needs of the buyers and sellers, a guild of traders had a council. Merchants and traders used to get in touch with a craftsman to place orders as per consumers' demands. Also, the Indian government came forward to help craftspeople sell their merchandise through government-run state emporia in 1950. Besides, several promotional exhibitions and fairs were also organised by the government which offered a platform for craftspeople to connect directly with the consumers. At present such initiatives are still being taken by the government. *HunarHaatis* an example of one such initiative which are periodically held throughout India. Several non-government organisations like Daastakaar, Antaran, Kalaraksha, Shrujan, and Khamir have also started working for the welfare of craftspeople and help them in selling their products to consumers (Hindustan Times, 2020). All these trading platforms and efforts have always made sure that Indian-painted craft products become a part of everyone's daily lifestyle.

However, it has been seen that preference of traditional Indian painted craft-based products in lifestyle of many has diminished over the years. This has resulted due to a multitude of causes. One such cause is the flooding of markets with machine-made, low-priced imitations of original works of art that has degraded the importance of handmade goods among many except niche segment of society (Anand A. & Sekhri S., 2019). Also, another cause could be growing influence of western culture that has a significant effect in the wardrobe and lifestyle patterns specially of the youth. Moreover, reduced awareness about and less inclination towards crafts in this consumer segment has resulted in lesser value for the manual dexterity of craftspeople and hence has impacted the demand for such goods (Anand A. & Sekhri S., 2019). Never the least the onset of Corona Virus pandemic further worsened the entire scenario. It affected the whole planet and India was not aloof. Every trade was affected due to lockdown, and it minimised entrepreneurial opportunities for craftspeople as well. Due to imposed lockdown, fairs and exhibitions could not be held, no direct contact with consumers could be made and hence sales of textile craft-based goods were affected (Juneja, A., 2020). Lockdown, therefore, negatively impacted the demand and supply chain of craft-based products (Khan, A.T., 2020). Decreased consumption of craft-based products, cancellation of trade shows and exhibitions, building up of dead stock, cancellation of orders from retailers, etc. built up heap of unsolved issues for craftspeople during this period (Hindustan Times, 2020; Mark to Market, 2020). They were not left with any method to market their excess inventory (Bhatnagar, V., 2020). For the craftspeople relying on small-scale or cottage industries for their income and means of subsistence, all these issues contributed to a financial crisis (Hindustan Times, 2020). To prevent the spread of Coronavirus, it was suggested worldwide

by World Health Organisation to remain indoors and use face masks to filter out viral particles. Home confinement resulted in lesser outdoor wear requirements and thus an increased need for casual dressing was noticed which led to rise in demand of such products. According to a study conducted at the Department of Mechanical Engineering, University of Colorado Boulder, reusable cotton masks were found to be efficient for up to a year (Times of India, 2021). Such a drastic change made life difficult for craftspeople. They tried to embrace product diversification to meet new demands and maintain their livelihood. Young consumers explored virtual online platforms for buying new products and the inability of craftspeople to quickly switch from offline to online marketing platforms pushed them further away from prospective buyers (Patgiri. R., 2020). This further led to a significant negative impact on this community.

Hence, considering the above a great need was felt to undertake research to understand level of awareness about traditional Indian painted crafts among youth, find out its acceptance in their lifestyle and give a new lease of life to selected painted Indian crafts by diversifying the products to suit the contemporary needs and to support the craftspeople so that they can continue to earn their living.

OBJECTIVES

- To gauge the popularity of traditional Indian painted crafts in youth.
- To ascertain acceptance of craft-based products among the target group.
- To diversify products in selected painted Indian crafts for youth.

METHODOLOGY

The present paper is based on a descriptive research design. For the study, a sample of 100 young respondents, both male, and female, living in urban areas of New Delhi and aged between 18-24 years were selected. For the sample selection, a combination of convenience-based sampling and snowball sampling methods was used. A digitised questionnaire was used as a tool for data collection which covered questions based on demographic information about the respondents, awareness about painted traditional Indian crafts among the target, and Indian craft-based products that the young consumers would like to buy. Two Indian-painted traditional crafts were finalised based on the responses received. For innovative product development, five craftspeople for each of the selected painted crafts were approached. After consistent telecommunications and video conferencing, two craftspeople in each of the painted craft categories were chosen. Their consent for participation in the study and suitability of their craft for product development were prime motives in the selection. A multistage, systematic model was created, examined, and followed for innovative product development. It included stages like mind mapping for product diversification, designing for product development, marketing, and sales. Feedback for the acceptance of final products was collected from the sample using digitised questionnaire. A 5-point Likert scale ranging from 1 to 5 where 1 represented no acceptance and 5 most acceptance was developed for rating the products. Additionally, efforts were made to conduct webinars for the target to raise awareness of and interest in a few selected traditional Indian painted crafts.

FINDINGS AND DISCUSSION

The general profile of respondents:

Analysis of respondents' profiles revealed that 54% of males and 58% of females were in the age range of 18-20 years, 16% of males and 34% of females were in the 21-23 years age range and the remaining 14% males and 8% females were of 24 years and above. Among male respondents 74% were enrolled in graduate degree courses, and the rest 26% were in post-graduation courses. While 64% of female respondents were doing graduation and the remaining 36% were enrolled in postgraduate courses (Table 1).

Table 1: General profile of respondents

S.No.	Demographic Profile	18-24 years (n=100)			
		Male (50)		Female (50)	
		<i>f</i>	%	<i>f</i>	%
1.	Age				
	18-20 years	27	54%	29	58%
	21-23 years	16	32%	17	34%
	24 years and above	7	14%	4	8%
2.	Education				
	Graduate	37	74%	32	64%
	Postgraduate	13	26%	18	36%

Analysis of responses received for the most popular traditional Indian painted craft among the target age group revealed that Madhubani painting from Bihar was the most known which was followed by Kalamkari painting from Andhra Pradesh, Gond painting from Madhya Pradesh, Patachitra of Gujarat and Phad painting from Rajasthan (Fig.1). This result may be attributed to the presence, availability, and propagation of selected Indian painted craft products among the consumers which led to its familiarity among the target group. These findings are in line with the research conducted by Anand A. and Sekhri S., 2019.

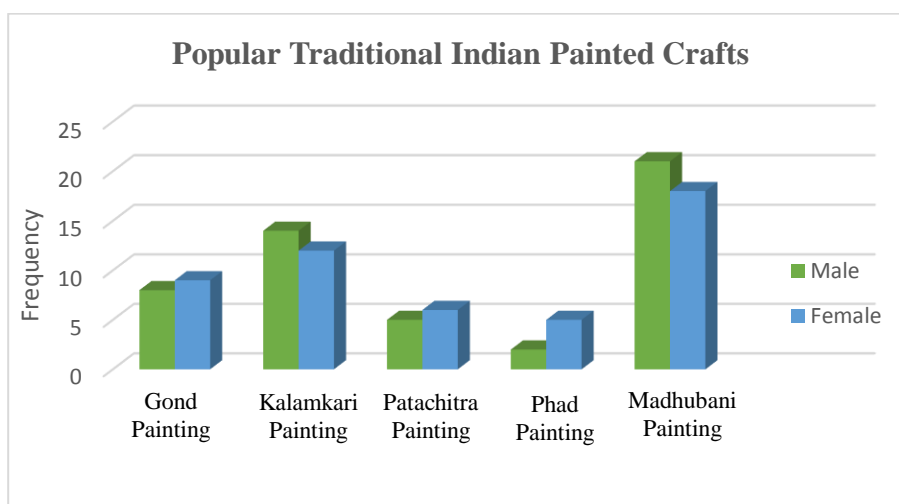


Figure 1: Popular Traditional Indian Painted Crafts among Youth

Analysis of results for the traditional Indian painted craft-based products that the young consumers would like to buy revealed that amongst both genders, face masks and T-shirts for casual dressing were the most popular of all the choices (Table 2). This might be due to the addition of the need for a face mask as everyday wear in one's lifestyle. More confinement to home surroundings during pandemic times and its impact on clothing needs might have made T-shirts a popular choice. Additionally, it might be also possible that the target age group was influenced by the government's nationwide initiative "#vocalforlocal" that they wanted to come up with in support of Indian craftspeople and made-in-India products.

Table 2: Popular Traditional Indian Painted Craft-Based Products among Target Group

S. No.	Question 2: Out of the following which craft-based traditional Indian painted craft-based product would you like to buy?	Male (50)	Female (50)	Total (100)
1.	T-Shirt	17	12	29
2.	Face mask	21	29	50
3.	Laptop bag	8	4	12
4.	Scarf/stole	4	5	9
		50	50	100

Based on the analysis, face masks and T-shirts were selected for product development. It was decided to develop these products in Madhubani painting and Gond painting. Kalamkari painting was not selected due to language barriers associated with the craftspeople practicing the craft. A systematic multi-stage model was developed for innovative product development. For the selected painted crafts, two craftspeople were contacted and step by step model was executed with them (Figure 2).

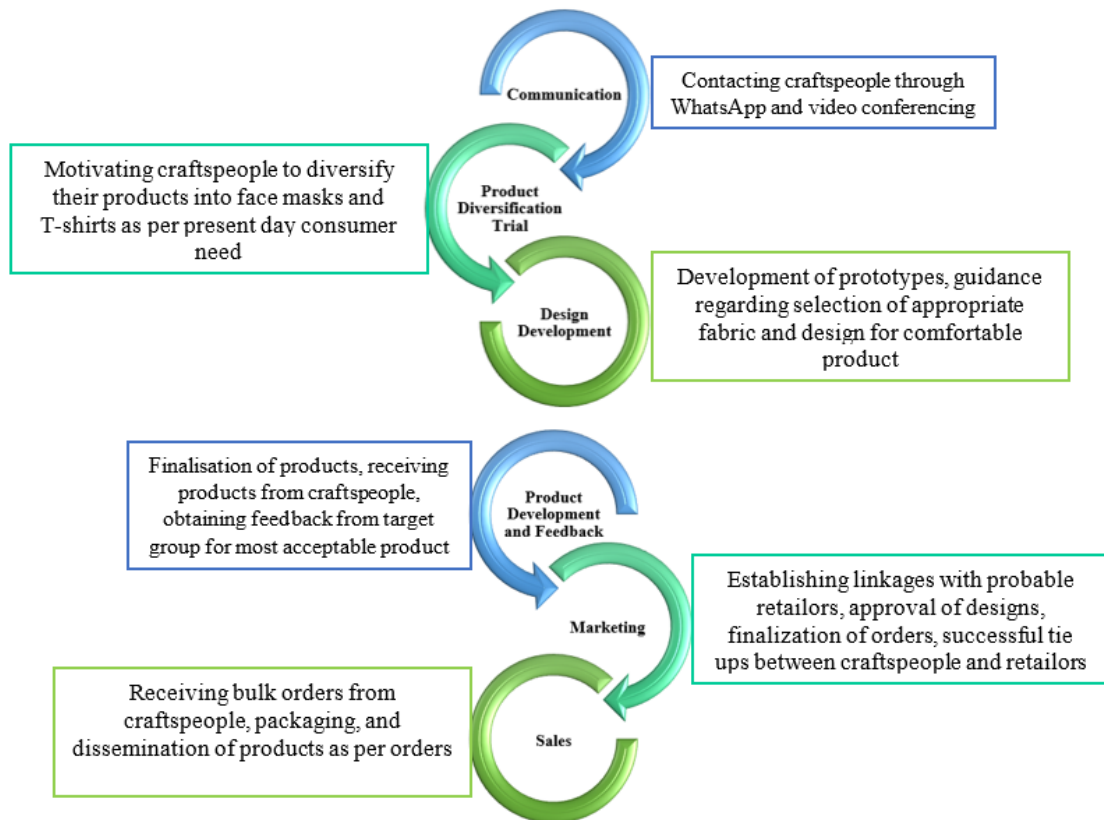


Figure 2: Model for Innovative Product Development and its Distribution

Figure 3, Figure 4, and Figure 5 depict Madhubani painting face masks, Gond painting T-shirts, and Madhubani painting T-shirts.



Figure 3: Madhubani Painting Face Masks



Figure 4: Gond Painting T-shirt

Figure 5: Madhubani Painting T-shirt

The acceptance of traditional Indian painted craft-based products was ascertained among the target age group. For this purpose, the respondents were contacted again for their feedback on the developed products, namely madhubani painting T-shirt, madhubani painting face masks, and gond painting T-Shirt. The products were rated by the respondents based on 5-point Likert scale which ranged from 1 to 5 where 1 represented no acceptance and 5 most acceptance. Table 3 represents the data received after analysis of responses.

Table 3: Acceptance of Traditional Indian Painted Craft-Based Products among Target Group

S.No.	Products	Likert Scale Rating	Male (50)		Female (50)	
			<i>f</i>	%	<i>f</i>	%
1.	Madhubani Painting T-Shirt	5 (Most accepted)	2	4%	5	10%
		4 (Accepted)	19	38%	21	42%
		3 (Neutral)	17	34%	14	28%
		2 (Less accepted)	12	24%	10	10%
		1 (Not accepted)	0	0%	0	0%
		Total	50		50	
2.	Madhubani Painting Face Masks	5 (Most accepted)	4	8%	6	12%
		4 (Accepted)	20	40%	23	46%
		3 (Neutral)	14	28%	18	36%
		2 (Less accepted)	10	10%	3	6%
		1 (Not accepted)	2	4%	0	0%
		Total	50		50	
3.	Gond Painting T-Shirt	5 (Most accepted)	0	0%	0	0%
		4 (Accepted)	4	8%	5	10%
		3 (Neutral)	16	32%	14	28%
		2 (Less accepted)	21	42%	19	38%
		1 (Not accepted)	9	18%	12	24%
		Total	50		50	

The analysis of results for acceptance of madhubani painting T-shirt revealed that highest percentage of respondents that is 38% and 42% for male and female respectively rated the product at point 4 of the Likert scale which indicated the acceptance of product among the target age group. 4% of male respondents and 10% of female respondents regarded the product as most accepted while 34% male and 28% females gave it a rating of 3. Only 24% and 10% of males and females expressed less acceptance for the products while none of the respondents expressed no acceptance for madhubani painting T-shirt.

Regarding the acceptance of madhubani painting face masks it was revealed that highest percentage of males and females found the product accepted that is by 40% of males and 46% of females. 8% of males and 12% of females found it most accepted, 28% males and 36% females were neutral, 10% male and 6% female found it less accepted while only 4% male reported it to be not accepted. Amongst females none of the respondents expressed no acceptance for the product.

As far as analysis of results obtained for gond painting T-shirt is concerned it was found that the highest percentage of both male and female respondents expressed their less acceptance for the product. While none of the respondents rated the product with 5-point rating, only 8% and 10% of male and female respondents expressed their acceptance. 32% of male respondents and 28% of female respondents were neutral, 42% of male and 38% of female rated the product as less accepted and 18% of male and 24% of female expressed no acceptance for the product.

Hence madhubani painting T-shirts and face masks had more acceptance among both genders of the target group. This acceptance may be due to the aesthetic appeal and price range of Madhubani products. Products made using Gond painting turned out to be more expensive and were also found to be less known among the target group.

SUMMARY, CONCLUSION AND IMPLICATIONS

The future of Indian textile crafts lies in its evolution with time and in product diversification to make it suitable for the needs of consumers. According to the present study, both males and females have a favourable attitude towards the adoption of products made using Indian textile traditions provided these are available as state-of-art products which will suit their lifestyle, as could be observed through painted face masks and T-shirts. The findings of the study could be beneficial for craftspeople working in other traditional Indian textile crafts. Additionally, it may be advantageous for sellers who can develop a direct link with craftspeople for innovative product development and give them new entrepreneurial opportunities. Further, to popularise Indian traditional crafts various educational institutes can step forward to sensitise and educate the young generation about various crafts thriving in India. Diversifying the product and closing the gap between producers and customers is crucial for the craft to grow and for its practitioners to be able to support themselves; otherwise, it may progressively lose its significance in society. Also, it is imperative today that craftspeople are trained to develop digital literacy so that they can establish direct contact with consumers to widen their selling market.

SUGGESTION FOR FUTURE RESEARCH

- More traditional Indian textile crafts could be explored for the development of state-of-the-art products that will suit the present-day lifestyle of the youth.
- Level of awareness of young consumers regarding diversified traditional Indian textile crafts could be enhanced to sensitize them towards these and make them potential consumers of traditional Indian textiles craft-based products.

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DIGITIZING MOTIFS INSPIRED FROM NATARAJA ON FASHIONABLE BAGS THROUGH DIGITAL PRINTING TECHNIQUE

Ayushi Yadav¹, Dr. Priyanka Kesarwani² and Dr. Monisha Singh³

¹M.A. Scholar and ^{2&3}Assistant Professor Department of Family and Community Sciences, University of Allahabad, Prayagraj, 211002 (U.P.), India
Email- kpriyanka1208@gmail.com

ABSTRACT

Fashion is a popular or the latest style of clothing, hair and accessories. A fashion accessory is parts of an outfit. The fashionable bags are commonly used by every woman and there are different types of bag commonly used by women's such as tote bag, shopper bag, box bag, slingbag, envelope bag, round bag, bucket bag, backpack, hobo bag and drawstring bag. Designers take their inspiration from sources gathered from nature, art, dance, music, object and sculptures etc. The sculpture had a historical role to make real in solid matter. Nataraja has been one of the most famous Hindu sculpture in Indian art and free-standing sculpture of the thirteenth century found in the Museum of Eine Ars Houston. Nataraja is referred as Lord of Dance. Thus, the present study is to introduce Nataraja motifs inspired from "Sculpture" to new textile experimentation, through CAD designing. The study was planned with the objectives; to designs different types of bags by using motifs of Nataraja and develop bags through digital printing technique. Total fifteen motifs of Nataraja were made through CAD software and evaluated in an online mode through google form by a panel of thirty judges for the selection of ten most preferred motifs for bags. The selected ten most preferred motifs were M6, M13, M7, M10, M9, M1 M3, M5, M15 and M12. Ten different motifs were used for designing ten different styles of bags. Two different placements were made in each bag. The judges were asked to select the most preferred designs among the two placements in each category of bags. The selected placements in each bag were B1a, B2b, B3a, B4a, B5a, B6a, B7b, B8a, B9a and B10a. Thereafter selected ten bag designs were again evaluated to find out five best designs of bag for the product development. The selected bag designs were B1a, B3a, B5a, B7b and B10a. The products were developed and their cost was calculated. The result showed that, the design of bags with code number B3a, B5a, B7b, B10a and B1a were highly acceptable in visual evaluation. Further result showed that, the developed product was highly acceptable by the judges in all the parameters such as suitability of the fabric used, neatness and clarity of the design and overall appearance. But it was somewhat acceptable in the parameter economic feasibility. The sale price of the developed bags B1a, B3a, B5a and B7b was ₹809. Whereas bag B10a was of ₹460. Thus, it can be concluded that, the developed bags (B1a, B3a, B5a, B7b and B10a) were highly acceptable by the judges because the motifs of the Nataraja transferred by digital printing on bags were beautiful and attractive. It will also inspire designer to collect the motifs of Nataraja and adopt the design for bags and other textile articles by using CAD software.

Keywords: Nataraja, CAD software, Digital Printing, Accessories, Fashion, Sculpture, Bag.

INTRODUCTION

Fashion is a popular or the latest style of clothing, hair and accessories. Nowadays people want to be fashionable. Women and fashion are an interesting combination. The craze for fashion

is great among women. Nowadays women don't believe in simplicity, most of the women want to give attention towards the fashion. A fashion accessory is parts of an outfit. Accessories are

often chosen to complete an outfit and complement with the wearer's look. Fashion accessories can be categorized into two general areas; those that are carried and those that are worn. The fashionable bags are commonly used by every woman; they prefer to carry different types of bags for different occasions. The mostly bags used by the women are tote bag, shopper bag, box bag, sling bag, envelope bag, round bag, bucket bag, backpack, hobo bag, drawstring bag etc.

Designing of bags is an essential aspect for many fashion brands. Unique prints on bags or distinctive surface pattern are necessary for brand identity. A textile designer is an individual that crafts design for everything. The designs they create can be used for apparels as well as accessories. Textile designers take their inspiration from sources gathered nature, art dance music, object and sculptures. The sculpture had a historical role to make real in solid matter.

Nataraja has been one of the most famous free-standing sculptures of the thirteenth century found in the Museum of Eine Ars Houston. This sculpture is made of bronze and it depicts the Hindu God Shiva as the divine cosmic dancer (**Srinivasan, S. 2004**). In India, Chidambaram is a single place that is called home of dancing Shiva. Nataraja is a brilliant invention, it combines the role of Lord Shiva in a single image as a creator, preserver and destroyer of the universe. It also conveys the conception of never-ending cycle of time (**Trüeb, R. M. 2017**). The Nataraja iconography is the epitome of Indian aesthetics.

JUSTIFICATION OF THE STUDY

Fashion is a popular form of artistic expression which includes apparel, accessories, footwear, cosmetics etc. Nowadays people want to be fashionable and the craze of fashion is great among women. Accessories tie our ensemble together they create interesting detail where clothes are simple or plain. Accessories add personality to look and give an opportunity to express unique personal style. Women use accessories to be fashionable and stand out from the crowd. Among accessories bag is the most common accessory which is found in wardrobe of almost every woman. Women don't prefer same bag every time, they prefer bag which is distinctive color style, and pattern.

The fashion industry is in the age of digital transformation, where each and every design can be digitized. Designers take their inspiration from different source such as nature, art, music, dance, object & sculpture. Sculpture art is one of India's oldest art forms, and is regarded powerful than writing and painting since it can be touched and felt.

Nataraja has been one of the most famous free-standing sculptures of the thirteenth century. It is a brilliant invention because it combines the role of Lord Shiva in a single image as a creator, preserver and destroyer of the universe. The finest example of Indian aesthetics is found in Nataraja imagery. Various motifs can be created by taking inspiration from Nataraja which can be digitized and used in fashion industries for apparels, home furnishing and accessories through digital printing

technique. The mixture of tradition and modern technology presents an exciting opportunity in the world of design and fashion.

The goal of the present study was to reveal numerous motifs of Nataraja to new textile experimentation, through CAD software. It was an attempt to incorporate the Nataraja motifs on different types of fashionable bags. Therefore, the present study was planned to digitize Nataraja motif on distinctive bag designs through digital printing technique.

MATERIALS AND METHODS

Development of motifs of Nataraja:

Total fifteen motifs of Nataraja were made through computer aided designing software i.e.; Corel draw is vector graphic editor software developed for designing.

Visual evaluation of developed motifs:

The developed motifs of Nataraja were evaluated by a panel of thirty judges including teachers and students of the Department of Family and Community Sciences (Home Science), University of Allahabad, Prayagraj, Uttar Pradesh for the selection of ten most preferred motifs for bags. The evaluation was done in an online mode through google form. The evaluation of the designs was done on the parameters; most preferred, preferred and less preferred. The percentage of three different parameters was calculated online by the google form for each motif. The motifs which had maximum percentage in “Most preferred” category was selected.

Development of designs of bag through CAD:

The designs of bag were made by computer aided designing software. Ten different designs of bag were made like tote bag, sling bag, shopper bag, backpack, envelope bag, drawstring bag, hobo bag, box bag, bucket bag and round bag.

Designing bags with different placement of motifs:

Ten different motifs were used for designing ten different types of bags (Tote bag, sling bag, shopper bag, backpack, envelope bag, drawstring bag, hobo bag, box bag, bucket bag and round bag). One motif was used for designing one type of bag. Two different placements of motif were made on each bag. Therefore, total twenty bag designs were made.

Visual evaluation of the bags on the basis of motif placement:

The evaluation of the bags was done to select one most preferred placement of bags in each category. The evaluation was done by the same procedures on the same parameters by the same panel of thirty judges (as discussed in section 2.2). The judges were asked to select the most

preferred designs among the two placements in each category of bags. Total ten designs of bag were selected.

Selection of the best bag designs:

The selected ten bag designs were evaluated again by the same procedures on the same parameters by the same panel of thirty judges (as discussed in section 2.2) to find out five best designs of bag for the product development.

Developments of bags:

After the printing process, the fabrics were stitched into bags, (five best designs selected by the judges). The bags were stitched by the skilled professionals.

Acceptability of the developed bags:

The developed bags were further subjected to visual evaluation by the same panel of thirty judges to assess the acceptability of the developed product. The acceptability of the bags was assessed on the parameters; Suitability of fabric used, Neatness and clarity of design, Economic feasibility and Overall appearance.

Three different scores were given as 3 for highly suitable, 2 for suitable and 1 for somewhat suitable. Weighted mean score (WMS) were calculated from the number of respondents against each characteristics of functional features.

The acceptance of the developed bags was analyzed through Weighted Mean Score (W.M.S). The weighted mean score was calculated from the scores given by the judge by the given formula:

$$W.M.S = \frac{No. \text{ of respondents } (HA) \times 3 + No. \text{ of respondents } (A) \times 2 + No. \text{ of respondents } (SWA) \times 1}{Total \text{ No. of respondents}}$$

W.M.S was analyzed for the acceptance level in the following ranges (**Gogoi et al., 2016**)

- Highly acceptable (HA): 2.34-3.00
- Acceptable (A): 1.67-2.33
- Somewhat acceptable (SWA): 0.0- 1.66

RESULTS AND DISCUSSION Developed motifs of ‘Nataraja’ through

CAD:

The motifs of Nataraja inspired from sculpture were developed using computer aided

designing software. Total fifteen motifs of Nataraja were developed and are shown in Figure 1.

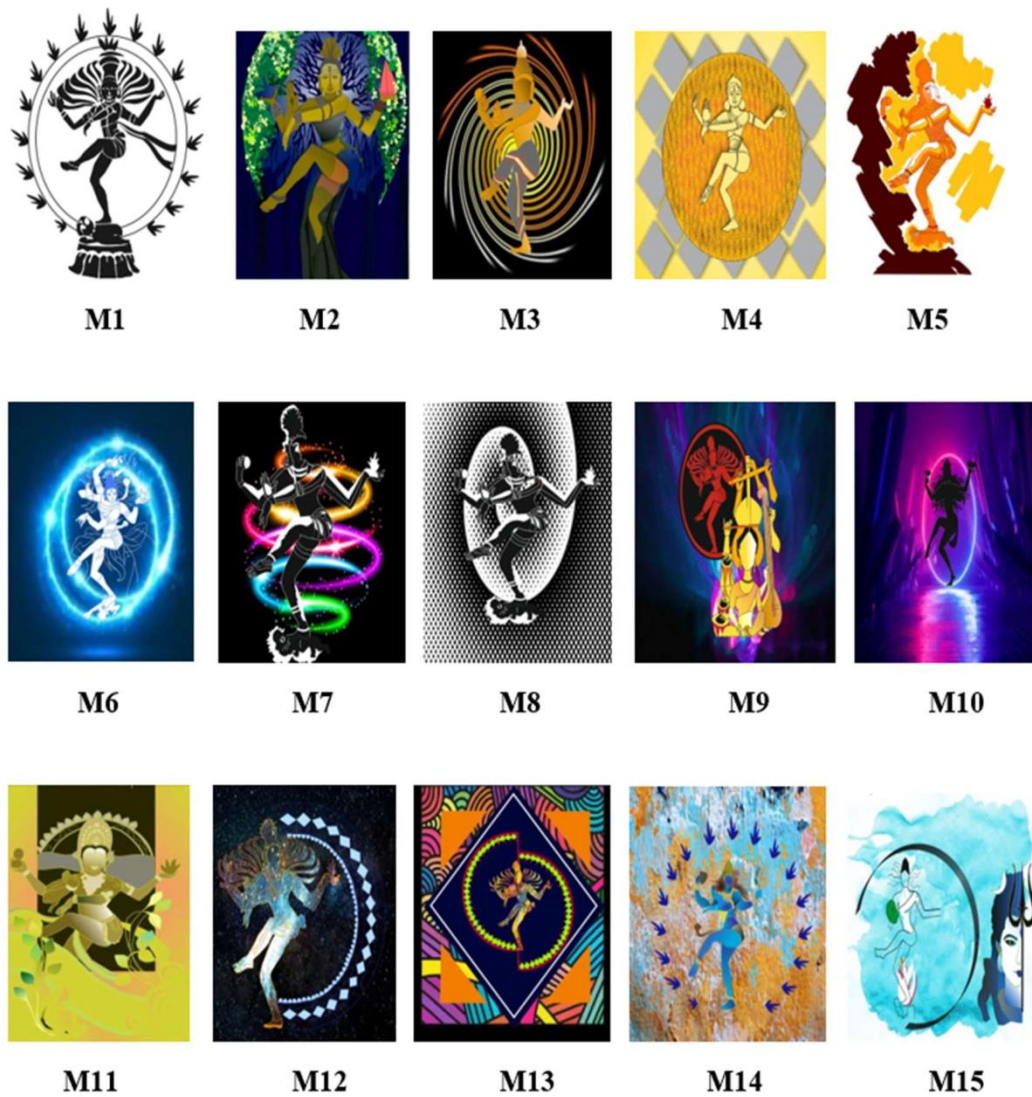


Figure 1 Motifs of Nataraja (M1-M15)

Visual evaluation of developed motifs:

All the developed motifs of Nataraja were subjected to visual evaluation by the judges for the selection of ten most preferred motifs. The result of visual evaluation is shown in Table 1.

Table 1 Average percentage obtained on visual evaluation of motifs

Motif number	Overall appearances (Per cent)			Rank
	Most preferred	Preferred	Less preferred	
M1	56.7*	43.3	00	IV
M2	20	43.3	36.7	XI
M3	50*	40	10	V
M4	26.7	53.3	20	IX
M5	50*	40	10	V
M6	76.7*	20	3.3	I
M7	60*	30	10	II
M8	23.3	36.7	40	X
M9	58.6*	37.9	3.4	III
M10	60*	30	10	II
M11	13.3	46.7	13.3	XII
M12	43.3*	43.3	13.3	VII
M13	76.7*	20	3.3	I
M14	33.3	36.7	30	VIII
M15	44.8*	48.3	6.9	VI

*Selected motifs

Developed design for bags:

Total ten different designs of bags were made i.e., Shopper bag, tote bag, round bag backpack, bucket bag, drawstring bag, box bag, hobo bag, sling bag and envelop bag. The bags were coded. The code numbers assigned to different bags are shown in Table 2 and the developed design of bags are shown in Figure 2.

Table 2 Code number assigned to different bags

S. No.	Bag name	Code number
1.	Shopper bag	B1
2.	Tote bag	B2
3.	Round bag	B3
4.	Backpack	B4
5.	Bucket bag	B5
6.	Drawstring bag	B6
7.	Box bag	B7
8.	Hobo bag	B8
9.	Sling bag	B9
10.	Envelop bag	B10

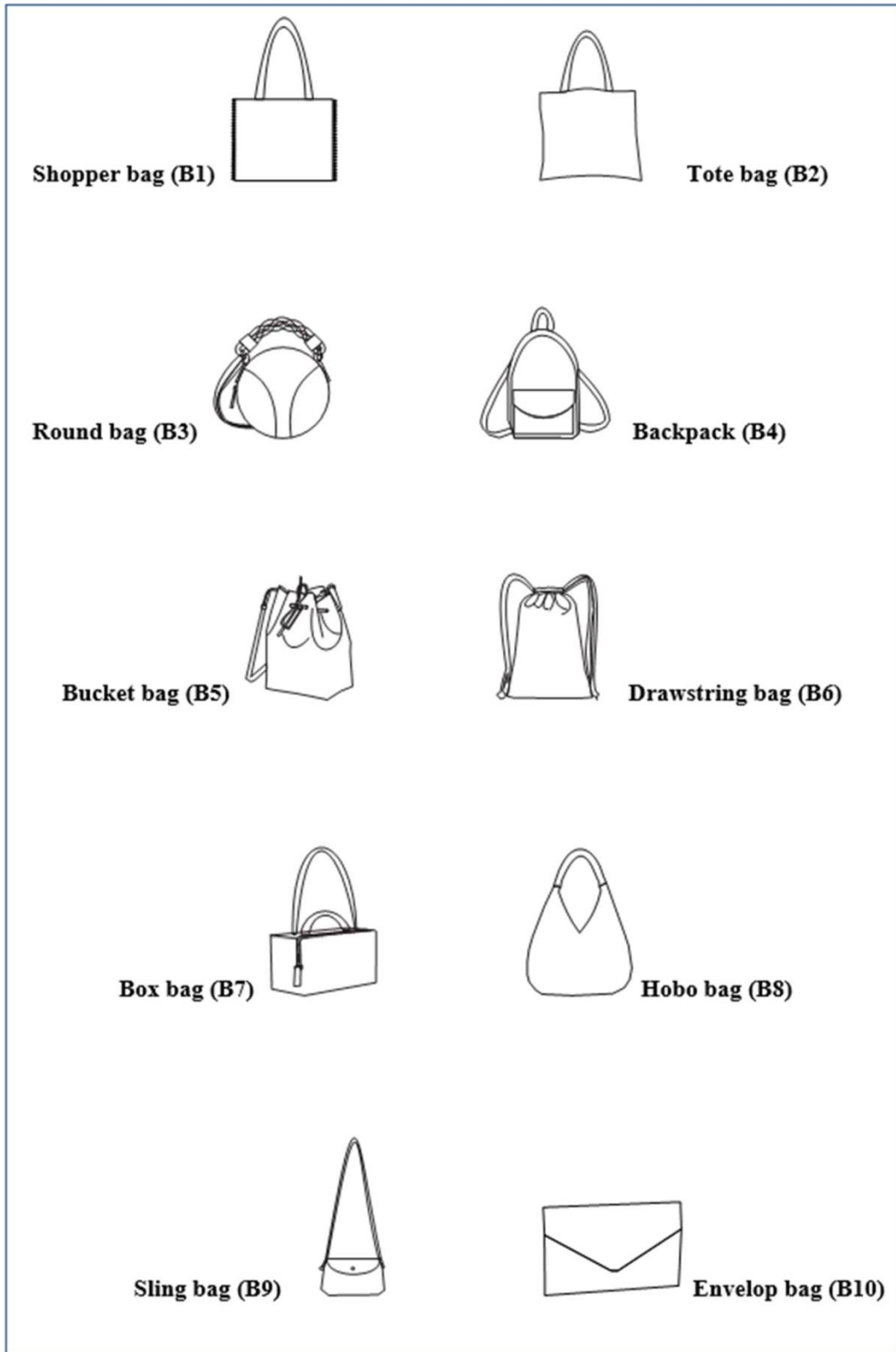


Figure 2 Design of Bags

Design of bags with different motif placement:

Twenty different designs of bag were made. Front and back designs were made for each bag. One motif was used for one type of bag. The code assigned for two different placements of motif are shown in table number 3. The bag designs, developed with different placement are shown in Figure 3.

Table 3 The motif assigned for designing different bags

S. No.	Bag name	Code number (Bag)	Motif number	Motif placement	
				Placement (1)	Placement (2)
1.	Shopper bag	B1	M1	B1a	B1b
2.	Tote bag	B2	M12	B2a	B2b
3.	Round bag	B3	M3	B3a	B3b
4.	Backpack	B4	M13	B4a	B4b
5.	Bucket bag	B5	M5	B5a	B5b
6.	Drawstring bag	B6	M6	B6a	B6b
7.	Box bag	B7	M7	B7a	B7b
8.	Hobo bag	B8	M15	B8a	B9b
9.	Sling bag	B9	M9	B9a	B9b
10.	Envelop bag	B10	M10	B10a	B10b

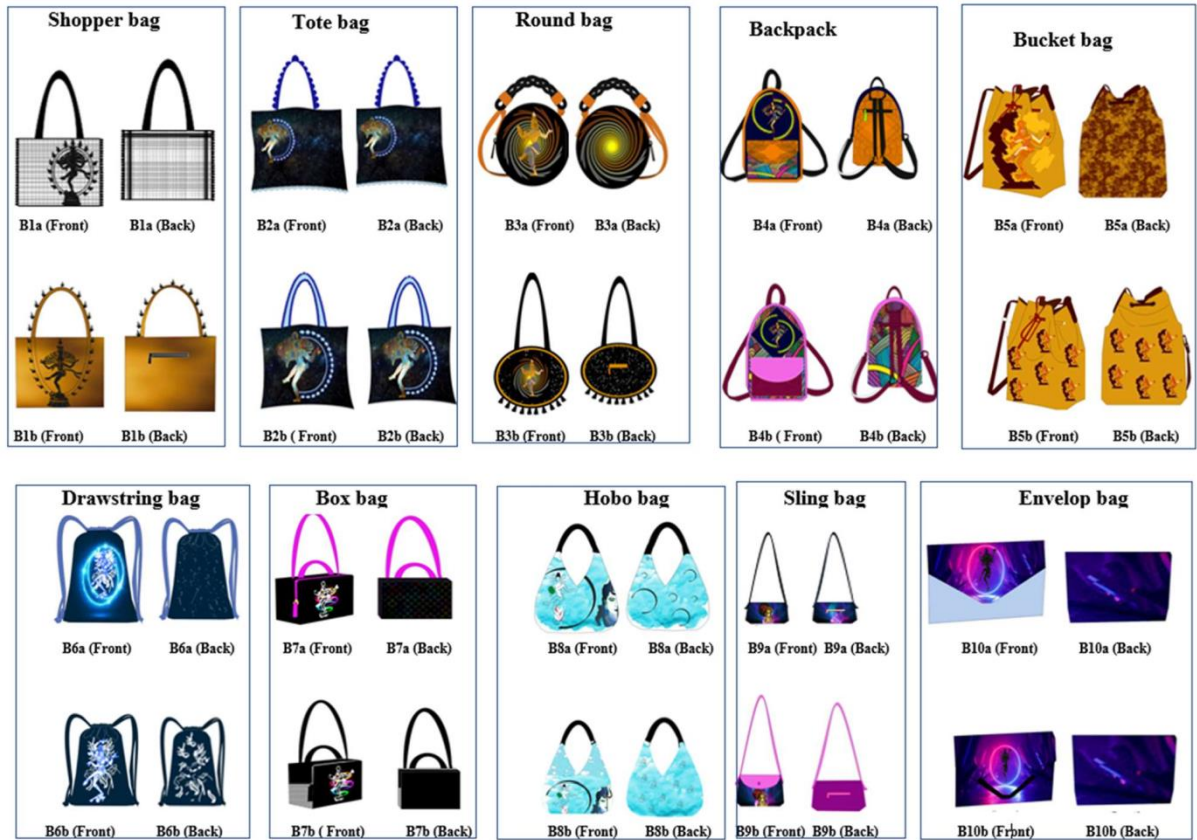


Figure 3 Placement of motifs

Visual evaluation of the bags with different motif placement

The prepared twenty designs of bag with different motif placement were subjected to visual evaluation by the judges for selection of best placement in each category of bag. The results of visual evaluation are shown in Table 4.

Table 4 Average percentage obtained on the visual evaluation of placement of motif

S. No.	Bag name	Code number (Bag)	appearances (Percent)	
			Motif Placement (a)	Motif cement(b)
1.	Shopper bag	B1	51.6*	45.2
2.	Tote bag	B2	16.7	83.3*
3.	Round bag	B3	90*	10
4.	Backpack	B4	96.6*	3.4
5.	Bucket bag	B5	63.3*	3.4
6.	Drawstring bag	B6	20	80*
7.	Box bag	B7	43.3	56.7*
8.	Hobo bag	B8	50*	50
9.	Sling bag	B9	76.7*	23.3
10.	Envelop bag	B10	63.3*	36.7

***Selected placements**

Table 4 depicts the average percentage obtained on visual evaluation of the bags with different motif placement. It was found that placement (a) was most preferred in backpack (96.6 per cent), round bag (90 per cent), sling bag (76.7 per cent), bucket bag (63.3 per cent), envelop bag (63.3 per cent), shopper bag (51.6 per cent) and hobo bag (50 per cent) whereas placement (b) was most preferred in tote bag (83.3 per cent), drawstring bag (80 per cent) and box bag (56.7 per cent). Thus, ten bag designs ‘one’ from each bag category were selected for further evaluation.

Selection of best bag designs

The selected ten bag designs were evaluated again by the same panel of thirty judges to find out five best designs of bags for the product development. The results of visual evaluation are shown in Table 5.

Table 5 Average percentage obtained on visual evaluation for selection of best bag designs

Bag name and codenumber (Bag)	Overall appearances (Per cent)			Rank
	Most preferred	Preferred	Less preferred	
Shopper bag (B1a)	46.7*	43.3	10	IV
Tote bag (B2b)	33.3	46.7	20	VI
Round bag (B3a)	80*	20	20	I
Backpack (B4a)	43.3	43.3	13.3	V
Bucket bag (B5a)	53.3*	30	16.7	II
Drawstring bag (B6b)	43.3	40	16.7	V
Box bag (B7b)	50*	40	10	III
Hobo bag (B8a)	33.3	40	26.7	VI
Sling bag (B9a)	33.3	60	6.9	VI
Envelop bag (B10a)	50*	43.4	6.7	III

***Selected best bag designs**

The result in the Table 5 depicts the average percentage obtained on visual evaluation of the design of bags. It was found that the bag with code number B3a got the highest percentage (80 per cent), bag B5a scored second highest percentage (53.3 per cent), followed by the bag B7b, bag B10a (50 per cent), bag B1a (46.7 per cent), bag B4a, bag B6a (43.3 per cent), bag B8a, bag B9a and bag B2b (33.3 per cent). Thus, the top five bag designs i.e., round bag (B3a), bucket bag (B5a), box bag (B7b), envelop bag (B10a), and shopper bag (B1a) was selected and used for the product development. The selected designs are shown in figure 4.



Figure 4 Selected bags for the product development

Product development

Digital printing on the fabric was done and the five selected designs of the bags i.e., round bag (B3a), bucket bag (B5a), box bag (B7b), envelop bag (B10b) and shopper bag (B1a) were developed into the products. The pictures of the developed products are shown in Figure 5



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 acceptability of the prepared product was evaluated on various parameters. The result of acceptability of the developed product is shown in the Table 6.

Table 6 Acceptability of the developed products

S. No.	Bag name and codenumber	Suitability of fabric used	Neatness and clarity of the design	Economic feasibility	Overall appearance
1.	Round bag (B3a)	2.5	2.6	2.1	2.5
2.	Bucket bag (B5a)	2.7	2.5	2.1	2.4
3.	Box bag (B7b)	2.7	2.4	2.1	2.5
4.	Envelop bag (B10a)	2.5	2.4	2.1	2.4
5.	Shopper bag (B1a)	2.6	2.6	2.2	2.6

Table 6 depicts that the acceptability of the developed products on the parameter suitability of fabric used. It was found that the developed products with code number B3a, B5a, B7b, B10a and B1a had the weighted mean score 2.5, 2.7, 2.7, 2.5 and 2.6 that comes in the range of highly acceptable. Thus, the fabric used for the bags was liked by the judges.

Neatness and clarity of the design of the developed products was also assessed. It was found that the bags with code number B3a, B5a, B7b, B10a and B1a was highly acceptable, with the mean score 2.6, 2.5, 2.4, 2.4 and 2.6. The motifs in the developed products were printed very neatly and clearly through digital printing technique.

Economic feasibility of the developed product was assessed by the judges and the data in Table 6 depicts that the bags with code number B3a, B5a, B7b, B10a and B1a was somewhat acceptable with mean score 2.1, 2.1, 2.1, 2.1 and 2.2. It was found that the price of the bag was little higher in comparison to the cost of other bags available in the market. This is due the reason that, single bag was developed. If the bags are put into the mass production, the cost of product will be reduced to the great extent.

Table 6 depicts the result of overall appearance of the bags with code number B3a, B5a, B7b, B10a and B1a. It was found to be highly acceptable with mean scores of 2.5, 2.4, 2.5, 2.4 and 2.6. Thus, the overall appearance of the developed products was good and liked by the judges.

Table 6 on the acceptability of developed product reveals that the bags with code number B3a, B5a, B7b, B10a and B1a were highly acceptable in the parameters such as suitability of the fabric used, neatness and clarity of the design and overall appearance. The products were somewhat acceptable in the parameter economic feasibility. The sale price of the products was little high but mass production of the products will reduce its cost to the greater extent.

CONCLUSION

It can be concluded that, the developed bags such as round bag(B3a), bucket bag (B5a), box bag(B7b), envelop bag(B10a) and shopper bag (B1a) received a high level of satisfaction by the respondents. The developed product was “highly acceptable” by the judges in all the parameters such as suitability of the fabric used, neatness and clarity of the design and overall appearance. But it was “somewhat acceptable” in the parameter economic feasibility. The sale price of the developed bags as round bag (B3a), bucket bag (B5a), box bag (B7b) and shopper bag (B1a) were ₹809. Whereas envelop bag (B10a) was of ₹460. Various motifs can be created by taking inspiration from Nataraja which can be digitized and be used in fashion industries for apparels, home furnishing and accessories through digital printing technique. The Nataraja motif not only enhanced the bags' visual appeal, but also added a distinct and alluring charm. These bags were attractive and unique. The designs had a religious, versatile and vibrant touch. Thus, the motifs of Nataraja will inspire the designers to incorporate them into bags and other textiles using CAD software. The mixture of tradition and modern technology will present an exciting opportunity in the world of design and fashion.

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**A CORRELATION STUDY ON THE THICKNESS AND COMPRESSION
PROPERTIES OF SURGICAL GOWNS USING KAWABATA EVALUATION
SYSTEM AND FABRIC TOUCH TESTER**

Ms.M. Nazeem Banu ¹ & Dr.Shabiya Thaseen ²& Dr.V.Subramaniam³

¹Ph.D Scholar,Associate Professor² & Retired Professor³

¹ & ²Department of P.G. Studies and Research in Home Science, JBAS College for women,
Chennai-18.

³Department of Textile Technology,AC College of Technology, Anna University,Chennai-25

*Corresponding author E-mail:nazeembanu84@gmail.com

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ABSTRACT

In addition to friction, bending, and shear, compression is also an important factor for fabric comfort. This research is carried out to compare the compression properties of commercially available reusable surgical gown fabrics of different Cotton, Polyester and Viscose blended fabrics. Fabric Feel Touch Tester (FTT) and Kawabata Evaluation System (KESF-B3) is utilized for measuring the surgical gowns compressional behavior which is subjected to low stress. The surgical gown fabrics comprised of (100% cotton, 100% Polyester, 70% Polyester/30% Viscose Rayon blends and 80% Polyester/20% Viscose Rayon). Among the selected fabrics the polyester – viscose rayon blended fabrics has shown good compression properties. As there is an increase in the recovery average rigidity obtained from FTT there is an increase in compression energy and % compression obtained from KESFB3. Hence a good correlation is found in the values obtained from both the testers for compression properties and thickness measurements.

Keywords: Compression properties, Fabric Thickness, Fabric Touch Tester, Kawabata Evaluation System.

INTRODUCTION

The fabric's breathability and moisture absorption are key comfort components. The comfort is significantly influenced by compression. Compression is measured in axial direction of the fabric. To maintain a neat appearance while wearing the clothing, ironing is done. It is important to comprehend the ironing mechanism completely. The surface fiber is initially squeezed, Fibers are then inserted into the fabric's air pockets. The yarns then have a tendency to take on an oval shape. It is possible to notice that the thickness has decreased at this point. Additional pressure leads in fiber deformation, twist in the yarn, fiber breaking, sliding of the fiber from the yarn, and holes. Therefore, compression when wearing a clothing and ironing call for great caution. Fibers are broken by compression, pilling appears on the surface of the fabrics with lower air permeability after washing, there is a tendency of the fiber to break, resulting in less comfort. This results in structural flaws in the garment and reduces the lifespan of the outfit. The fiber's dyes are squeezed out by compression, which tarnishes the area. Therefore, it is clear from this discussion how significant the compression property is in durability of the fabric.

Fabric's compressional behavior is the way it reacts to forces that are applied in a plane normal to it. It is described as action of variable normal pressure and fabric thickness. Fabric's comfort and thermal qualities are influenced by the thickness and compressibility (Patil C A et al., 2013).

Knapton et al., (1975) proposed that the compressional values of fabric can be measured with thickness gauge at different pressures. Fabric's thickness compression quality is a crucial component of objective measurements (De Jong et al. 1986).

A cloth with a compressive modulus that collapses readily is likely to be soft. Therefore, any modifications to the surface of the fabric like as singeing, milling, or pressing, which are typically employed to improve hand, will significantly affect the fabric's compressibility (Murthyguru., 2005).

A highly compressible fabric has high compressional energy and can absorb or withstand compressive forces to a greater extent at the deforming points, and this prevents folding at the deforming points and a higher drape coefficient results. The bulk, yarn structure, and handle of fabrics are directly impacted by the compressive qualities of textile materials. The compressibility of the yarn, which is mostly determined by the degree of the yarn twist (highly twisted yarn will be less compressible), has a direct impact on the fabric's softness. Low load compression quality is important in determining the fabric's handle as they are transformed to clothing articles and one has to know how the fabric will behave during the manufacturing processes subjected to various strains. Weave significantly affects the compressible qualities of a fabric (Nitin S Dhoot et al., 2013).

Compressible fabrics also find application in various areas such as medical and industrial. The compression of a fabric is completely dependent on the degree of pressure provided and, this in turn is determined by a number of factors, including the physical and elastomeric properties, type and shape of the yarn used and most importantly the compressive stress produced in the fabric during the application process (Pardeshi S et.al., 2013).

A study has been carried out to understand the effect of pick density, Polyester content in the blend and weave of the fabric upon the tactile and comfort properties of the polyester/ viscose blended fabrics using low stress mechanical method on KESF. With an increase in the compressional resilience, linearity of compression and work done by compression (compressional energy) shown a decreasing pattern with an increase in the thickness for higher polyester content in the blended fabric (RK Nayak et al.,2009).

Ukponmwan (1990) studied the compressional behavior of five cotton/polyester blended fabrics and its effect on the durability has been discussed. The compressional behavior of those cotton/polyester blended fabrics before and after abrasion were determined. Good correlation was obtained between the compression properties and percentage loss in weight of the samples after abrasion.

Using low stress mechanical properties, the tactile comfort of the denim materials found to be increased with the ration of viscose content in Polyester/Viscose blended denim fabric. The comfort property also was found to be effective (Uren, 2019).

Compression is a three-stage process, which includes flattening of the fibers that protrude from the fabric's surface, flattening of fabric buckles and those areas that is thicker than average, and the compression of the fabric's main body. The analysis of the pressure-thickness relationship demonstrates a very prominent effect in fabric construction and yarn structure. The fabric compressibility depends on material, yarn and finishes given to fabric (Alimaa et al., 2000)

A good correlation between the outer and inner surface of the fabric in terms of bending and thickness parameters using FTT and KESF were analyzed. The findings are significant as to estimate the reliability and comparability of the FTT towards the standard measurements, within the said scope and limitation (Haji Musa et al., 2017).

To protect both patients and the healthcare staff from contamination during an operation, surgical gowns are worn. Modern surgical gowns are made from a variety of woven and non-woven textiles other than cotton fabrics from which they were originally produced. Pamuk et al., (2008) studied the comfort and thermal qualities of various fabrics used to make surgical gowns. Eight surgical gown materials that are readily accessible on the market were assessed. Three fabrics out of eight had a combination of Spunlace, SMS, and Spun-bond which were nonwovens, the rest of the five fabrics were made of (100% cotton, 50% polyester-50% cotton, 65% polyester-35% cotton, 66% polyester-33% cotton, 1% carbon, and 99% polyester-1% cotton) were woven gowns. The measurement of heat conductivity and absorption resistance values were measured using Alambeta thermal and comfort measuring device. Thickness and Thermal resistance are correlated, the blends having 65% polyester -35% cotton and 100% cotton found to have good thermal conductivity and less thermal resistance.

Hence comfort properties and thickness of the samples at low stress using Kawabata evaluation system (KESF) and newly launched Fabric feel touch tester (FTT) is evaluated and correlated to check the reliability and effectiveness of two testers. FTT is recently devised for measuring textile comfort, so these readings were evaluated for reliable values and to correlate with the values obtained from the standard KESF method.

OBJECTIVES OF THE STUDY

- Compare and correlate the thickness values measured using KESF and FTT for Eight Surgical gowns.
- Compare and correlate the compressional energy and recovery average rigidity obtained from FTT and KESF for Eight Surgical gowns.

HYPOTHESIS

Despite the different working principle, significant correlation is observed between thickness and compression parameters obtained from the two methods Fabric Touch Tester and Kawabata Evaluation system

METHODOLOGY

Eight surgical gowns of different manufacturers was purchased and tested for its fiber composition using chemical testing, geometric properties using standard methods. The compression values are obtained from two different instruments Fabric Feel touch Tester and Kawabata Evaluation system the findings was tested statistically to find out any correlation among the readings obtained from the two testers.

Table I- Geometric properties of the fabrics

Fabric sample	Fiber Composition	Fabric Thickness mm	Weight g/sq.mtr	Fabric Count		Ends/cm	Picks/cm
				Warp(Ne)	weft(Ne)		
1	100% cotton	0.56	196.1	8.6(2 ply)	9.5(single)	15	14
2	70% Polyester 30% Viscose Rayon	0.24	146.3	17.9(2 ply)	17.4(2 ply)	24	21
3	100% cotton	0.53	190.9	9.4(single)	9.0(single)	15	14
4	70% Polyester 30% Viscose Rayon	0.28	150.7	18.9(2 ply)	17.9(2 ply)	24	23
5	80% Polyester 20% Viscose Rayon	0.26	179.2	174.6(denier)	13.5(single)	24x2	19
6	100% Polyester	0.29	148.5	16.8(single)	19.5(single)	20	22
7	100% Polyester	0.25	157.5	164.9(denier)	18.4(2 ply)	25x2	21
8	70% Polyester 30% Viscose Rayon	0.24	126.2	85.2(denier)	23.5(single)	36x2	22

Fabric Touch Tester

All measurements were carried out in a controlled laboratory setting with a temperature of roughly 21°C and a relative humidity of 65%. According to instructions provided by the machine maker, each cloth for FTT (Fig. 1) was cut into L shape (31cm x31cm). The sample was positioned on the FTT instrument's bottom plate, and the device's two neighboring platforms served as the sample's L-shaped support structure. To stimulate the mimic in temperature difference between the skin and fabric, top plate of the instrument was set up at a temperature that was 10 °C higher than the bottom plate. As the machine starts, the top plate slowly descends until it meets the fabric. Both plates pull the fabric even lower before returning to their original positions after a few seconds. FTT receives values from the compression sensors for both the outer and inner surface of the fabric as the test is conducted. Thickness is a component of the compression module, as the fabric is compressed between the top and bottom plate, pressure is applied on that area and the values of thickness are recorded. The laser sensor records the distance and compression sensors records the compression forces. Table 2 represents the compression indices obtained from FTT.

Figure 1- Fabric Touch Tester (FTT)

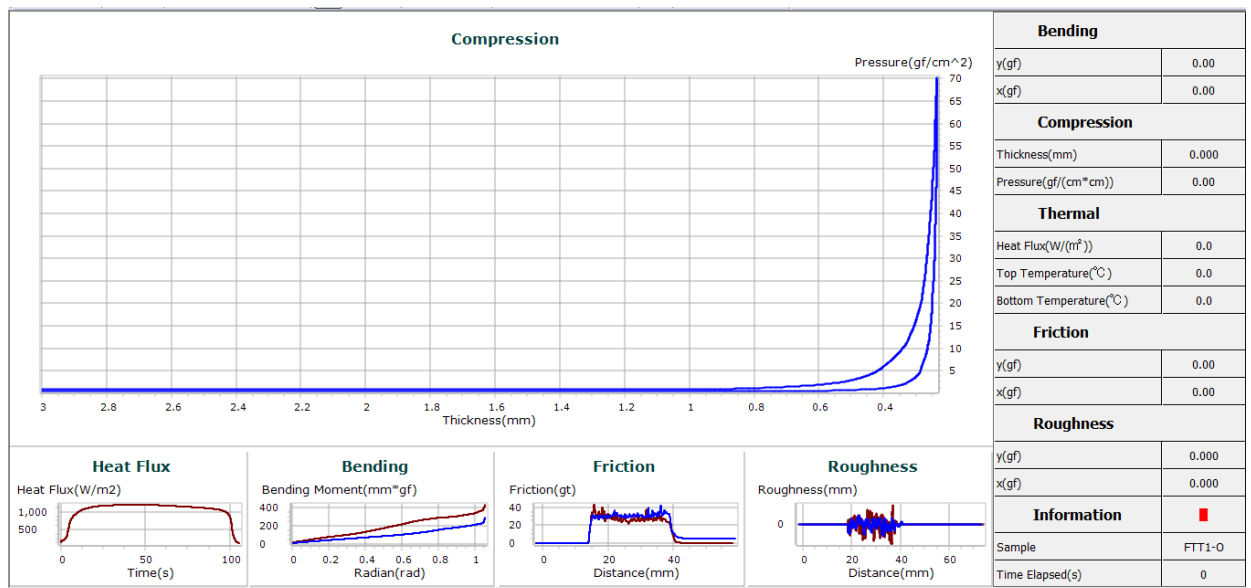


Figure 2- Hysteresis curve obtained from plotting software

Table -II- Compressional parameters in FTT

Compression	CW	Compression energy needed to compress the fabric sample	gf* mm
	CRR	Compression Recovery Rate	-
	CAR	Compression Average Rigidity	gf/(cm ² *mm)
	RAR	Recovery Average	gf/(cm ² *mm)

		Rigidity	
	T	Thickness	mm

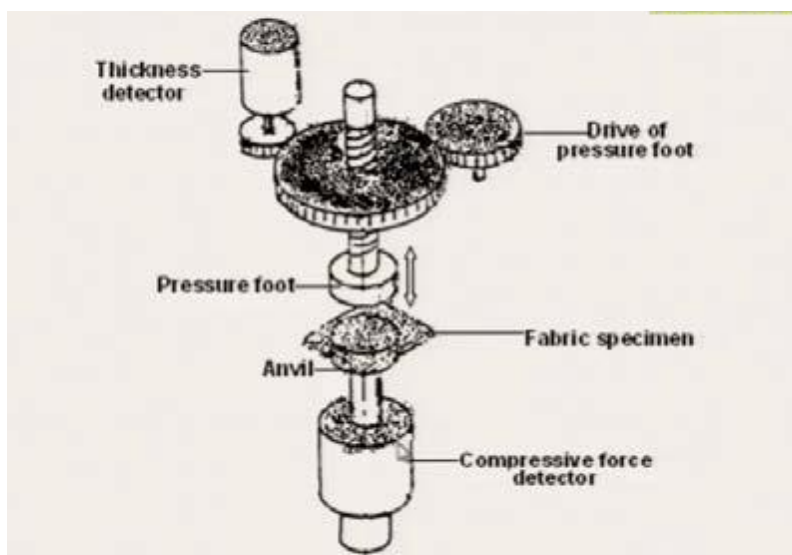
Kawabata Evaluation System

In KESF3- method, the fabric sample is compressed between anvil and pressure foot. The pressure in the compressed area of the sample is increased due to pressure foot simultaneously monitoring the thickness detector measures the fabric thickness. A drive arrangement rotates the thickness detector which in-turn moves the presser foot up and down. When maximum pressure 50 gm/cm² (5Kpa) is reached signal is sent to the motor and it reverse to its initial position. And compression and recovery takes place. Compression and recovery curve is obtained. The conditions for testing the compressional behavior of fabrics on the KES-FB3 testing machine are set at a sensitivity level of 2×5, velocity at 50 sec/mm, stroke rate at 5mm/10 V, and the specific area of the sample used for testing is 2 cm². Fig 2- represents the KESF tester

Plotting software

Ten experimental data points from the sample are taken for plotting and using Lab Fit software for plotting, the modified exponential curve by the iteration method using a non-linear regression is obtained.

Figure 2- KESF Tester



The compression and Recovery parameters are given below:

TO –Fabric Thickness (mm) at minimum load (0.5g/sq.cm)

TM- Fabric Thickness (mm) at maximum load (50.0 g/sq.cm),

WC –Compressional energy, area represented under the compression curve (J/m²),

RC% - Compressional resilience in percentage

LC – Linearity of compression thickness curve

EMC% - Percentage compression, which is ratio of the thickness measured with load to the actual thickness without load-100(TO–TM)/T0.

Evaluation of KES-compressional parameters

If the fabric's thickness at zero pressure = T_0 , and at pressure P equals T_m , so the Pressure thickness curve would follow as below:

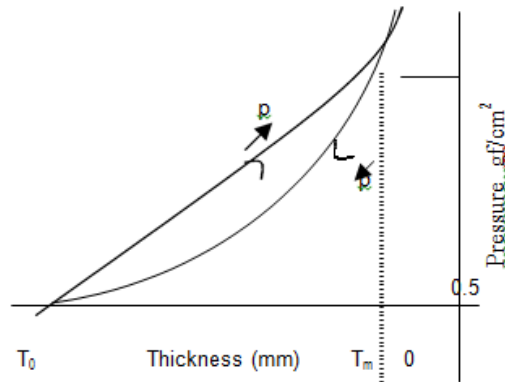


Figure 3. Pressure-thickness evaluation

1. Compressional energy (WC) = $\int_{T_m}^{T_0} p \, dT$
2. Linearity of the compression thickness curve (LC) = $\frac{\int_{T_m}^{T_0} p \, dT}{0.5 p_m (T_0 - T_m)}$
3. Compressional resistance = $RC = \frac{\int_{T_m}^{T_0} p \, dT}{WC} \times 100 = \frac{\int_{T_0}^{T_m} p \, dT}{WC} \times 100$
4. EMC = $1 - \frac{T_m}{T_0}$

Four separate parameters, including Compression energy (WC), linearity of compression thickness curve (LC), compressional resilience (RC), and compressional percentage (%C), are used by KESF to quantify the compressional behavior of fabric. The fullness and compression qualities of textile increase with increasing values of WC.

Cloth is springier and has a better hand when resiliency to compression is higher. Values of compressional resiliency are high in thinner textiles. Naturally, this produces a softer feel and higher comfort capabilities. The handle characteristics can also be evaluated using % compression values; the greater the percentage compression values, the softer the textiles are and the handle qualities.

KESF gives the hysteresis of compressional curves from LC, WC, RC, T_0 , T_m Values got from output data.

RESULTS AND DISCUSSION

Correlation analysis was done between the compression parameters tested by FTT and KESF for the eight surgical gowns.

TABLE III-Recovery Average Rigidity and Compressional Energy

Fabric	Fiber Composition	RECOVERY AVERAGE RIGIDITY (gf/ cm ² *mm)	COMPRESSIONAL ENERGY WC (g.cm/cm ²)	r- Value	P- VALUE
1	100% cotton	3227	0.084	r= 0.72225	0.042921 P<0.05
2	70% Polyester 30% Viscose Rayon	3029	0.091		
3	100% cotton	3304	0.087		
4	70% Polyester 30% Viscose Rayon	3956	0.072		
5	80% Polyester 20% Viscose Rayon	7566	0.195		
6	100% Polyester	4857	0.108		
7	100% Polyester	6098	0.182		
8	70% Polyester 30% Viscose Rayon	3595	0.172		

The P-Value is 0.42921. The result is significant at p <0.05. Value of R is 0.7225. This is a moderate positive correlation, which means there is tendency for high X variable scores go with high Y variable scores (and vice versa). Value of R², the coefficient of determination is 0.522.

Figure 4- Scatter plot for Recovery Average Rigidity versus Compressional Energy

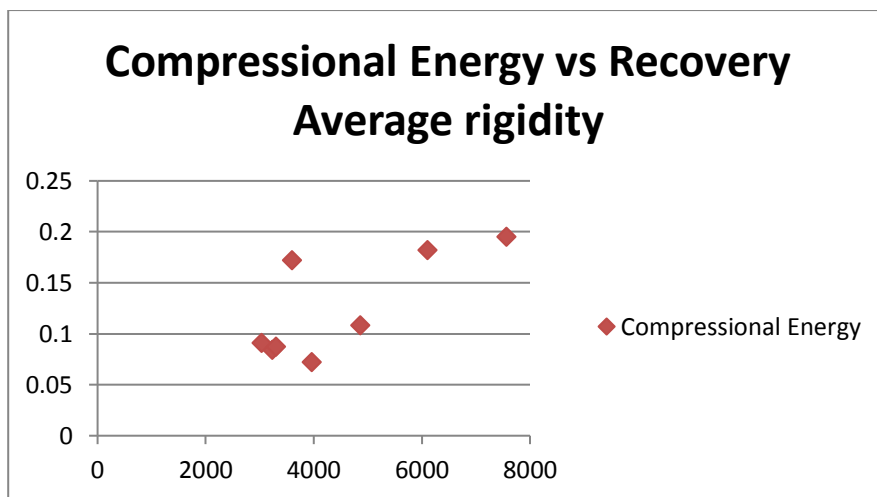


Table III represents the values of Pearson correlation coefficient r which is used to examine a relation between Recovery Average Rigidity (RAR)($\text{gf/ cm}^2\cdot\text{mm}$) tested by FTT and Compressional Energy (WC)(g.cm/cm^2) obtained from KESF. The above table shows a significance of $p < 0.05$ and positive correlation between Recovery Average Rigidity and Compressional Energy ($r = 0.7225$) The P-Value is 0.040937. The result was found to be significant at ($p < 0.05$) level.

The pattern of association denotes that the increased values of RAR and WC would lead to better compressional properties.

TABLE IV-Recovery Average Rigidity and %Compression

Fabric	Fiber Composition	RECOVERY AVERAGE RIGIDITY $\text{gf/ cm}^2\cdot\text{mm}$	% COMPRESSION	r value	P value
1	100% cotton	3227	27	r= 0.7272	0.040937 P<0.05
2	70% Polyester 30% Viscose Rayon	3029	32		
3	100% cotton	3304	42		
4	70% Polyester 30% Viscose Rayon	3956	45		
5	80% Polyester 20% Viscose Rayon	7566	53		
6	100% Polyester	4857	45		
7	100% Polyester	6098	42		

8	70% Polyester 30% Viscose Rayon	3595	43		
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The value of R is 0.7272. This is a moderate positive correlation, which means that there is tendency for high X variable scores go with high Y variable scores (and vice versa). The value of R², coefficient of determination is 0.5288. The P-Value is 0.04093. The result was found to be significant at $p < .05$

Figure 5- Scatter plot for Recovery Average Rigidity versus Percentage Compression.

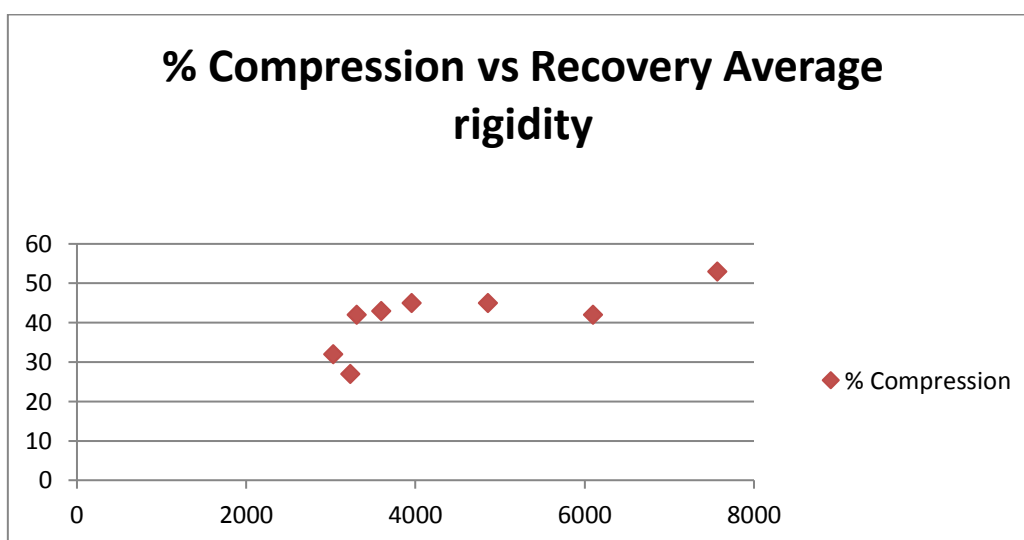


Table IV represents the findings of Pearson correlation coefficient r which was used to examine the relation between recovery average rigidity (RAR) ($\text{gf}/\text{cm}^2 \cdot \text{mm}$) tested by FTT and Percent compression (%C) obtained from KESF. The above table shows significance of $p < 0.05$ and positive correlation between factors of Recovery Average Rigidity and Percent Compression with ($r = 0.7272$). The P-Value is 0.040937. The result was found to be significant at ($p < 0.05$) level.

The nature of the association denotes that the increased values of RAR and %C would lead to better compressional properties.

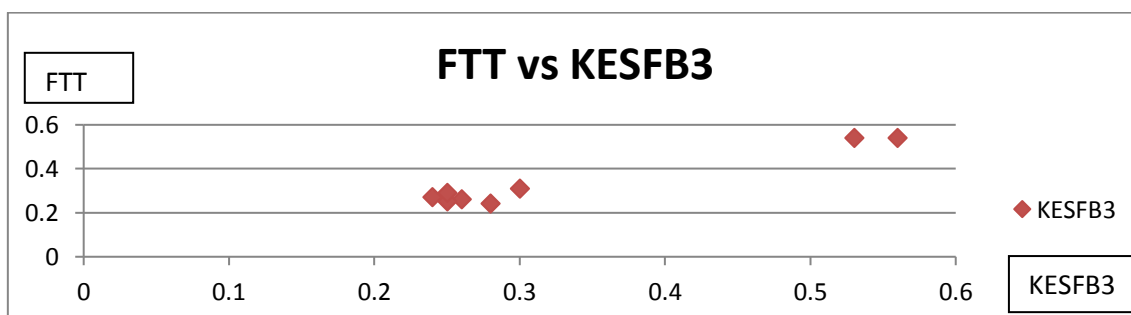
Table V- Fabric Thickness of samples obtained from KESF and FTT.

Fabric	Fiber Composition	Thickness by FTT mm	Thickness By KESF mm	r value	P value
1	100% cotton	0.56	0.54	0.9816	0.000015 $P < 0.05$
2	70% Polyester 30% Viscose Rayon	0.24	0.27		
3	100% cotton	0.53	0.54		

4	70% Polyester Viscose Rayon 30%	0.28	0.24
5	80% Polyester Viscose Rayon 20%	0.26	0.26
6	100% Polyester	0.30	0.31
7	100% Polyester	0.25	0.25
8	70% Polyester Viscose Rayon 30%	0.25	0.29

The value of R is 0.9816. This is a strong positive correlation, which means that high X variable scores go with high Y variable scores (and vice versa). The R² value that is coefficient of determination is 0.9635. The P-Value is 0.000015. The result was found to be significant at (p < .05) level.

Figure 6- Scatter plot for fabric thickness of samples tested using FTT versus KESF



CONCLUSION

Fabric compression properties play an important role in the perception of softness, smoothness and prickliness properties. The higher the value of recovery average rigidity, the better is the compressional qualities of fabric.

Compressional properties and thickness values tested with two different methods using Fabric Touch Tester and Kawabata Evaluation system had significant correlation. Fabric Touch Tester can be implied as an alternative for Kawabata Evaluation system with low stress compressional behavior of fabric. FTT also reduces considerable time and energy in recording output and computations. The findings had a significant correlation which suggests the reliable usage of FTT than KESF.

Recommendations for further study

- A comparative study on the thermal properties of fabric using Fabric Touch Tester and Kawabata Evaluation System.

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A STUDY ON CONSUMERS AWARENESS AND ACCEPTANCE OF FABRICS DYED WITH NATURAL DYES

N. Nivya¹, Dr. G. Bagyalakshmi² and Dr. Y. Lakshmi Prabha³

¹Ph.D. Scholar, Department of Textiles and Clothing, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, Tamil Nadu-641043.

²Associate Professor, Department of Textiles and Clothing, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, Tamil Nadu-641043.

³ Professor, Head of the Department of Home Science, St. Joseph's college for women (A), Visakhapatnam, Andhra Pradesh.³

Corresponding author: nivyanakka1989@gmail.com

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ABSTRACT

Sustainable development is indeed a primary goal for development of the nation. Sustainable development is the management and conservation of the natural resource base and the orientation of technological and institutional change in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations in an environment-friendly, technically appropriate, economically viable, and socially acceptable manner. Moreover, sustainability can be recyclability, which is the fashion buzzword among the new generations. But more awareness of sustainable dyes needs to be inculcated to adapt their usage in daily practices. The consumer decides whether or not to purchase by comparing the change in utility. Consumer demand, therefore, plays a crucial role in the acceptance of any practice in the market. Therefore, the proper awareness related to sustainable dyes should be considered to increase demand in the market. Many consumers are not even aware of natural dyes produced in their places which have a lot of demand in other countries and often literates are also reluctant to accept sustainable dyes on a daily basis. One should know the traditional sustainable dye that are produced in their states because these suitable dyeing and printing processes are the heritage and culture and pride of our nation. In this context, there is a serious need to do a study on consumer awareness and acceptance of sustainable dyes which will help further research studies. Hence the study was conducted to know the awareness and acceptance of sustainable dyes among consumers in selected areas of Andhra Pradesh. Henceforth it will be helpful to do further study in spreading awareness of sustainable clothing practices among consumers thereby getting an average idea of why people accept/are reluctant to use natural dyes in clothing. A sample size of 500 people of various age groups was selected to do this present study in selected areas of Andhra Pradesh. The percentage of awareness is taken into consideration to do a comparative study among various age groups.

Keywords: Awareness of sustainable dyes, Acceptance of sustainable dyes, awareness of locally produced sustainable dye cluster.

INTRODUCTION

Clothing is one of the most important investments that an individual can make and it need not be expensive: "buy sparingly, buy quality, and buy conservatively" in style and color. Take the necessary time to consider what manner of dress will be most appropriate. Since humans are social animals, they tend to influence others' attire.

The demand for a good is defined as the quantity a consumer is able and willing to purchase. The factors affecting consumer demand are the effect of socio-demographic variables on consumer preferences and the effect of past behavior on current decision-making (David B. Eastwood, 1985). There is a close interlink between the social, economic, and industrial progress of each period in history and the evolution of clothing. Clothing styles were affected by the demands of the environment, changing trends and fashion, and the human personality.

One of the basic needs of human beings is clothing. Everyone has to purchase clothes at regular intervals. The purchasing behavior of a consumer depends upon income, age, and sex. And especially in purchasing clothes, one should have proper knowledge about what they are buying and wearing. Fashion also plays a major role because it creates an identity for the wearer which makes them differ from one another, clothing style makes one unique. Fashion is a major factor that influences clothing purchases. Fashion does not mean wearing trendy and costly clothes alone, but wearing healthier and promoting healthier clothing which means sustainable fashion.

Supporting sustainable fashion makes you and your motherland healthier and happier for the next generations. Therefore, knowing the knowledge levels of people on sustainable clothing and creating awareness about sustainable clothing is the basic responsibility of a researcher. Quick fashion leads to unnecessary land fillings leading to pollution that cannot be regenerated or reused. The usage of natural resources will help to reduce pollution; it depends on the acceptance of people in the market. Buying behavior and consumption patterns must be changed in terms of economical, psychological, and social factors.

Over some time buying habits and consumption patterns change due to a lack of awareness of sustainable dyes, and a low acceptance, and quick change in fashion are major factors affecting sustainability. The need to recognize the awareness of want or desire or a consumer problem must be considered. Once the needs are recognized, conflicts develop as to how competitive needs may be satisfied.

Limitedness of the resources as against the unlimited desires and urgent needs are given priority over the less important ones. Research is extremely important to develop a marketing strategy because a knowledge of the factors that influence consumer purchases can help to increase the market share of sustainable textile goods.

Ethical fashion is fashion made ethically. This can encompass a whole host of business and production practices aimed at treating your workers fairly and minimizing your impact on the environment. Ethical fashion means your clothing is eco-friendly and people-friendly (Rajanna L. Gotipamulet.al., 2019) and it allows you to reduce your impact on the environment and invest in safer, more sustainable practices.

One of the objectives of this study is to assess if sustainable dyes concern consumers and affect their green buying behavior. This breakthrough can only be possible if consumers are willing to buy naturally dyed products. When consumers are aware of natural dyes, then they are willing to opt for them.

OBJECTIVES

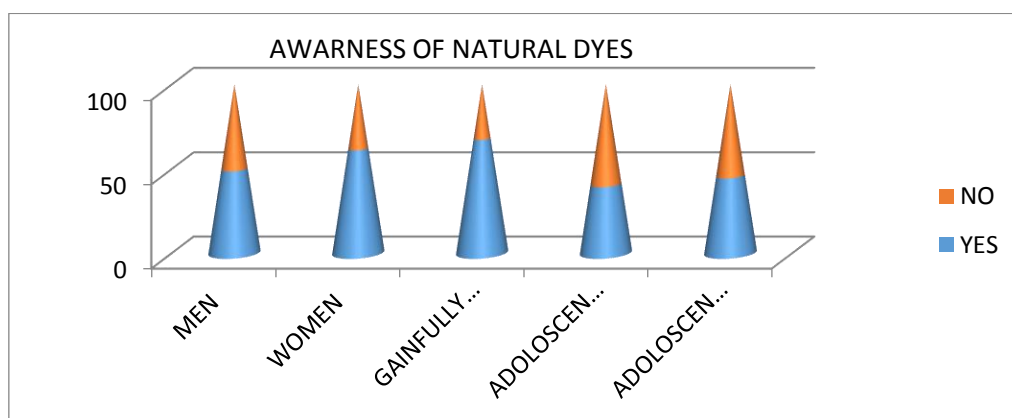
- To know the awareness of consumers regarding sustainable dyes in the selected area of Andhra Pradesh, namely Visakhapatnam.
- To identify the acceptance of sustainable dyes among the various age groups by simple percentage method.

METHODOLOGY

Survey method of research was followed for the study. The random sampling method was selected for primary data collection in selected areas of Visakhapatnam city of Andhra Pradesh. A pre-tested questionnaire was administered to the sample and those who were not able to answer the questionnaire were interviewed using the interview schedule to know consumer awareness of natural dyes. A total number of 500 sample of various age groups and both genders were selected from Visakhapatnam city to gather the information and the data is interpreted through simple percentages. The questionnaire consisted of questions on awareness about natural dyes, awareness about naturally dyed products, their benefits and availability. This study is a part of the doctoral work being pursued by the corresponding author.

RESULT AND DISCUSSION

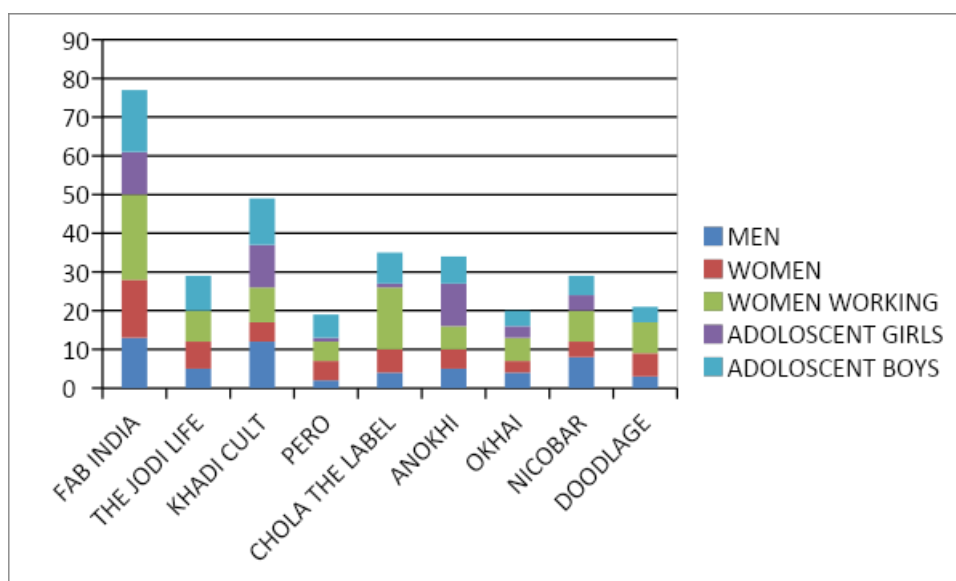
The study was conducted in selected areas of Visakhapatnam, Andhra Pradesh to know consumer awareness of sustainable dyes. A sample of 500 was selected for data collection by random sampling method, and the various target groups are as follows: women housewives and gainfully employed of age group 25-40 years, men of 25 -40 years of age, adolescent girls and adolescent boys of 18 to 20 yrs of age, each target group is 100, and thereby a total of 500 samples. Primary data collection was done using research tools questionnaire and interview schedule to collect information for the study. The result was interpreted using simple percentages.



Pic:1 Awareness of natural dyes among various age groups

1. Awareness about Natural Dyes: The results of the collected data revealed that 68% of gainfully employed women and 62% of housewives are aware of natural dyes, and if we observe the awareness among adolescents 41% of girls and 46% of boys are aware of natural dyes which is a positive note because approximately half of them are aware of sustainable dyes. They are the future of the nation and they are easily influenced by trends, the impact

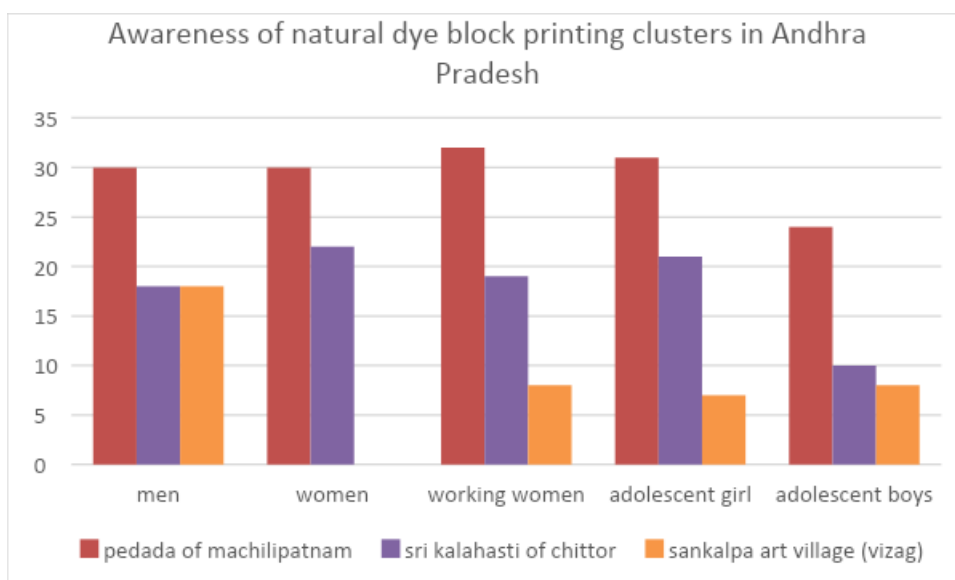
of natural dyes on adolescents seems to be fair. Whereas 50 % of men know about natural dyes (refer to pic 1).



Pic:2 Awareness of clothing brands with Natural dyes

2. Awareness of naturally dyed brands of clothing:

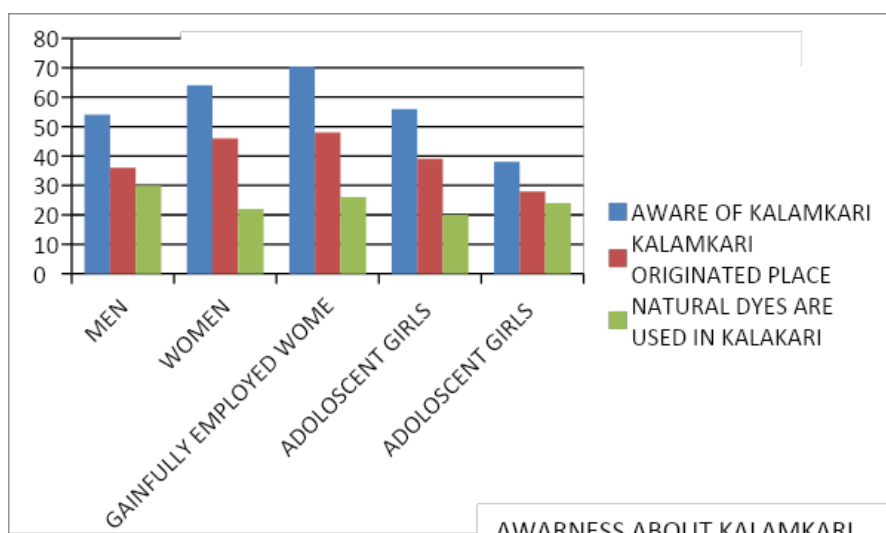
The government of India launched an eco-mark scheme in 1991 to increase consumer awareness with respect to environmentally-friendly products. The products that require eco-marketing are textiles, detergent cakes, paints, packages, pesticides and insecticides, cosmetics, and pharmaceutical products. The eco-labelled goods naturally spur the demand for green products and in turn, aims to increase green consumerism. There are around 9 famous branded companies selected whose information was given to consumers, to know their awareness Only 2 brands were identified by the consumers i.e. 22 % of working women are the highest awareness about FAB INDIA and approximately 12% of adolescent boys and girls followed by men are aware of KHADI CULT whereas the rest of the brands received a negligible number of percent where consumers are unaware of it. (Ref pic:2), Keeping eco-friendly goods in the hands of the consumers is the social responsibility of the manufacturers. But the role of wealth creators in the market has become more which in turn damages the ecosystem rather than preserving it.



Pic:3 Awareness of natural dye Block Printing clusters present in Andhra Pradesh

3. Awareness of block printing clusters in Andhra Pradesh:

These clusters of naturally dyed fabrics in Andhra Pradesh have a great history and are well known in other countries too. Machilipatnam and Pedana village is one such a famous place in Krishna district of Andhra Pradesh well known for vegetable block printing named Kalamkari. The other place that produces kalamkari is Srikalahasti of Chittoor district. The difference between these two kalamkari works is that Machilipatnam kalamkari produces fabrics using blocks and Srikalahasti kalamkari is with a tool “kalam” known as pen art. Sankalpa art village is situated in the Pedagadi area of Visakhapatnam district of Andhra Pradesh and was started in the year 2012. The awareness regarding block printing clusters is very low among people. When consumers were asked the question about awareness of natural dye clusters which are famous in Andhra Pradesh the following percentage was noted: around 29% are aware of Pedana of Machilipatnam, 18% are aware of Srikalahasti kalamkari and 8.2% are aware of Sankalpa art village of Visakhapatnam. So, it is evident that though the production is taking place and kalamkari fabrics are being exported across the world having high demand, domestic acceptance and marketability is very low.



Pic: 4 Awareness of kalamkari

4.Awareness of kalamkari:

The uniqueness of kalamkari is the pure organic vegetable-based printing which makes the art different from other prints in India. The mythological themes of kalamkari patterns and intricate designs produced by this method cannot be seen elsewhere. The scene of Ramayana and Mahabharata is so well narrated in the form of painting enhancing the beauty of the art. The awareness regarding this art is around 72% in working women and 64% of housewives and the origination place of kalamkari is known by 48% of working women and 46% of housewives are aware of it. A little more than one fourth (26%) of working women and 22% of housewives are aware of natural dyes used in kalamkari production. (Ref pic:5) whereas the rest of the consumers, men, adolescent boys and girls have low awareness.

Table:1 opinion on scope of natural dyes in future

Gender	Yes		No	
	f	%	f	%
Male	28	5.6	72	14.4
Women	42	8.4	58	11.6
Women Gainfully Employed	48	9.6	52	10.4
Adolescent Girls	12	2.4	88	17.6
Adolescent Boys	28	5.6	72	14.4
Total	158	31.6	342	68.4

*n=100 of each category therefore, a total of 500 sample

5. Opinion on scope of natural dyes in future:

When the subjects were asked about their opinion on natural dyes having a good future, a majority of respondents said that since these are eco-friendly and human-friendly these sustainable dyes have good future. But 72% of men do not agree with the statement, they feel that these are not that popular and are costly and the market of these fabrics are nowhere seen or heard like synthetics and hence they felt it may not have a great future. And the highest (88%) of adolescent girls responded in a negative note. They feel these are very sober colours and many colour shades cannot be seen. They felt it doesn't have good acceptance by adolescents. Around 48% of working women agree with this statement followed by 42% of house wives. So, it is clearly evident that the majority of women felt that natural dyes have good future market and acceptability. (Ref: Table 1).

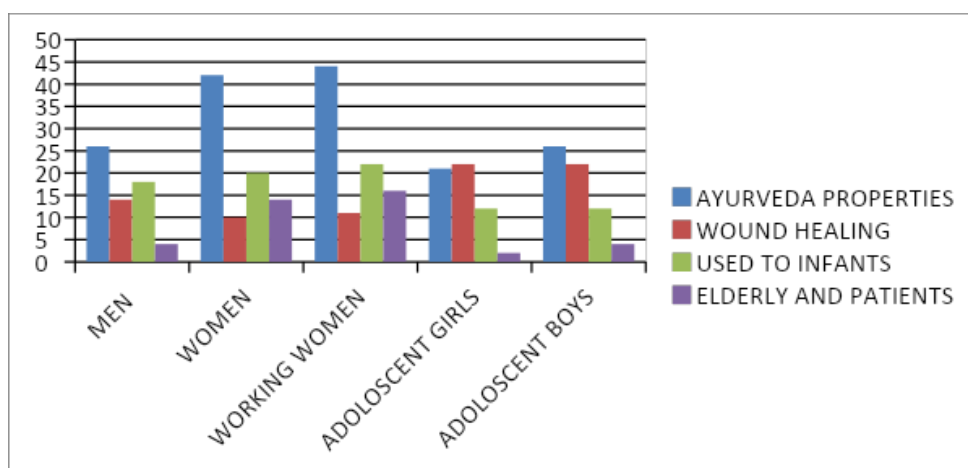
Table 2: Awareness of the Advantages of natural dyes

Gender	Awareness of natural dyes are easy to extract		No Effluent Generation		Health Hazardous		Highly Sustainable	
	f	%	f	%	f	%	f	%
Male	22	4.4	12	2.4	30	6	6	1.2
Women	24	4.8	18	3.6	24	4.8	14	2.8
Women Gainfully Employed	26	5.2	20	4	22	4.4	13	2.6
Adolescent Girls	-	-	18	3.6	33	6.6	12	2.4
Adolescent Boys	18	3.6	16	3.2	30	6	6	1.2
Total	90	18	84	16.8	139	27.8	51	10.2

n=100 of each category therefore, a total of 500 sample

6. Awareness of the Advantages of natural dyes:

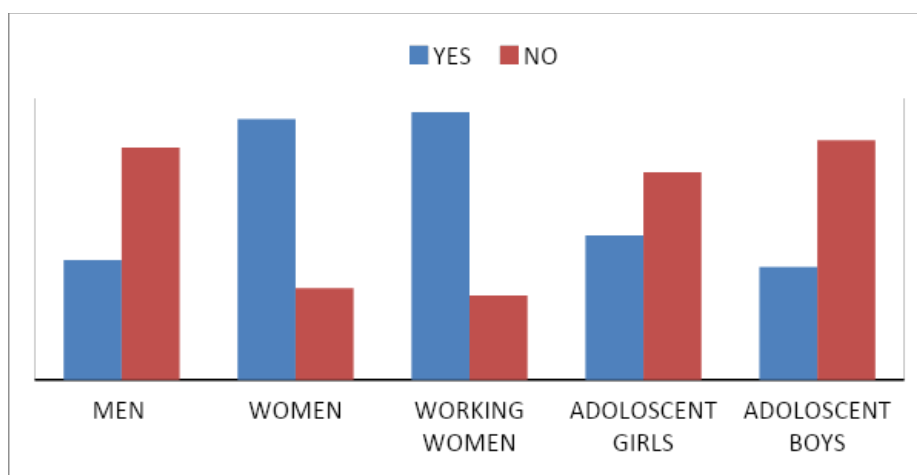
Analysis shows that approximately 26% of working women and 24% of house wives felt that natural dyes are easy to extract followed by 22% of men and 18% of adolescent boys whereas adolescent girls were not aware that these are easy to extract. When the subjects were asked about the effluent generation of natural dyes around 20 % of working women are aware that natural dyes don't produce any harmful effluent whereas rest of the respondents have very low awareness regarding effluent generation. 30% to 32% of adolescent girls and boys are aware that natural dyes are not health hazardous, followed by 30% of men and women who seem to have low awareness of it. Around 13-14% of women are aware that natural dyes are highly sustainable followed by 12% of adolescent girls where men and adolescent boys seem to have very low awareness. (ref tab:2). The improper management of resources leads to an explosion in the eco-system is the major reason. one needs to protect the eco- system. The option of “reuse and recycle the waste or old fabrics to avoid land fillings” should be practiced as a stepping stone towards sustainability.



Pic:5: Awareness of Ayurveda properties of natural dyes.

7. Awareness of Ayurveda properties of natural dyes.

Natural dyes excel in their special medicinal properties; hence these are best suitable for infant’s wear, clothing for old aged and to patients. These are used for special therapies to cure certain skin diseases which cannot be seen in synthetic dyes which irritate skin because of its chemical substances. From the above survey, 10 – 15% of women and adolescent girls agree that natural dyes are sustainable and around 40- 45% of women are aware that natural dyes have rich Ayurveda properties. Below 5% are aware that natural dyes have good healing properties and are used for the elderly and patients.

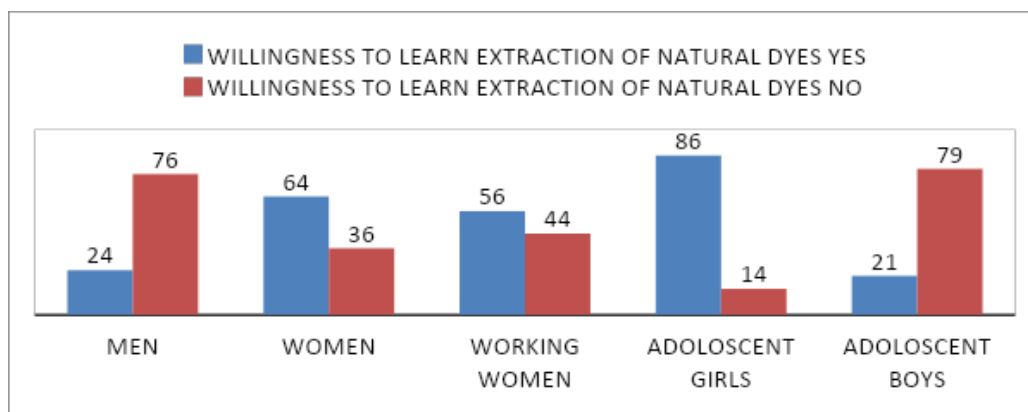


Pic: 6 Willingness to purchase natural dyes

8. Willingness to purchase natural dyes:

The commercialized industry environment are the direct factors which influence the growth of sustainable products because of heavy competition in market and number of manufactures producing synthetic dyes with innovative shades, natural dye producers are at a loss because of its low production and manufacturing process. It takes time to extract one dye from natural source, whereas in the meantime a number of synthetic dyes are produced and spread worldwide. The threat of

product substitute and the intensity of rivalry among competitors is a challenge for an entrepreneur to compete in the market. The study revealed that around 76% of women are willing to purchase natural dyes and 64% of men are willing to purchase them, 32-41% of adolescent boys and girls show little interest in purchasing natural dyes.



Pic:7 Willingness to Learn Extraction of Natural Dyes

9. Willingness to Learn Extraction of Natural Dyes:

In present scenario a firm without green concept cannot survive in the market. But the only thing to promote green consumerism is to create awareness and interest to make the consumers buy eco-friendly products. Lack of information keeps the consumer dark about the utility of green products. Proper motivation should start from colleges as adolescents are the target groups and to women communities the knowledge should be spread about natural dyeing methods and printing.

From the above survey majority of adolescent girls i.e. 85% show more willingness to learn more about the extraction of natural dyes followed by women. Men and adolescent boys show very little interest in learning the extraction of natural dyes.

CONCLUSION

The result is showing evidence that educated consumers, especially gainfully employed women tend to be aware of eco-friendly products and are also knowledgeable about environmental-related issues, even though their willingness to purchase/ promote is little and some are not at all interested in purchasing or encouraging artisans and promoting natural dyes. The majority are not aware of clusters producing stainable dyes in Andhra Pradesh which are traditional and ancient art of that region. There is a need to create awareness on the purchase and promotion of natural dyes to avoid environmental-related issues which is the major responsibility.

Increasing consumer demand towards natural dyes will help reduce their cost, as many consumers expressed that their high cost was a limiting factor in their purchase. Awareness among consumers that their buying choices can make a difference to the environment should be promoted since there is no motivation for the majority of people to purchase natural dyes. More research studies should be done to promote sustainable practices among consumers in their daily lives. Targeting young boys and girls who are fashion freaks regarding awareness about the damage to the ecosystem because of

harmful substances released by the textile industries and making them realize the need for green buying practices can make a better change to society and thereby nation.

SCOPE FOR FUTURE STUDY

Awareness campaigns and workshops on the advantages and acceptance of natural dyes need to be conducted for urban people who are least bothered about environmental safety. Locally producing dyeing units should take responsibility for conducting exhibitions thoroughly and awareness campaigns to explore more sustainable practices. Certificate, and diploma programs courses launched by the skill India development program related to dyeing and printing should also be included in Sustainable dye extraction and block printing with natural dyes for women in rural areas as these are eco-friendly and also our ancient culture too. Using natural resources will make traditional dyeing and printing art revive. These programs also help women's potential to develop as entrepreneurs in the field of sustainable dyeing and printing. Local NGOs also should take the active initiative to impart knowledge about sustainable dyes to rural women to overcome poverty and uplift the community. It helps the holistic healthy development of the nation since it is a part of our heritage and culture to make use of natural resources and to make the motherland healthier for future generations.

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ECO FRIENDLY COMPOUND COLOURATION OF COTTON AND COTTON/VISCOSE USING EXTRACTS OF TEMPLE WASTE FLOWERS OF MARIGOLD AND HIBISCUS

Dr. Pradnya Ambre¹ and Prof M. D. Teli²

¹Assistant Professor, H.O.D. Department of Textile Science and Apparel Design.

Dr. B.M.N. College of Home Science, Matunga, Mumbai.

pradnya@bmncollege.com

²Ex Professor,

Department of Fiber and Textile Processing Technology,

Institute of Chemical Technology, Mumbai

mangesh95teli@yahoo.com

HSAI Membership Number - 13/MH/A-2/LF

ABSTRACT

India is a home for festivals and celebrations. Traditional ceremonies commonly use flowers, most frequently marigold and hibiscus. They are also used for household purpose and offered at temples. After the purpose is served, it generates a substantial amount of waste. There is common practice in India of throwing the temple flowers once used in Idol worship into river, which contributes to the water pollution. The waste disposal of such flowers is itself an issue and hence exploring the potential of using this flower waste from temples for colouration of textile has been undertaken. Marigold flowers contain lutein as a major colouring compound which gives yellow hues to the textile substrate and hibiscus is based on anthocyanins which produces different hues when applied in conjunction with various mordants. Therefore in the present study, the temple waste marigold and hibiscus flowers were collected from local area and the attempt has been made to standardize procedure of extraction and dyeing. The dye extract was made using water as the extracting medium and then applied to garments composed of 100% cotton and cotton/viscose to produce both single and compound colours. Amla, harda, and pomegranate peel are some examples of natural mordants used in the premordanting process. The vast spectrum of hues produced by combining marigold and hibiscus, including various shades of yellow, yellowish beige, light beige, and beige, was particularly promising. Additionally, it was found that the fastness characteristics fell within acceptable limits. Natural dyes are brightly colored when metallic mordants are used, however, the colours achieved in this investigation were all calming and understated due to the usage of natural mordants. Today, worldwide stakeholders in the textile industry are moving toward a greener, cleaner approach to textile processing in order to protect the environment. As a result, this study is quite encouraging because it illustrates the possible application of natural dyes for textile coloring.

Key words: temple wastes, marigold, hibiscus, compound shades, natural mordants

INTRODUCTION

Particularly the dyeing operations have played a significant role in the textile industry's contribution to environmental degradation. In the past, natural dyes were used to color fabrics since coloration is always prized in textiles. However, as synthetic dyes were developed in the middle of the nineteenth century, they quickly gained popularity due to their easy accessibility to a wide shade range and greater fastness features. Synthetic dyes, however, have recently been discovered to have negative effects on the environment and, ultimately, human health. Synthetic dyes are presently

being used extensively, estimated at over 10,000,000 tons per annum, and their production and consumption generate huge amounts of waste and unfixed colourants, endangering human health and disrupting the natural eco-system(Sanjeeda andTaiyaba,2014).

As an outcome, natural dyes are now rediscovering their former significance, and researchers are focusing on studies of sustainable and eco-friendly natural dyes. (Teli and Ambre , 2017). There have been numerous experiments that demonstrate the potential for using organic waste to color textiles. Sharan et al (2015) have successfully carried out the dyeing of cotton using various mordants with the dye extracted from coconut husk which is an outer covering, usually thrown as waste with enhanced color fastness abilities, they were able to produce a variety of red, yellow, and brown colours, which is promising for the efficient use of fruit waste. Teli and Ambre (2017) explored the compound shade impact of indigo top dyed with marigold using natural mordants on cotton and cotton/viscose,. They came up with a variety of green hues with satisfactory color fastness features.Extract of marigold is known to possess medicinal properties since ancient times and recently it has been proven to possess antimicrobial properties when applied to textile material (Ali et al, 2008, Asmamani, 2010). Hibiscus flowers are found in various colours such as white, red, yellow , peach. Hibiscus is also known for its medicinal properties.

India is a home for festivals and celebrations. The most typical flowers offered in temples and used in ceremonies are marigold and hibiscus. As a result, after serving their purpose, a sizable amount of waste is produced. There is common practice in India of throwing the temple flowers once used in Idol worship into river, which contributes to the water pollution. The waste disposal of such flowers is itself an issue and hence exploring the potential of using this flower waste from temples for dyeing of textile has been undertaken. The marigold and hibiscus flowers recovered in temple waste were used in the current investigation and the attempt has been made to standardize procedure of extraction and dyeing. To obtain single as well as compound hues, dye extract was made using water as the extracting medium and then applied to 100% cotton and cotton/viscose textiles. Premordanting technique employed natural mordants including pomegranate peel, amla, and harda.

OBJECTIVES

- To adopt a standardized method to extract the colour from discarded natural flowers like marigolds and hibiscus.
- To apply natural mordants and the extracted dye using exhaust technique on selected substrate in order achieve the compound shade effect
- To assess the dye absorption by measuring K/S values of dyed samples
- To assess the wash fastness, rub fastness, light fastness and perspiration fastness properties of coloured samples

METHODOLOGY

Natural colourants used in this research study

Marigold and hibiscus waste flowers from homes and temples were gathered and utilised in the study.After thoroughly drying in the shade, the flowers were ground into powder using a blender.

Natural mordants used

Natural mordants from Shital Ayurveda, Mumbai, such as crushed amla, harda, pomegranate rind were used in the research.

Substrates

The substrates used in this research were procured from local market in Mumbai, 126 GSM 100% cotton woven fabric and 108 GSM cotton/viscose blend woven fabric.

Extraction process

5 gram of each dye's powder were boiled in 100 ml of water using the reflux technique to obtain 5% stock; the extract was then filtered, centrifuged, and restored to its original volume before being used for dyeing.

Extraction of mordant

To produce a 5% stock, 5 grams of mordant powder was boiled by reflux technique with 100 ml of water. The extract was then utilized for mordanting after being filtered, centrifuged, and reconstituted to its original volume.

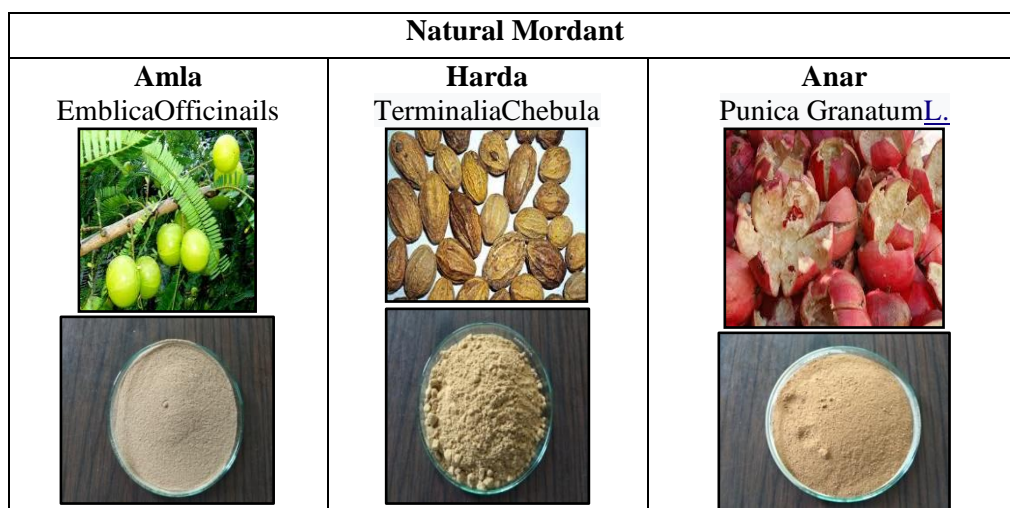


Figure 1: Natural mordants used for the study



Figure 2: Natural dye – Marigold



Figure 3: Natural dye – Hibiscus

Mordanting and Dyeing

The premordanting method was used to mordant cotton and cotton/viscose blends. The Rota dyer (Rota Dyer machine, Rossari® biotech, Bombay) was used for this procedure, with a material to liquid ratio of 1:30. At room temperature, the fabrics were added to the mordant solution at 10, 15, and 20% (owf) strengths. The temperature was thereafter raised progressively to 95°C. At this temperature, the mordanting was done for 60 minutes. The treated fabrics were squeezed after being mordanted, and then they were dyed with natural dyes for a compound shade (Marigold + Hibiscus) at the ratios listed in Table 1 (Ambre, 2020 and Teli, 2017). For 60 minutes, dyeing was continued at 95°C. After being dyed, the materials were squeezed, given a cold water rinse, and then dried.

Table 1: Mordant and dye concentration for compound colors followed in this study

Mordant	Dye Ratio (30% Shade) Marigold : Hibiscus				
20% conc	100 : 0	70 : 30	50 : 50	30 : 70	0 : 100

Testing for colour strength and Fastness

By employing a 10 degree observer and the reflectance method, all the dyed samples were assessed for the depth of color. The absorbance of the colored samples was measured using the Rayscan Spectrascan 5100+ that was furnished with reflectance accessories. The ISO105 II method was used to assess color fastness to washing. 2008 Indian Standards Manual. according to Teli et al. (2014), the AS 2001.4.21.2006 test method was utilized to assess the color fastness to light. An artificial light source (a mercury vapour, tungsten filament, and internally phosphor-coated lamp) was used to test the light fastness. The color fastness to rubbing (dry and wet) was assessed using AATCC 8:2005, and the color fastness to perspiration was assessed using ISO 105 E04 (Texanlab Testing Manual).

RESULTS AND DISCUSSION

The marigold flower (*Tagetes erecta* L.) is a good source of lutein, an essential compound used as a yellow color pigment for textile dyeing, as well as carotenoids. Marigold extract is compatible with all natural fabrics, according to several studies conducted in the past. According to Vankar and Shukla (2011), hibiscus is a natural dye with a variety of colors based on anthocyanins. In this study, marigold and hibiscus-inspired compound colors were produced on cotton and cotton/viscose fabrics. Tables 2 and 3 exhibit an overview of K/S values for cotton/viscose blends as well as the K/S values for 100% cotton. The results definitely show that when the amount of hibiscus was increased at the expense of marigold in the dye bath, the K/S values on cotton and cotton/viscose decreased. This pattern remained throughout all three of the examined mordants. Reduced L* values indicated that the shades were getting darker but duller. Negative a* values going positive meant that the shades were becoming redder rather than greener, which may be the result of a rise in the portion of redder hibiscus.

Table2: K/S values of compound shades of marigold and hibiscus using various mordants on cotton

Mordant	Compound Shade, (%)	K/S	L*	a*	b*
Amla 20%	Marigold: Hibiscus				
	100:0	5.25	69.47	-1.42	15.90
	70:30	3.45	65.06	-0.11	14.44
	50:50	2.10	60.42	0.60	13.60
	30:70	1.76	55.93	2.05	11.00
	0:100	0.71	49.37	3.36	8.34
Harda 20%	100:0	5.49	72.30	-0.70	15.72
	70:30	3.07	69.83	0.22	15.70
	50:50	1.89	68.36	0.85	15.08
	30:70	0.91	65.33	1.78	13.85
	0:100	0.81	63.34	2.78	13.25
Pomegranate rind 20%	100:0	4.40	67.29	1.07	18.54
	70:30	3.92	66.77	1.22	18.16
	50:50	2.88	63.16	2.46	16.98
	30:70	1.92	62.61	2.91	17.07
	0:100	1.21	55.87	4.59	14.92

Table 3 : K/S values of compound shades of marigold and hibiscus using various mordants on cotton/viscose blend

Mordant	Compound Shade, (%)	K/S	L*	a*	b*
Amla 20%	Marigold: Hibiscus				
	100:0	5.62	73.81	-1.02	17.33
	70:30	3.27	70.65	0.25	16.45

	50:50	2.21	67.70	0.47	14.51
	30:70	1.72	69.21	1.08	15.90
	0:100	0.71	63.81	2.17	13.75
Harda 20%	100:0	7.39	72.10	-2.35	21.81
	70:30	5.56	72.30	-1.92	21.67
	50:50	3.84	68.46	-0.70	20.36
	30:70	1.46	67.62	-0.14	20.20
	0:100	0.75	59.95	2.62	17.83
Pomegranate rind 20%	100:0	6.37	74.68	-0.11	19.40
	70:30	4.53	70.37	1.48	18.03
	50:50	3.27	69.67	1.83	18.04
	30:70	1.92	68.89	1.98	17.93
	0:100	0.76	65.57	2.55	16.62

The fastness information for cotton and cotton/viscose is provided in Tables 4 and 5, respectively. Ratings were assessed for each fastness grade individually using standardized evaluation measures. The ratings for cotton and cotton/viscose were found to be equal and within the acceptable range of ratings. Marigold and hibiscus single and compound colours that were premordanted with pomegranate rind surpassed amla and harda in terms of wash fastness. For the three study-used mordants, the wash fastness scores for cotton/viscose blend materials were comparable. When dyed with single and compound colours of marigold and hibiscus using various mordants, the cotton/viscose blend produced superior results than 100% cotton in terms of dry rub fastness. When it came to ratings for light fastness, cotton/viscose blends performed marginally better than 100% cotton. The scores for alkaline perspiration fastness on 100% cotton are somewhat higher than those for acidic sweat. The scores for sweat fastness on cotton/viscose blends are comparable in both the acidic and alkaline categories. An analysis of the fastness ratings data showed that the three mordants used in this experiment gave satisfactory results on cotton and cotton/viscose blends dyed with single and compound colors using marigold and hibiscus extracts. Because marigold produces yellow shades and hibiscus with natural mordants produces light beige hues, the shades obtained in the compound effect were yellow to medium and light yellowish ochre.

Table 4: Details on the fastness characteristics of marigold and hibiscus compound colors on cotton after using various mordants

Mordant	Compound Shade, (%)	Wash Fastness	Rub Fastness		Light Fastness	Perspiration Fastness	
			Dry	Wet		AC	AL
Amla 20%	Marigold: Hibiscus						
	100:0	4	4	3-4	6	3	3
	70:30	3	3	3	6	4	4-5
	50:50	3	3	3	6	4	4-5
	30:70	3	3	3	6	4	4-5
	0:100	3-4	3-4	3-4	6-7	4	4-5
Harda 20%	100:0	3-4	4	3-4	6	3-4	3
	70:30	3-4	3-4	3	6	4	4-5

	50:50	3	3	3-4	6	4	4-5
	30:70	4	3	3-4	5-6	4	4-5
	0:100	3-4	3	3-4	6	4	4
Pomegranate rind 20%	100:0	4	3-4	3-4	6	4	4-5
	70:30	4-5	3-4	3	6	4	4-5
	50:50	4	3-4	3-4	6	4	4-5
	30:70	4	3-4	3-4	6	4	4-5
	0:100	4	3-4	3-4	6	4-5	4-5

Table 5: Details on the fastness characteristics of marigold and hibiscus compound colors when applied to a cotton/viscose blend with various mordants

Mordant	Compound Shade, (%)	Wash Fastness	Rub Fastness		Light Fastness	Perspiration Fastness	
			Dry	Wet		AC	AL
Amla 20%	Marigold: Hibiscus						
	100:0	4	4	3	6-7	4	4-5
	70:30	3	4	3-4	6	4-5	4-5
	50:50	3	4	3-4	6	4-5	4-5
	30:70	3	4	3-4	6-7	4-5	4-5
0:100	3-4	4	3-4	6-7	4-5	4-5	
Harda 20%	100:0	3-4	4	3-4	6-7	4-5	4-5
	70:30	3-4	4	3-4	6	4-5	4-5
	50:50	3-4	4	3-4	6	4-5	4-5
	30:70	3-4	4	3-4	6	4-5	4-5
	0:100	4-5	4	3	6-7	4	4-5
Pomegranate rind 20%	100:0	3	4	3-4	6-7	4-5	4-5
	70:30	3-4	4	3-4	6-7	4-5	4-5
	50:50	3-4	4	3-4	6-7	4-5	4-5
	30:70	3-4	4	3-4	6-7	4-5	4-5
	0:100	4-5	4	4	6	4-5	4

CONCLUSION

Waste flowers from marigold and hibiscus could be used to make dye. Additionally, fabrics composed of 100% cotton and cotton/viscose were developed in a combination of marigold and hibiscus colors. Natural dyes have a limited palette of colors and shades, which makes it possible to create a wide variety of colors by combining two or more dyes in one bath. In addition, while metallic mordants are also hazardous to the environment, using natural mordants makes the study more environmentally friendly. Natural dyes are brightly colored when metallic mordants are used, however the colours achieved in this investigation were all serene and subtle due to the usage of natural mordants. Though natural dyeing can not replace the use of synthetic dyes for textiles in the industry but it can definitely be explored for bulk applications. At present processing of textiles with natural dyeing method is limited to certain niche products. Also with the more and more

technological advances through research studies in natural dyeing can bring the change slowly and steadily. The study also has potential for further research such as exploring the discharge printing effect on compound shades developed using the combination of marigold and hibiscus extract. As this study focuses on the use of natural wastes materials from household or from temple waste flowers , there is also a scope for exploring such waste materials from the food industry, agriculture , marine life and so on. If we consider hotel industry and their kitchens , the daily consumptions of onions for the preparation of food items, the considerable amount of wastes is generated from onion peels which can be used to extract the colour which can be further used for textile application.

In a view of protection of our environment today, globally stakeholders of textile industry are taking steps towards greener and cleaner approach as far as textile processing is concerned. Thus this study is very much promising as it showcases the potential use of natural wastes obtained from used flowers for textile colouration and their combination for achieving compound effect and thus more number of hues. Also the medicinal properties that marigold and hibiscus flowers are possessing , add the value to the end product.

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AN INVESTIGATION ON PHYSICAL PROPERTIES OF SILK WASTE BLENDED YARN

Reema Bora¹, Binita B. Kalita², Bulbul Baruah³

¹Ph.D. scholar, ²Professor and HOD, ³Professor,

Department of Textiles and Apparel Designing

College of Community Science

Assam Agricultural University, Jorhat-785013

reembora31@gmail.com

HSAI membership Number: HSAI-2022-AS-1181-LF

ABSTRACT

In this investigation, Eri and Muga pierced cocoons were used as a waste for the preparation of the blended and 100% yarn. Eri and Muga silk waste blended yarns were prepared in a ring spinning system in three different ratios viz. 30:70, 50:50, 70:30, and 100% Muga yarn were also prepared in the same spinning system. Yarn properties like yarn count, twist,lea strength, CSP, unevenness, thick and thin places, and neps of yarns were studied. The prepared yarns i.e. 100% Muga and blended yarns showed counts in the range of medium to fine (17.5 Ne to 23 Ne) comes in the category of medium to fine yarn count. From the results, it can be seen that the 0:100 Muga and 30:70 Eri: Muga blended yarns showed better properties as compared to the other two blended yarns. Properties were improved in the blended yarn as the Muga fibre proportion was increased in the blend ratio. This study will help use silk waste, raise revenue, and increase eco-friendly production.

Keywords: Muga, Eri, Blending, Ring Spinning, pierced cocoon, silk waste

INTRODUCTION

In today's era, global trends are shifting towards environmentally friendly materials as well as manufacturing methods. Therefore, natural fibre applications are gaining attraction globally. Silk, as a natural protein fibre is one of the textile fibres that have recently received more attention due to the new frontiers brought about by technological advancement that has extended the usage of silk fibre beyond the conventional textile industry. The silk industry in India has been identified as an employment-oriented industry. The silk fibre is biocompatible, biodegradable, easy to functionalize, and has excellent mechanical properties (Oduor E. O *et al.*, 2021)

Silk is the first name that strikes one's mind when looking into textile fibres' aesthetics. Silk is the glorious gift of nature and is an intimate natural fibre which is also popular with splendour, sibilant with luster, and spectacular in vision. India is the only country in the world that produces all four varieties of silk namely Mulberry, Eri, Tasar, and Muga. The non-mulberry silks viz., Tasar, Eri, and Muga are collectively called Vanya silks.

Silk is the one thread with which a silkworm spins its cocoon. The silkworm pupates in its cocoon and emerges like a moth. The thread produced by the spinning glands of the silkworm is the finest and strongest natural fibre in the world. Muga silk is one of the exceptional and rarest silk found lone in Assam. Muga silk thread is rare because of its texture, luster, and durability.

India holds a world monopoly in the production of Muga silk along with tropical Tasar. The golden yellow colour silk is a prerogative of India. Muga culture is specific to the state of Assam and an essential part of the tradition and culture of the state. Other than Assam small amount of exclusive golden yellow Muga silk is produced in Meghalaya, Nagaland, and Arunachal Pradesh. Silk as the fibre, strongest natural fibre, and has decent tensile strength, and moderate abrasion resistance. Muga silk is produced by *Antheraea assamensis* silkworm; feeds on Som (*Machilus bombycina*) and Sualu (*Litsaea polyantha*) leaves (Nogame A. *et al.*, 2020).

Among the 4 types of silk, Eri silk also known as ahimsa silk accounts for 78.4 percent and its contribution to the total raw silk production in the country is 7.26 percent next to Mulberry silk. Eri silk is mainly cultivated in the northeastern region of India. Now, there is a vast scope for the development of Ericulture all over India. Eri silk cocoons are open mouthed therefore it is spun like cotton. Eri silk is strong and durable which have a typical texture. The appearance of Eri silk is like wood mixed with cotton and the softness of silk. The short length of the fibre is nearly 57 mm. The tenacity of 3 to 3.5 g/d and the denier of the filament is 2.2 to 2.5 d. It has outstanding thermal properties, which can be a substitute for wool. Eri silk is more highly crystalline than other non-mulberry silks (Sreenivasa *et al.*, 2005). It has incredible blending potential with other fibres like wool, cotton, and polyester. (Anjali A. *et al.*, 2011)

Eri culture is largely practiced in north eastern regions of India. Nearly 98 percent of Eri silk is produced by the states like Assam, Nagaland, Meghalaya, and Manipur. This is also known as “Endi”. It is also cultivated in the states of Bihar, Orissa, West Bengal, and Andhra Pradesh on a minor scale. It is observed that there is massive scope for the progress of Eri culture on a larger scale not only in traditional states but also in non-traditional states such as Andhra Pradesh, Gujarat, Rajasthan, Punjab, Karnataka, and Uttar Pradesh (Nadigeret *et al.*, 2007). Eri silk is a multivoltine silk spun from open-ended cocoons. It is derived from domesticated silkworms known as *Samiaricini* which feeds primarily on castor leaves. The popularity of Eri silk in the textile world is limited because of the irregular filaments, reeling difficulties, and lack of favourable environmental conditions for rearing Eri silkworms. (Tamta M. and Mahajan S., 2021). The Eri silk fibre is the only domesticated non-mulberry variety of silk that possess excellent thermal insulation property and the fabrics made out of Eri silk yarn is popularly utilized as warmth giving attires by the individuals of north-eastern states of India in particular (Choudhuri and Kumar P., 2018). Eri fibre possesses exceptional twin nature with excellent strength and softness (Padaki N., and Naik S.V., 2016).

OBJECTIVE OF THE STUDY

The present study is an attempt to utilize Eri and Muga silk waste for the preparation of the blended yarn in different ratios as well as to know about the blended yarns.

- Utilization of silk waste
- Preparation of blended yarn in different ratio
- Study of the properties of the blended yarn

MATERIALS AND METHODS

MATERIALS

The Eri pierced cocoons are collected from Eri Silkworm Seed Production Centre, Azara, Assam, Central Silk Board, Ministry of Textiles, Govt. of India, and Muga pierced cocoons are collected from Muga Silkworm Seed Production Center Boko, Assam, Kaliabori, Central Silk Board, Ministry of Textiles, Govt. of India.

METHODS

The blended yarns were produced in three different ratios of 30:70, 50:50, and 70:30 Eri: Muga. 100 % Muga silk waste yarn also twisted for base reference. A ring spinning system in a single form was used to prepare all the yarns. The pure yarn was also prepared in the same spinning system.

After the collection of pierced cocoons degumming is done. Sodium carbonate (Na_2CO_3)-1g/L and Soap-2g/L were used for the degumming process. In the degumming process, Silk sericin is removed using soap water or sodium carbonate followed by hydro extraction (removal of excess water). This process helps to decrease the sericin content of the silk up to 2-3%. This 2-3% sericin is ideal for further opening and carding process. This process makes the cocoon easy to open by making it fluffy.

After the degumming process, Muga and Eri opened Pierced cocoon fibres were straightened and cut into 55 mm staple lengths and properly mixed in the required ratio manually. These stapled fibres were then guided to the blow room. In this section, fibres were opened up to have a close and homogeneous blend. Thereafter, the material goes through many processes like card, draw frame, simplex, and spun on a ring frame, and at the end, it goes through the winding. These yarns were prepared at the Mechanical and Spinning division of CIRCOT, Mumbai India.

Yarn count

Yarn count can be measured using direct and indirect systems. An indirect system was used to measure the count for this investigation, where the yarn number of counts is the number

of units of length per unit of weight (Jewel, 2012). The count of yarn was determined with the help of Beesley Balance.

$$\text{Count (Ne)} = \frac{\text{Length in meters}}{\text{Weight in grams}}$$

Twist per inch (TPI)

The number of turns per unit length of yarn is expressed as turns per meter or turns per inch. The quantity of twist is a significant factor in the finished product. Fine yarn leads to more

twists than coarse yarn. Auto yarn twist tester is used (Bora R., 2017).

Lea strength (lb)

A sample of the lea is prepared from the cone using the wrap reel. The length of the lea is 120 yards. The lea strength test is carried out using IS: 1671-1977 on the lea strength tester.

Count Strength Product (CSP)

CSP is the product of the English count and strength of yarn measured in pounds. CSP differs as the twist factor changes. CSP is obtained by multiplying the count of yarn with the lea strength (Jewel, 2009).

CSP of blended yarn in the study was calculated by using the formula,

$$\text{CSP} = \text{Count} \times \text{Strength}$$

Yarn evenness

Yarn evenness was measured on Uster Tester-5. It is an electronic instrument used to measure yarn unevenness and imperfections at various levels. The test is carried out using the ASTM D-1425 method.

Imperfections (thin places, thick places, and neps) measured at the following sensitivity level:

Thin places	- 50 %
Thick places	+ 50 %
Neps	%+ 200 %

FIBRE



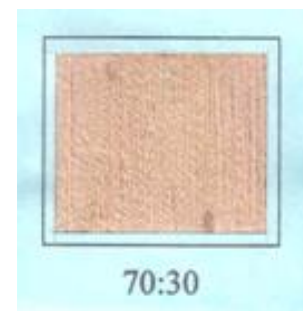
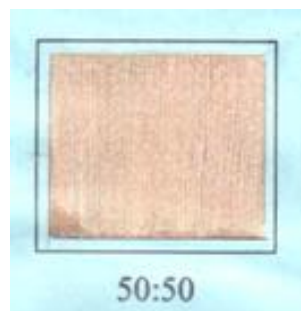
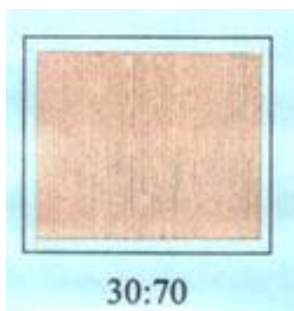
RESULTS AND

CONTROLLED YARN



DISCUSSION

ERI:MUGA BLENDED YARN



The results obtained from the present investigation as well as relevant discussion have been summarized under the following heads.

Yarn count and Yarn twist of prepared Eri: Muga silk waste blended yarns

Evaluation of yarn count and yarn twist of prepared Eri: Muga silk waste blended yarns were shown in Table 1. It is shown that the Yarn count of 100%Muga silk waste and 30: 70 Eri: Muga silk waste blends appear to be higher i.e. 23 and 19.9 Ne respectively, than the other blended yarns. The yarn count of 50:50 Eri: Muga blend was 18.7 Ne whereas 70:30 Eri: Muga waste blended yarn exhibited yarn count value of 17.5 Ne. From the

Table 1: Effects of blending on yarn count and yarn twist of waste silk blended yarn

Sl. No	Eri: Muga	Yarn count (Ne)	Yarn twist (TPI)
1	0:100	23	15.5
2	30:70	19.9	19.6
3	50:50	18.7	18.5
4	70:30	17.5	16.9

Ne*= Numerical expression, TPI*= Twist per inch

data displayed in the table it was found that 100% Muga and blended yarn count range (17.5 Ne to 23 Ne) comes in the category of medium to fine yarn count. The considered medium to fine yarn count range is 14 Ne to 78 Ne. This category is largely used to make textiles for clothing and apparel (Lakhchaura P. *et al.*,2019).

From the results, it has been observed that the yarns which contain a higher proportion of Muga waste fibre appear to be a finer yarn count than other blends.

Twists were used to impart cohesion to constituent fibres and strength to the yarn. The results reported in Table 1 reveal that Twist for 30:70 Eri: Muga silk waste yarns had a maximum twist that is 19.6 followed by 50:50 (18.5) and 70:30(16.9). Muga silk waste yarn had the lowest twist because of which it has a finer count may be and the lowest twist may be due to the longer length of the Muga fibre. Similar results were reported in a study on spinning limit for different fibres (cotton, viscose rayon, and polyester) on a friction spinning machine by Chattopadhyay and Sinha (2007) that for a similar count of yarn, the twist was maximum in cotton yarn and lowest in viscose yarns. As the viscose fibres were too long and flexible in comparison to cotton. Therefore, viscose yarns showed a lesser twist than cotton. The twist is reliant not only on the diameter of the yarn tail but conjointly on the friction coefficient between the fibres and the drum, as well as the force with which the fibres hard-pressed against the drum, and the length of the fibre.

Lea strength and CSP of prepared blended yarns

Table 2 shows that the lea strength is highest for 100% Muga silk waste yarn among all the yarn i.e. 115.4 lb. Among the blended yarn 50:50 yarn has the highest strength which is 106.3lb followed by 30:70 (105.8lb) and 70:30 (89.3lb).

Table 2: Effects of blending on lea strength and CSP of blended yarn

Sl. No	Eri: Muga	Lea strength (lb)	CSP
1	0:100	115.4	2654.2
2	30:70	105.8	2105.4
3	50:50	106.3	1987.8
4	70:30	89.3	1562.7

CSP*= Count Strength Product

The highest lea strength may be due to the single strength of the Muga silk fibre. A similar result has been found in a study by Nisha V. (2007), where silk is blended with wool in different ratios like 35:65, 50:50, 65:35. The result showed that lea strength was maximum in 100 per cent silk which is reduced when the wool proportion was increased in the blend ratio.

The count strength product was highest (2654.2) in terms of 100% silk waste yarns. It has been reduced in the blends like 30:70 (2105.4), 50:50 (1987.8), and 70:30 (1562.7) respectively as the CSP depends upon the lea strength of the yarn. CSP of the blended yarn is reduced as the Eri fibre portion is increased in the blend.

Lakshmi (2014) stated that Yarns having higher lea strength exhibited higher CSP due to the higher strength of silk fibres and it was reported that the maximum lea strength was registered in 100 percent silk waste among all the yarns.

Yarn unevenness, thin & thick places, and neps of prepared yarns

Areas that are longer than 4 mm in length are counted as thick places. Table 3 displays U%, thin-50%/km, thick+50%/km, neps+200%. It can be observed from the table that unevenness percent was highest (27.6 %) for 70:30 Eri: Muga silk waste yarn and lowest (21.2%) for 100% Muga yarn. The Unevenness percentage for 50:50 and 30:70 was 26.0% and 21.8% respectively.

Unevenness creates in yarn due to the uneven distribution of fibre throughout the length of the prepared yarn (Nkiwane L. *et al.*, 2010). It may be because of the diameter variations and shorter length of Eri fibres also. Whereas Muga, is a finer fibre throughout the length and has lower fibre length variation. So, the addition of Eri fibre with Muga silk waste fibre increased the unevenness percent for blended yarns (Chollakup *et al.*, 2004; Lakhchaura P. *et al.*, 2019).

Table 3: Effects of blending on evenness of blended yarn

Sl. No	Eri: Muga	U%	Thin places (-50%)	Thick places (+50%)	Neps (+200%)
1	0:100	21.2	3010	2005	1920
2	30:70	21.8	2910	2540	3490
3	50:50	26.0	5670	3190	3790
4	70:30	27.6	5701	3210	3920

Thin places were measured at levels -50%. It can be seen from Table 3 that the thin places at - 50% sensitivity level were lowest for 30:70 (2910/km) followed by 50:50 (5670/km), 70:30 (5701/km) in Eri and Muga silk blended yarns and 3010/km in 100% Muga silk waste yarn. Similarly, table 3 also displays the thick places measured at +50% sensitivity levels. It can be observed that at +50% level highest thick places were found for 70:30 Eri: Muga silk yarn (3210/km) followed by 50:50 (3190) and lowest for 30:70 yarn (2540/km) among the blended yarn.

The difference in thin and thick places may be due to the number of fibres present in the cross-section. The lowest thick places are due to the fewer fibres in the cross-section. A similar result has been found in a study by Nkiwane L. *et al.*, 2010.

The thick places which are shorter than 4mm in length are called Neps (Saville B.P.,2000). Neps were measured at +200%. The neps per kilometre for 30:70, 50:50 and 70:30 blend ratios were 3490/km, 3790/km, and 3920/km respectively. Whereas 1920 for 100% Muga silk yarn which can be seen in Table 3. It is shown that 70:30 Eri: Muga yarn has the highest neps compared to other yarn.

It was observed that neps per kilometre of yarn were increased as the Eri content increased with the Muga silk waste fibres in developed blended yarns. It may be due to the short length of fibre as raw materials of yarn also cause neps (Fruter, 2009).

CONCLUSION

In this investigation it was found that 100% Muga silk waste yarn possesses the highest yarn count and among the blended yarn 30: 70 Eri: Muga silk waste yarn possesses the highest. From the result of all the yarns, it was observed that yarns that contain the higher proportion of Muga waste fibre were showing finer yarn count.

It was found that the 100% Muga silk waste exhibits the lowest twist and 30:70 Eri: Muga silk waste yarns exhibit the highest twist. Muga silk waste yarn possesses the highest lea strength among all the yarn and among the blended yarn 50:50 yarn possesses the highest strength. The count strength product was highest in the case of 30:70 Muga and Eri silk waste blended yarn. It has been reduced as the Eri fibre proportion was increased in the blend. It can be observed that 70:30 Eri: Muga silk waste yarn has the highest unevenness percentage and lowest for 100% Muga yarn. Less unevenness is created to Muga yarn because of the higher fibre length as well as less diameter variations of the fibre. Whereas Eri, being a short fibre has different cross sections throughout the length. Variation in fibre diameter and length variation is one of the major reasons for yarn unevenness. The addition of Eri with Muga fibre increased the unevenness of all the blended yarns. It can be observed that the 70:30 blend had the maximum number of thin, thick places and neps among the blended yarns. It was observed that neps per kilometre of yarn were reduced by an increase in the proportion of Muga silk waste fibres in developed blended yarns. This study showed that silk can be utilized and the properties of the yarns were suitable for the production of the fabric.

Recommendations

- The developed yarn can be utilized by the Handloom and textile sectors for the production of fabrics.

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UNLATCHING THE RETICENT CLOTHING DEMANDS OF GROWING ELDERLY SEGMENT: PROBLEMS, NEEDS AND SOLUTIONS

Sneha Sharma¹ and Dr. Sabina Sethi²

¹ Researcher, Lady Irwin College, University of Delhi

² Professor, Department of Fabric and Apparel Science, Lady Irwin College, University of Delhi,

Email: sabina.sethi@lic.du.ac.in,

Author Postal Address: C-195, VivekVihar, Delhi 110095

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ABSTRACT

Ageing is an ongoing process that can lead to loss of functional ability and with a higher risk of morbidity and mortality. Disability becomes a significant concern as people age because it severely restricts daily functioning, adding to the responsibility of care giving. The clothes we wear are a reflection of our culture, personality, identity, age and fashion. It is through our clothes that our body is presented and perceived, therefore how dress operates in the context of age, is significant for understanding how cultural expectations act directly at a bodily level (Nyong & Duze, 2011). It has been observed that India's elderly population is growing with enhanced awareness regarding health issues, which are expected to put considerable pressure on the health care system in general and geriatric care in particular. With this rapidly growing elderly population in India there is a corresponding increase in related issues due to the age or lifestyle. Keeping their specific requirements in mind it is important to generate knowledge about the problems faced by the senior population and then develop targeted solutions in terms of clothing for them. There is a pressing need for first-generation entrepreneurs and healthcare practitioners, who would sense a gap in terms of products and services designed specifically for the 60-plus age group, giving them a true sense of autonomy amidst the changing physiological conditions.

Keywords: Ageing, Care-giving, Clothing, Elderly population, Geriatric care

INTRODUCTION

India is a developing country whose demographics have been changing. From being a country with highest percentage of young cohorts it is reaching at a potential where it will be termed as country with largest percentage of elderly as well (India Ageing Report, 2017).

In developing countries like India, the well-being of older persons greatly depends on whom they live with, particularly where the elderly has little resources to access formal welfare systems. Living arrangements among the elderly was not an issue in India till a few decades ago because their families were expected to take care of them; but with the reduction in fertility rate and increased life expectancy at old age, conventional living arrangements have been undergoing transformation. With declining informal social support systems, older persons who live alone are increasing (India Ageing Report, 2017).

For better understanding of the demographics of senior population it is important to do it with respect to their health status, common ailments/diseases, disability, Activities of Daily Living (ADL) and their involvement in creating a social demand in Indian market.

- **Health Status of Elderly**

As defined by World Health Organization (WHO) Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.

Since health is determined by many economic, social, psychological and physiological factors. Poor health and morbidity diminish the quality of life and wellbeing of the elderly while increasing psychological distress and perception of vulnerability.

- **Disability**

With the increase in age, disability becomes a major concern, as it seriously limits the functioning in daily life and hence increasing the care-giving burden. According to the 2011 census, the disability rate was 51.8 per 1,000 for the elderly and 84.1 per 1,000 for the 80-plus population as compared to 22.1 per 1,000 for the general population. 80-plus women have higher levels of disability as compared to elderly men indicating greater disadvantages.

The last census (2011) conducted by Ministry of Home Affairs collected information on disabilities relating to visual, speech, hearing, mobility and mental health. The prevalence of mobility and vision-related disabilities was found to be high among both men and women (India Ageing Report, 2017).

- **Activities of Daily Living**

Activities of Daily Living (ADL) are the basic tasks of everyday life such as feeding, bathing, dressing, mobility, use of the toilet/continence and when older persons are not able to perform these activities, they require assistance. ADL limitations are indicative of the care burden in any society (India Ageing Report, 2017).

With an increase in the assistance needed by elderly to perform ADL a study done by HelpAge India in 2019 found out that most Indians are not happy about having to care for their parents or in-laws. They said they "never" felt happy or satisfied taking care of the elderly, while nearly 14% said they "rarely" felt happy. People were asked to rate the job of taking care of the elderly on a "burden scale" that offered three options- "mild to moderate", "moderate to severe" and "severe", about 15% checked the box for "severe". However, the report also reflects that out of 2,050 respondents 65% of daughter in laws helps elderly in day to day activities like shopping, changing and washing clothes, walking, eating and bathing (TOI, 2019).

- **Growth of New Consuming Class: Elderly**

The above discussions may present the grim picture of getting old however this is not a universal truth especially in the metropolitan and Tier 1 cities of India. A study done by CII on senior consumers revealed that 60 plus seniors or 'Senagers' are behaving a lot like teenagers and becoming a growing consumer class in India (TOI,2019). Similarly a study conducted in the national capital by Agewell foundation "Changing Patterns of Income and Expenditure in Old Age", highlighted that a fifth of the elderly (21.4%) had a net worth of Rs 10-20 lakh, and just 85 respondents put their net worth at over Rs 50 lakh; 13% claimed their net worth was less than Rs 50 lakh but more than Rs 20 lakh. Their maximum expenditure (31%) was on health care services and products followed by food/cloth for self (28%) (TOI, 2018).

A CII study on senior consumers has pegged the market for their medical needs and lifestyle products at Rs 43,000 crore. However, the potential market size driven by senior citizens is as large as Rs 1,00,000 crore (excluding categories like real estate and pharmacy, along with banking, financial services & insurance (BFSI). Of this, only Rs 10,000 crore has been tapped so far. (TOI, 2019). This means there is a huge potential market whose demands are not met and these needs to be identified and served by the marketers and manufacturers etc.

These findings show that the population is ageing in India and now constitutes a sizable proportion of total population. The older persons constitute a consumer group with significant aggregate purchasing power and specific demands; however, the clothing market is either not aware of this opportunity or does not think that it is worth pursuing. The review clearly indicates there is economic sense in serving this customer segment, but besides the economic criteria to justify serving the elderly we should also consider the ethical aspect where we must as a society overcome our ageist attitude and make a conscious effort towards inclusiveness. Just because a person is no longer in the so-called young category, it should not mean that he/she is not important to the community. Meeting the physiological needs of a person also contributes to their emotional well-being and augments their quality of life. Therefore, there is a need to sensitize the fraternity, towards these special clothing requirements of senior citizens. Identifying their clothing related problems and generating customized solutions for the same as undertaken in the study is a first constructive step in the right direction.

OBJECTIVES OF THE STUDY

1. To identify clothing related problems faced by elderly in general in 60 -80+ years age group
2. To explore design solutions offered as an outcome of other researches globally, and suggest them for seniors in India.

RESEARCH DESIGN

The present study was a need-based research. The researcher was inspired to undertake this study after seeing how her own grandparents and other senior acquaintances were facing clothing-related issues in their everyday lives. To establish the feasibility of such a research, a preliminary study was conducted to see whether other senior members were also experiencing comparable problems. Through snowball technique, ten respondents were identified for this baseline survey out of which six were men and four were women. All the respondents in the preliminary study sample shared that as they have aged, their clothing demands have changed, however no satisfactory solution was available to them at the time of the study. With this in mind, the research was planned such that it had 3 main phases:

I Observation and Data Collection

II Analysis of Data

III Study of clothing guidelines for seniors and Exploration of Design Solutions

METHODS AND MATERIALS

The sample in this cross-sectional study was taken as per the age group categorization given by WHO guidelines [Early/young-old (60-69 years), Middle-old (70-79 years), Late/old-old (80-89 years), and Very-old (90+ years)]. A total of 80 respondents were interviewed and observed to identify clothing related issues. The respondents were selected by purposive sampling technique along with snow ball sampling technique to get vital number of respondents from every age group.

During the study it was observed that the actual number of respondents interviewed were more than 80 as many elderly respondents were interviewed along with their family members and caregivers.

The locale of the study was various residential localities in Delhi NCR consisting of 9 districts in Delhi, viz. North, North West, North East, South, South West, South East, West, East and Central Delhi, along with NCR Gurugram and Noida.

Apart from the residential localities in Delhi NCR following departments were also visited for data collection;

- Department of Geriatric Medicine, AIIMS, New Delhi
- Geriatric Help desk, HelpAge India, AIIMS, New Delhi
- Physiotherapy laboratory, AIIMS, New Delhi
- Memory clinics, AIIMS, New Delhi

Data was collected through interview schedule, questionnaire and observation technique in order to obtain a holistic insight about the problems and requirements of elderly in terms of clothing.

In order to elicit detailed responses, the questions in the interview schedule were kept brief and open ended. Care was taken that the questions were not worded in a suggestive manner in order to avoid bias in responses. Observation of participants while conducting interviews in comfortable settings was a pertinent source of information and helped in gathering valuable data and insights. Participation in this study was on voluntary basis and only those seniors, family members and caregivers were included who agreed to participate voluntarily.

RESULTS AND DISCUSSION

Ever-mounting physical changes in body with age cause slowdown in the individual's activities. Physical changes in human body due to aging changes the expectations of elders regarding clothing and their preferences. Dressing and undressing being a very important everyday task causes a great deal of difficulty for seniors, especially for those who suffer from some additional physiological condition or ailment apart from the common ones that come with ageing.

In order to identify the clothing related issues faced by seniors this paper is focused on two important aspects:

- Identifying clothing related problems faced by elderly
- Need for adaptive clothing and general clothing selection guidelines for seniors.

1. Identifying Clothing Related Problems Faced by Elderly

The identification of commonly used accessories and other textile/garments that were directly/indirectly used by seniors was done through extensive interactions with them, their family members and/or caregivers which were then listed and compiled. This was followed by identifying and listing the specific problem/s commonly faced by the seniors while wearing a particular garment. Along with this, an effort was also made to identify the seniors who were more likely to face these identified issues. These are presented in Table 1.

Table 1: Clothing Related Issues Faced by Elderly

S.No.	GARMENTS	ISSUES FACED BY ELDERLY RESPONDENTS	SENIORS MORE LIKELY TO FACE THE IDENTIFIED CLOTHING RELATED ISSUE
1.	Socks	Difficulty in orientation of heel of socks	Seniors with foot related issues, Arthritis, Diabetes, Dementia, Parkinson's disease
		Difficulty in distinguishing left and right socks	
		Uncomfortable front seam	
		Sweaty feet	
		Aggravated blisters in soles	
		Tightness and leaves marks around calf	
		Due to numbness of feet unable to feel falling of footwear	
2.	Pants And another Pull-Down	Tightness around belt	
2a.	Garments Pants/Trousers	Uncomfortable belt area (poking snaps and buttons) due to limited mobility	Seniors with Parkinson's, Alzheimer's, Dementia, Wheelchair users, Bedridden and hospitalized individuals
		People on wheelchair find difficulty in self-wearing	
		Difficulty in opening and closing of snaps and zipper due to lowered hand dexterity	
		Difficulty in medicine application on knee or/and on calf area	
2b.	<i>Pyjama (an Indian Lower garment worn by men)</i>	Tight draw strings	Seniors with Catheter/Incontinence, Diabetes, paralysis patients, Wheelchair users, Bedridden Patients, hospitalized individuals
		Difficulty in medicine application on knee or/and calf areas	
		Elasticated belt squeezes urine catheter pipe	
		Insulation issues during winters	
2c.	<i>Salwar (an Indian Lower garment worn by women)</i>	Tight draw string	Seniors with Incontinence, Diabetes, Wheelchair users, Bedridden Patients
		Unable to open quickly for toileting	
		Difficulty in medicine application on knee or/and calf areas	
		Insulation issues during winter	
3.	Shirts, T-shirts, Kurta (an Indian Upper garment worn by men/ women), and Kurti (an Indian	Difficulty in closing and opening of small buttons.	Seniors with Arthralgia, Coronary heart disease, Alzheimer's, Diabetes and Dementia and Arthritis
		Problem in button and buttonhole co-ordination	
		Uncomfortable sleeve and armhole proportions	

	<i>Upper garment worn by women)</i>	Difficulty in medicine application on hand and/or joints Abrasion in lower sleeve due to elbow crutch. Difficulty in distinguishing front and back and inside/outside of the garment (t-shirt) Difficulty while dressing and undressing due to decline in hand dexterity Garment fit issues (sagging shoulder, tightness around abdomen area, loose and uncomfortable gathering in sides and underarms)	
4.	Under garments (Men)	Difficulty while dressing and undressing	
4a.	Vests	Loose straps Difficulty in distinguishing front and back and inside/outside of the garment	Majority of seniors, due to unavailability/lack of awareness most seniors discontinue wearing it
5.	Undergarments (women)	Uncomfortable and tight elastics	
5a.	Bra/ Undershirt	Poking hooks and snaps Difficulty in fastening and unfastening at back Yellowness/ soiling of fabric	Majority of seniors, due to unavailability/lack of awareness most seniors discontinue wearing it
5b.	Underpants	Tight elastics Tightness in crotch/genital area Uncomfortable fit around hip area	
6.	Saree	Difficulty in closing and opening of small buttons	
6a.	Blouse	Problem in button/ buttonhole, hook and eye co-ordination Uncomfortable sleeve and armhole proportions Difficulty while dressing and undressing due to decline in hand dexterity	Seniors with Arthritis, Coronary heart disease, and Diabetes
6b.	Petticoat	Tight drawstrings and elastics Excess fabric at hem that hampers movement Other issues Difficulty in pleating saree Uncomfortable	
7.	Others items of clothing		
7a.	Towels	Harsh Fabric peels away sensitive skin when used.	Most Seniors as the skin becomes sensitive as it ages
7b.	Bed sheet/cushions	Harsh rough fabric feels Not waterproof Stained/ soiled easily	Seniors with incontinence, bedridden seniors etc.

7c.	Hats/scarves	Loose/ Tight Fit	Most seniors' dues to sensitive skin
		Keeps slipping from the head	
		Uncomfortable drawstring at back	
		Can't wear while sleeping (slipping issues)	
		Uncomfortable seam bulk on top	

A list of garments/accessories that are commonly worn by seniors was first developed by looking at the responses collected during interviews. This was followed by identifying and listing the specific problems commonly faced by the seniors while wearing a particular garment and also the seniors who more likely to face a particular problem were also identified based on the literature review, talking to the respondents, care givers and also medical practitioners. Based on these findings, various design solutions were explored.

2. Need for Adaptive Clothing and General Clothing Selection Guidelines for Seniors

The importance of customizing clothing for groups with unique needs is growing among clothing designers. While developing these adaptive garments, therefore, it is crucial that both physiological issues as well as the provisions needed to make the clothes self-reliant are considered together. Adaptive clothing refers to apparel that has been designed for people who have difficulty in dressing themselves independently due to age, physical disability or lack of mobility. The elderly and the infirm experience difficulty in dressing themselves generally due to their inability to manipulate closures, such as buttons and zippers, or due to a lack of a full range of motion required for self-dressing (Rai, 2018). Adaptive clothing through use of appropriate design features makes it possible for an individual to dress unassisted or in case of severe disability the features make it easier for the care giver to dress and undress. An adaptive garment through use of discreet adaptations simplifies the clothing process by reducing the need for painful movements: lifting arms, lifting the seat, legs, etc.

To explore practical design solutions, the researcher did an extensive review of existing literature by going through published papers (online as well as print) pertaining to - Physiological changes in body with age, clothing related issues faced by seniors, possible solutions developed /suggested/ available globally. This review highlighted the lack of research undertaken in this domain in our country. The secondary data was also collected by visiting various shopping portals, e market places, websites of various clothing brands and other providers of facilities for seniors' citizens, this was undertaken so as to check the availability of clothing specifically for elderly group. Besides this, studies done previously in the Department of Fabric and Apparel Science, Lady Irwin College, University of Delhi were also a source of information.

After extensive review and research, a comprehensive data base was prepared of design features that would be appropriate and should be kept in mind while designing and developing adaptive clothing for elderly population. In addition to this, a compilation of clothing related guidelines was also prepared. This would be of assistance to the elderly population and their care givers in their general clothing selection thereby help them make judicious purchases for a comfortable and well-fitting wardrobe.

- **Selection of Design Features for Functional Clothing**

Adaptive design encompasses aesthetics as well as serviceability thereby enhancing the quality of life of the wearer. Adaptive clothing is designed keeping in mind the needs and abilities of the

wearer. The adaptations in clothing are incorporated based on several factors such as age, type of disability, level of dependency/independence, level of mobility, and dexterity, as well as whether a person requires help when dressing/undressing from a care giver. A core component of adaptive clothing design and construction should be that it is comfortable, functional, and fashionable. The basic concept of design being both structural as well as decorative. Adaptive clothing that addresses these issues proactively will benefit both the user and the caregivers or healthcare professionals, to be more efficient, increasing independence of the wearer, as well as prevent potential injuries. The design features which are of great significance for functional/adaptive clothing that should be taken into consideration include-

- Strategic clothing openings and their placement
- Appropriate selection and use of fasteners
- Use of proper seams and seam finishes

All the above design features need to be skillfully incorporated while selecting and /or developing the garment to make them well suited, comfortable, discreet and provide ease in dressing.

Fasteners

The role of fasteners is very important in adaptive clothing to close the strategic openings neatly with easy accessibility and to retain the normal look of the garment.

Type of fastener applied and their positioning should be done in such a way that process of fastening and unfastening becomes easier and less time consuming for an individual or caregiver. Also, According to Farha (2021), type of fasteners also influences consumer decisions.

Suitable fasteners for adaptive clothing are:

- Large buttons and buttonholes
- Zippers with round/ broad rings
- Snap buttons
- Velcro
- Sew on hook and loop button
- Magnetic closures
- Hook and bar

Use of the correct fasteners increases the overall functionality of the garment. Soft elastic in comparison to buttons or zippers are preferred as they are easier to fasten while taking off and putting on the garments (Farha, 2021).

Seams

Seams have a direct contact with the wearer's skin which can irritate, scratch, and reduce the shelf life of the garment if not chosen wisely. A garment with ordinary seams could be unsatisfactory. Special seams like French seam, mock French seam, and run and fell not only give a neat look and sturdy finish to the garment, they also add to the comfort and durability of the garment. Top stitching is a decorative seam which can be used at edges of sleeves, neckline etc. seam finishes like over locking, pinking, bias binding etc. to prevent the raveling of the fabric.

Selection of Fabric

A good design is based on the organization of the basic element- line, shape or form, colour and texture. Proper and appropriate selection of fabrics is very important for developing comfortable functional garment for good fitting. Fabric design, texture and colour, all must be taken into consideration while selecting fabric for seniors.

Texture refers to the surface appearance of the fabric as well as its feel and hand. The fabric for elderly should be soft, smooth, fine, comfortable, and breathable.

The most appropriate fabrics with required qualities of comfort for seniors include 100% cotton or linen woven or knits. These are ideal for making garments that are worn in direct contact with skin like undergarments or intimate wear, cotton blends like cotton/polyester, cotton/rayon can also be used. Terry cot, a cotton polyester blend can be used for men's bottom wear. Apart from these bamboo fabrics which is naturally hypoallergenic, moisture- absorbent and quick drying, 40% more absorbent than even the finest organic cotton can be taken into consideration. However as compared to cotton and linen bamboo fabrics are expensive.

Fabric design should be such that it hides the problematic areas and takes the emphasis away by deceiving the eye and changing the apparent size by camouflaging the deviating body shape. Over all small patterns and prints tend to soften the figure outline.

Colour can play an important role in creating the optical illusion to make figure appear more proportionate. The cool, sober, pleasing and light soft pastel shades are best suited to the requirements of elderly clothing. Solid dark coloured, vibrant colours should be avoided unless preferred by the wearer.

Additional guidelines (Nyong & Duze, 2011) to be considered while selecting/designing clothes for senior population:

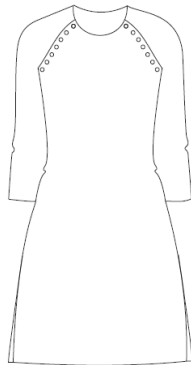
- Tight clothes are difficult to manage and ride up easily thus accentuate a deformity, so slightly larger size than needed should be chosen
- When dressing paralyzed limbs, dress the affected limb first but undress it last
- Clothing should not emphasize the disability in any way
- Choose a fabric that washes easily and dries quickly
- Two thin garments are often warmer than a single thick one
- Clothes should be strong enough to take abrasion caused by orthotic device or sliding transfer technique of wheelchair
- Fabrics with stretch such as knits or those with elastane yarn are easier for those with paralysis, pain or decreased limb function
- Instead of closures, elasticized waist pants or with velcro are easier for those with incontinence
- Clothes with easily accessible closures either in front or side Leave room for prostheses and braces.
- Clothes should have ample room for prostheses and braces, splints, slings, crutches etc.
- Choose tops with back open for people who are chair bound or bed ridden
- Avoid clothes with small buttons, zippers and hooks
- Choose socks and stockings with base-grip to avoid falls on feet without shoes especially at night
- Garment should give aesthetic appeal without hampering its functionality because fashion matters at all ages.

These guidelines have to be kept in mind while selecting and/or designing garments for elderly. An effort should be made to ensure that while selecting and/or designing garments for seniors the most important factor- inclusiveness in the design solutions, need to be given utmost priority.

Keeping in mind the above design features and principle of inclusivity in mind, following design sketches of prototypes were developed. It was proposed that prototypes of these will be constructed and then test fit to be done on respondents after taking their consent

Designs of Suggested Prototypes for Women

Plate-I



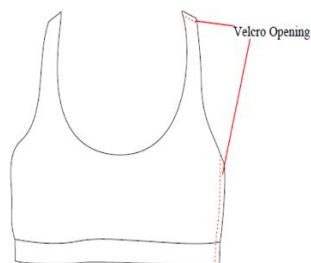
A trendy kurta with raglan sleeve style. Fastened with press buttons across the front, making it easy to remove by unfastening the press buttons and sliding down. This facilitates undressing as removing a shirt over the head by raising the arms high is not possible/ painful/ in convenient for seniors.

Figure 1: Kurta with Raglan Sleeves



A comfortable elasticated salwar with yoke design on belt area. The yoke is attached to the elasticated belt with Velcro as fastener. The design is best suitable for seniors with incontinence and for paralysis and wheelchair users. Since fastening and unfastening of traditional cord in the salwar is not possible/ convenient with age due to decline in finger dexterity and also sometimes due to urgent need for urination due to poor bladder control.

Figure 2: Salwar with Yoke

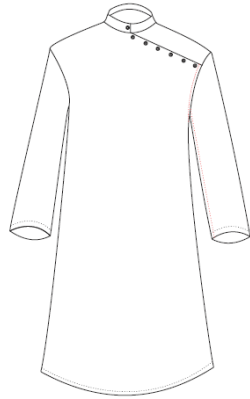


An intimate wear that is soft and easy to wear. The sports bra design has left side seam and upper shoulder strap fastened with Velcro. Unfasten the Velcro from both side seam and shoulder and slide on/off the bra from right arm for dressing/undressing. Fastening and unfastening of conventional Bra closures whether in front or back is difficult with age due to poor eyesight/ poor finger dexterity / restricted arm movement etc. in fact it is one of the primary reason why many of the elderly women stop wearing Bra

Figure 3: Side Open Sports Bra

Designs of Suggested Prototypes for Men

Plate-II



Trendy asymmetric kurta/achkan is perfect for seniors who want to look trendy. The adaptive design has left slit below shoulder fastened with press button. Left arm hole seam and the under-arm seam of sleeve is fastened with Velcro which will aid in easy removal of the garment.

Fig.-4: Asymmetric Kurta/ Achkan



Functional shirt design with concealed magnets. The magnets are concealed behind each decorative button giving it a functional as well as aesthetic touch. Perfect for people with lowered hand dexterity and memory issues.

Fig.-5 Shirt with Magnetic Fasteners

Easy to wear side open pants with elasticated belt design has traditional front zipper design replaced with Velcro. The inner seams of pants are fastened with Velcro from knee level to hem. Perfect for seniors with arthritis/joint issues and crutch users.

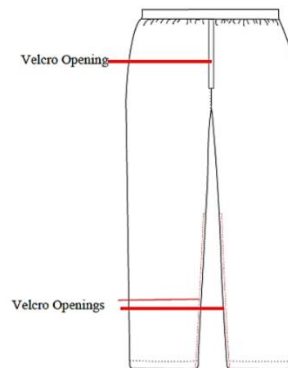


Fig.-6 Side Open Pant

CONCLUSION

Aesthetically appealing and comfortable clothing plays a significant role in all round development of an individual at all stages of life, as it affects physical and mental well-being as well as social and personal development of an individual. The social, psychological and cultural contextualization of clothing adaptations is important for its adoption by all age groups and may be more, in case of senior population. Clothing design for groups with special requirements is gaining importance among garment designers. Designing and developing garments with keeping inclusiveness in all aspects will give elderly a sense of being independent by making the process of dressing, undressing, and toileting easier; aesthetically appealing clothes with enhanced functionality and safety features will also boost their morale and confidence.

In the present study an attempt was made to identify and list the garments commonly worn by the Indian elderly population (men and women). The most commonly worn articles of clothing by men were Pant- shirt and kurta -Pyjama while by women were Kurta - salwar and saree - blouse. This was followed by identifying and listing the specific problem faced by the seniors while wearing a particular garment, along with this, the seniors who were more likely to face a particular problem were also identified. The findings of the study highlighted that dressing/ undressing, distinguishing front from back of the garment/ socks, closing and unclosing of fasteners, poor fitting, welt marks due to tight bands/ cords etc, rough fabric of garment causing skin irritation were some of the main issues faced by elderly.

After extensive review and research, a comprehensive data base was prepared of design features that would be appropriate and should be kept in mind while designing and developing adaptive clothing for elderly population. These were - Strategic clothing openings and their placement, appropriate selection and use of fasteners and Use of proper seams and seam finishes. In addition to this, guidelines for general clothing selection were prepared that would help in making judicious purchases for the elderly. These guidelines broadly covered following aspects – selection of appropriate fabric in terms of fibre, texture, colour and, design; suitable fasteners, appropriate seams, aesthetic appeal and functionality.

After taking the identified features into consideration and keeping the general clothing selection guidelines for seniors' number of designs were also sketched.

While the unique requirements of the elderly might poses a challenge to designers but at the same time it also presents a new market opportunity as adaptive clothing market, which focuses on the inclusive design of clothing and footwear for people with varying degrees of disability, has already grown substantially in recent years (Li, 2023). Studying the needs and problems related to clothing of elderly and exploring more design solutions would help in generating a huge market for adaptive clothing for the aging population in India.

It would be fair to say designers and manufacturers who will meet the challenge of serving clothing needs of seniors will reap the benefits and achieve profit from a receptive and growing market and will have a noteworthy potential of success.

SCOPE FOR FURTHER WORK

- Study can be done on standardization of sizes for Indian elderly (men, women or both)
- A detailed study on market size and willingness of brands to suitably launch apparel for elderly segment can be done

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REINVIGORATION OF PHAD PAINTING ON JUTE BAGS FOR WOMEN

Sumalatha S¹, Anjana V², & Sudhakar R^{3*}

¹ Faculty, ² M.Sc. Student, ³ Asst. Professor

Department of Apparel Technology and Management, Bangalore University,
Bengaluru – 560056, Karnataka, India.

E-mail: sudhakar@bub.ernet.in

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ABSTRACT

The global approach toward fashion products is increasing daily among fashion consumers due to social media influence, which has increased designers' responsibility to bring acceptable design concepts into the market. On the other side, there is the requirement to revive traditional art forms, which are slowly fading away. Phad painting of Rajasthan is a religious narrative of the folk deities painted on cotton cloth with vibrant natural colours by Phad practitioners, historically belonging to the Joshi clan of Bhilwara and carried by priest singers to villages to narrate the story. The present study was conducted to explore and understand the acceptability of contemporary Phad motifs on jute bags designed for women aged 18 to 35. Five bags were designed according to the trend. Five motifs were selected from traditional Phad paintings, contemporized by fusing painting, embroidery and mirror work in creative layouts by retaining vibrant colour combinations as in traditional paintings. A well-thought-out questionnaire survey helped to understand the degree of acceptance of the developed designs. The response seemed optimistic, and all designs were rated well for their design concept, motif selection, design layout, fabric selection and colour combination.

Key words: Embroidery, Sustainable Bags, Living Temple, Traditional Art.

INTRODUCTION

Fashion accessories have become very powerful add-ons to clothing today; no matter how vital clothing is for the occasion; the whole attire goes incomplete without accessories. Apparel and accessories contribute approximately 8 % of the total merchandise retail market of USD 710 billion and are the 2nd largest after food and grocery (Gugnani, 2018). Clothing and accessories are as important as food and grocery and help present oneself effectively irrespective of the occasion. The scope of the fashion accessory industry is evident through its high visibility in various channels of retail formats in metro cities. The sale of accessories has become a significant source of revenue. Adapting to quickly changing trends is essential to the success of marketing accessories (Meadows, 2004).

Sacks, packs, pouches, purses, bags and belts have always been a practical way to carry items of necessity. Bags stand apart for their functional as well as decorative applications (Meadows, 2004). Before 19 century, pockets were sewn into garments in which essentials were carried. After the 19th century, the clothing silhouette narrowed to reveal body shapes to add a glamour element to the wearer. This change demanded women to carry additional add-ons like a bag to carry essentials

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(Tortota, 2005). Today handbags have evolved into a functional piece of accessory with decorative element which suits the occasion. Among the fabrics which are said to be eco-friendly, jute fabric stands out with its properties like dimensional stability, which is essential for a bag to hold its shape without the support of a shape holder and fabric strength, which is directly related to the product's durability. In recent days, serious efforts have been made to find substitute applications of jute in speciality and value-added products (Cai et. al., 2000, Rehaman et al. 2019).

Value addition is of utmost importance in fashion today, and our Indian art forms keep inspiring in every aspect of design, from motifs to the application of colours. Whether embroidery or painting, each traditional art form has always stood up because of its uniqueness. Indian players have gone a step ahead in the global market with a uniquely modern version of traditional motifs on accessories using various types of value-addition techniques such as embroidery, painting and printing.

India has always been identified as the land of cultural diversity because of its traditional arts and crafts. India has one of the world's largest collections of songs, music, dance, theatre, folk traditions, performing arts, rites and rituals, paintings and writings known as the Intangible Cultural Heritage of humanity (Art & Culture, GOI portal). The rich cultural diversity of India resulted in distinct folk art and crafts. Traditional paintings such as Warli, Madhubani, Khalighat, Phad, Kalamkari and Patchitra are popular across India and abroad for their uniqueness, and these ideologies have passed from one generation to another. Among them, the Phad painting is a type of scroll painting that narrates mythological and religious stories, which is 700 years old narrative art form originating from Shahpura, Rajasthan (Shekhawat, 2018). Among the various paintings that got developed between the 15th to 17th centuries under Royal Patronage and practiced in Rajasthan, Phad painting is one among them (Gill, 2018).

The word 'Phad' comes from the Sanskrit word 'patt', which means a flat painting surface. In the Rajasthani (Marwari) language, phad means a fold (Shekhawat, 2018). It is one of India's varied folk-art forms, where mythological and folk story characters along scenes are painted on a long cloth with vibrant colours. This art form stands afar for its uncommon features from other similar art forms in painting forms, where chitarkars paint heroic acts and genealogies of particular Gods. These chitarkars belong to Joshi Family (Shekhawat, 2018). One of the practitioners of this art form named Kalyan Joshi, who is an heir to the family tradition, the son of Shrilal Joshi, who revived the art and grabbed the world's attention towards this art form, has shared his views on Phad painting. This Joshi family belongs to the Chhipa Community (block printer community), believed to be original conceptualizers of the Phad painting, formally addressed as Chhipas. Joshi, also called Jothishi, meaning astrologer, predicts the future, and they were priests in the temple too (Illumine Films, 2010).

This art is considered sacred to date and practiced only by their family members for centuries. Many of these art pieces are still found in 'Dev Narayan Temple', which belongs to the Joshi family and is believed to be 100 years old. This art form is taught only to male offspring, keeping in mind that they practice it with the same passion and pass it to their offspring, while daughters are kept away as they move on to other families when they get married. This way, they have kept this art form secret, and presently only 13 to 15 members of the family are known to practice this art (Illumine Films, 2010).

Process

Phad paintings are made on unprocessed muslin fabric starched with refined wheat flour. Firstly, they mix this refined wheat flour with cold water, boil it for a few minutes and cool it to room temperature. Then they double fold 13 half-hand lengths of cotton fabric, which they usually measure from middle finger straight to elbow (approximately 3.5 to 4 m) and rinse into the prepared refined wheat flour starch. Then the fabric is flat-dried on the floor, and excess starch from the fabric surface is removed by running the wooden tool to and fro (Tripathi, 2017).

Even the family's female members help prepare colours for painting. Handmade natural colours are used for outlining and filling painting. They usually use primary and secondary colours, which are of full intensity. Yellow is obtained from mica mines, red from sangrak, blue from indigo, brown from mud gathered in mines, and black by mixing smoke from chimneys with betel leaves. Glue and poison are obtained from bisabolol (also known as levomenol, natural monocyclic sesquiterpene alcohol which is colourless and chemically considered toxic) to prevent painting from getting eaten away by worms (Illumine Films, 2010).

The first paint stroke is started by a little girl from the same family on an auspicious day, according to the Hindu calendar. Most of the Phad paintings have few standard features, such as the painting layout filled with human figures in flat construction, and the size of each figure depends on the social status of the character as well as the role they are given in the story (Sharma, 2017).

They divide the whole story into four parts according to the sequence of occurrence. Then the process starts with drawing outlines using brown and orange-brown colours, followed by filling the characters with colours like red, blue, yellow and black. They believe that filling the colour into the eyes of the character will bring life into that painting, so they do that at the end. In the story of Dev Narayana, more gods and goddesses' pictures with jewellery, accessories like head turbans, and animals like horses and elephants are seen. In regular religious episodes, females and males face each other with flowers, females lighting lamps for God, and female and male dancing poses are seen (Tripathi, 2017).

This art form is used as a travelling shrine carried from one village to another, which seems as if the temple has travelled to visit places personally. This unique art form is a fusion of performance and visual art, carried by priests of the 'Rabari Tribe', who are called folk singers and are also known as Bhopas and Bhopis. They belong to an itinerant storyteller caste from the northwestern district of Jodhpur and Nagaur, with their roots in a village named Pabusar (Shekhawat, 2018). They consider Joshi family members as gurus who paint the life history of 'Dev Narayana' and pay for the Phad painting.

The Bhopas carry Phad painting in the rolled form to the villages, usually in the winter, where villagers will be in leisurely after reaping the crops. After reaching the village, they select a suitable public place where the crowd can quickly assemble and clean the ground neatly before unfolding the sacred Phad painting. After sunset, the Phad paintings are spread between two poles, and then well-dressed Bhopa will start narrating the story, ending the following day. The Bhopas wear unique red-coloured clothing, which includes turban, shirt, skirt, and anklets similar to the anklets worn for Bharathanatyam (traditional Indian dance) dance and a bag to accommodate lamps and peacock feathers which are used in performance. Usually, Bhopis use oil lamps as the

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focus light to show the character in Phad painting, and Bhopas narrate the story by singing and dancing with musical instruments to add rhythm to it (Shekhawat, 2018).

The painting, though usually done on a long cloth to use as a visual aid to narrate stories, started appearing on a small canvas, framed and sold in domestic and export markets. The family also attempted to give a modern touch to this art and contemporized characters by taking them from one part of the story. Then there were also attempts to print the story's narration, which was not seen in traditional Phad paintings. In such a small frame, a small portion of the story was used as the main painting, and new colours were also introduced. Modern design concepts, such as abstract and collage techniques, were also experimented with. Even achromatic colour schemes such as black and white were used (Illumine Films, 2010, Tripathi, 2017).

Consumers are looking for innovative products in the accessory's category regarding fabrics and designs. At the same time, consumers also want products which are eco-friendly because of the kind of awareness campaigns currently happening all over the world. Though it seems complicated to bring these qualities into every fashion accessory, one may not deny the possibility of such products. Considering all these changes that have taken over in the field of fashion, a line of different types of jute bags were designed by contemporizing part of Phad painting characters with the fusion of painting, embroidery and mirror work to impart newness to the traditional application of art.

OBJECTIVES

- To design eco-friendly jute bags for women with contemporized Phad painting characters as a value addition by amalgamating painting, embroidery and mirror work and assess its acceptance in the market.

METHODOLOGY

An online pre-market survey was conducted among women aged between 18 to 35 years, who regularly purchased bags from various retail outlets and online shopping websites, to draw information about bags which they carry on various occasions. A well-designed questionnaire was used to gather information on what they consider while buying bags, their prime priority while choosing them, frequency of buying, functional and aesthetic qualities they consider, value addition they look for, priorities on fabric types, affordable price etc. Literature was reviewed and similar products were studied in the retail stores and online shopping websites to understand the trend in colours, fabrics, value addition, motifs placements and other related stuffs.

1. Materials

Plain woven jute fabric weighing 330 g/m² with 19 ends/inch and 17 picks/inch was purchased from a local fabric store, located in Bengaluru. White canvas material was used for painting which was later applied on bags as applique with the help of embroidery stitches. 6 ply cotton threads were used for embellishing the motifs and colours were chosen according to designs on jute fabric. 14-size hand needle was used for embroidery in order to accommodate cotton threads, and its slender shape with a pointed tip helped to penetrate threads into fabric flawlessly. Cotton threads are more suitable for loosely woven fabric for embroidery because of their flawless penetration into the surface without any sort of thread cut or abrasion. Acrylic colours were used for painting

the motif because it retains natural texture, versatility and is user-friendly. It doesn't require any kind of finishing treatment. Number 0 to 6 nylon bristles art brushes were used for filling and outlining the motifs. An 8-inch size embroidery hoop was used to hold the fabric in place while embroidering. According to the design requirement differently shaped mirrors were used in the embroidery to match the size of motifs. Tracing paper which has low opacity was used to trace the motifs. A power-operated single needle lock stitch Juki sewing machine of model DDL-8700 with 5500 rpm was used for stitching jute bags and 3ply poly cotton sewing thread was used to sew the jute bags.

2. Method

The literature was reviewed for various fashion accessories developed based on traditional concepts concerning design, fabric and value-addition techniques. A study was conducted using a survey method in 15 reputed accessory stores in Bengaluru City, where the target customers were teenagers (students) to middle-aged women (working women). A well-designed questionnaire helped to understand views on the type of bags bought for various occasions, purchasing pattern, place of purchase, affordable prices, fabric preference, utility and opinion on using traditional motifs as value addition on bags. An observation made on online shopping websites selling designer bags for women helped to understand the requirements for designer bags.

Idea Generation

The theme "Colours of life" was inspired by traditional Phad painting, where they use primary and secondary colours along with some neutral colours. The mood and colour boards were developed accordingly, followed by design development.



Fig. 1 Theme Board

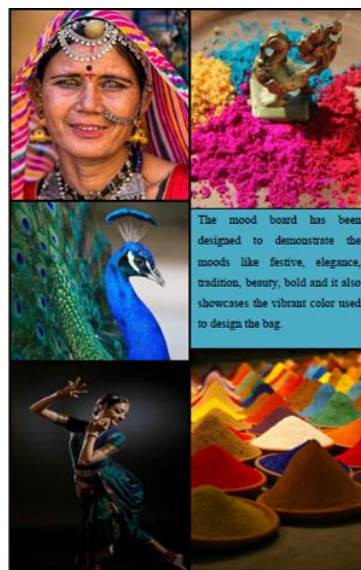


Fig. 2 Mood Board

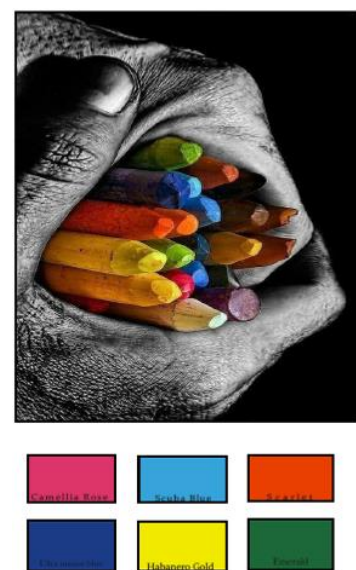


Fig. 3 Colour Board

Contemporization of Motifs and Design Development

In order to connect easily with the present generation, daily life characters were selected instead of mythological characters.

1. **Motif 1** was selected from the Painting made of achromatic colour scheme where two females are seen heading towards temple from which one female carrying oil lamp appeared apt for contemporization.

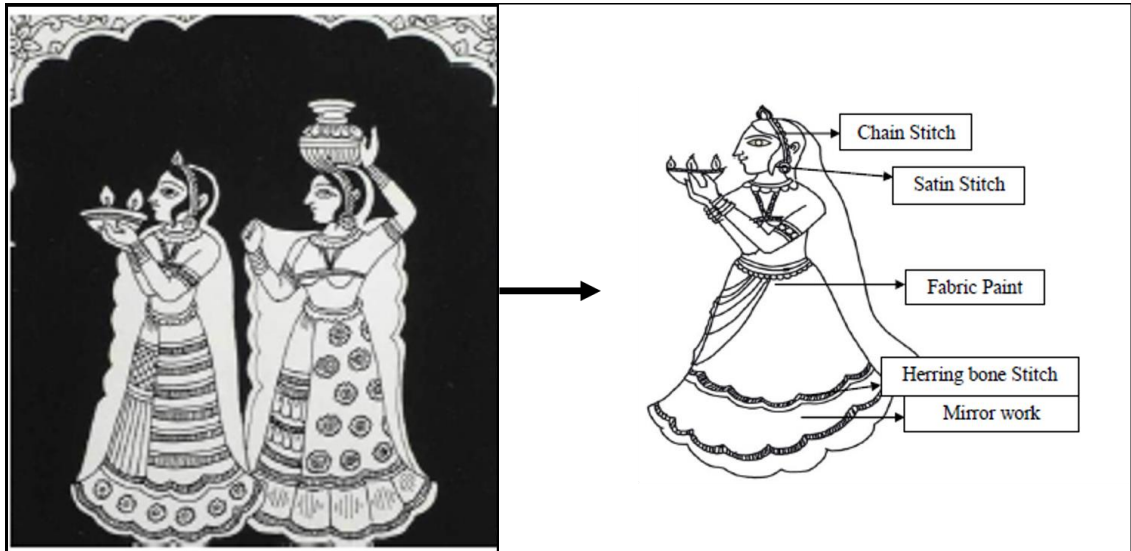


Fig. 4 Contemporized Motif 1

2. **Motif 2** was selected from the sequence of religious story, where man and woman facing each other with a flower in hand which is symbol of love.

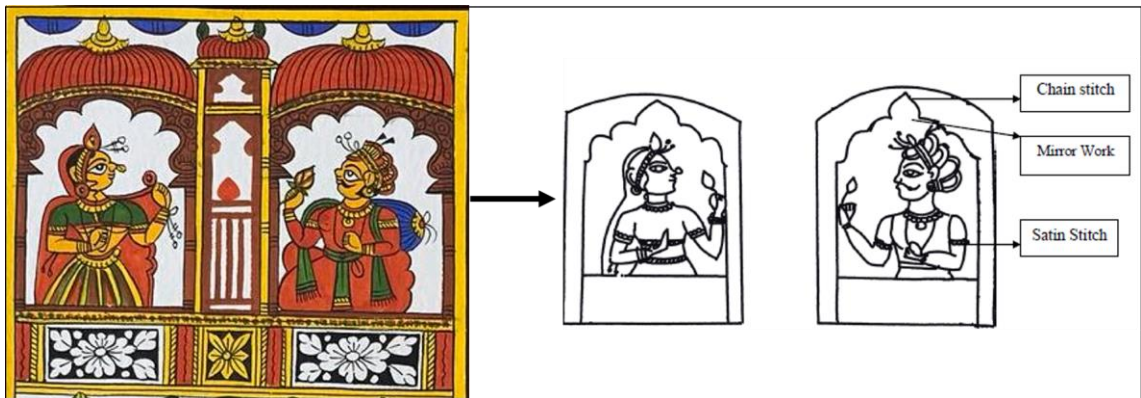


Fig. 5 Contemporized Motif 2

3. **Motif 3** was selected from painting where two females are seen playing music using traditional musical instruments.

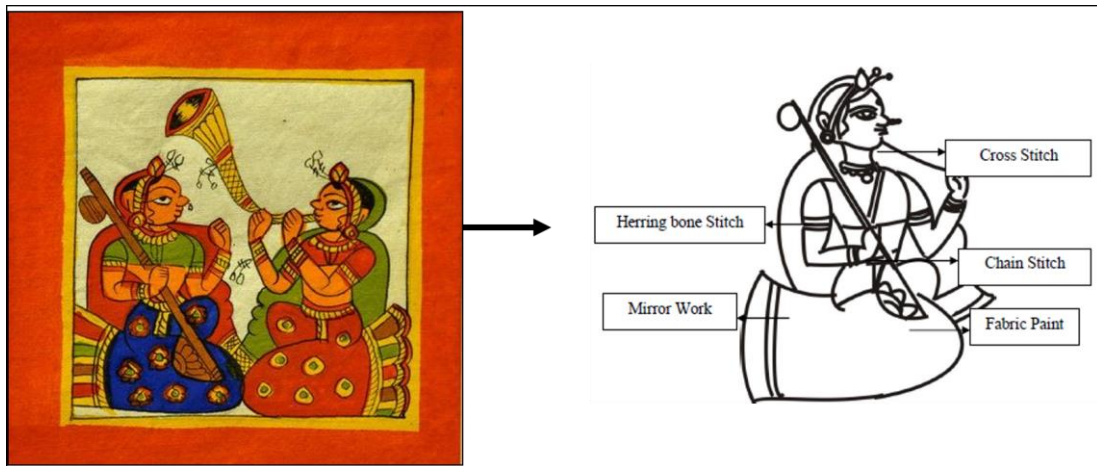


Fig. 6 Contemporized Motif 3

4. **Motif 4** was selected from wedding procession painting where bride and groom are seated on horse.

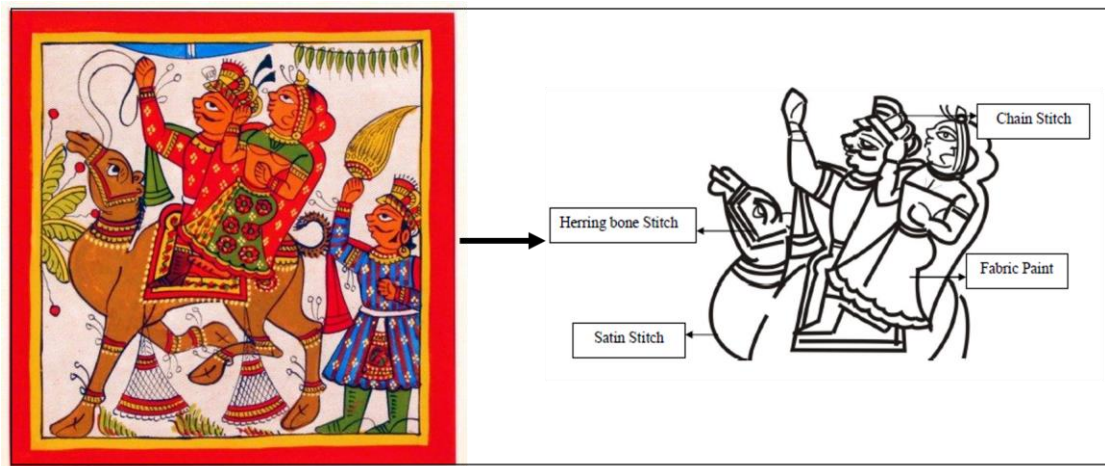


Fig. 7 Contemporized Motif 4

5. **Motif 5** was selected from central sequence of the Phad painting where king is seated on the throne holding flower with content.

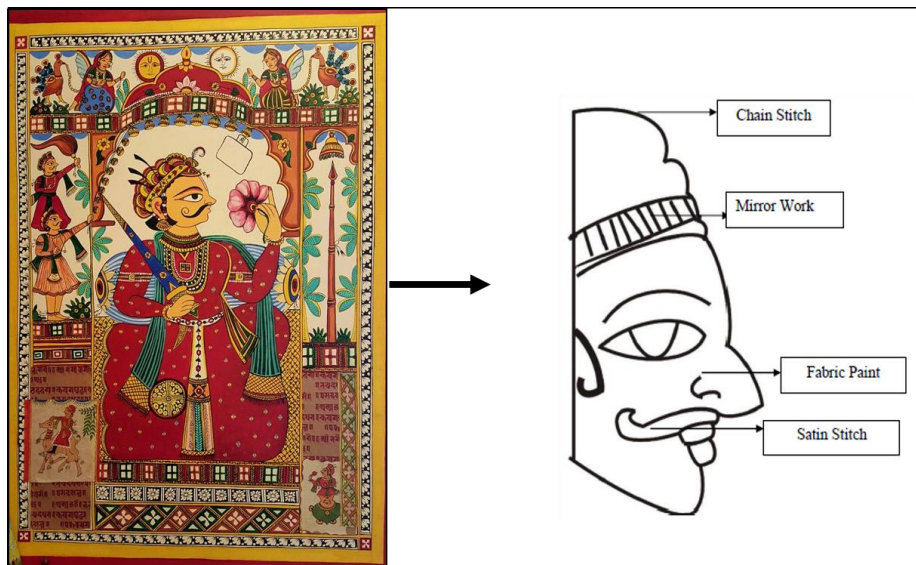


Fig. 8 ContempORIZED Motif 5

Developed designs were traced onto the white cotton canvas material, and then outlines were drawn in a predetermined sequence followed by filling motifs. In order to give a contempORIZED look to the designs, chain stitches were used to outline selected contours, and satin stitches were used to fill the design at selected places on the motif. Small mirrors, termed shisha in the local language, were used to give an ethnic look to the bag.

RESULTS AND DISCUSSION

The developed products were displayed in one of the well-known designer bag stores in Bengaluru. A well-designed questionnaire was used to understand customers' opinions on the product concerning design, fabric selection, value addition, colour combination, motif selection and placement, an occasion to be carried and the price. Among the 156 respondents, all were women, and the age group ranged between 18 to 35 years.



Fig. 10 – Design 1



Fig. 11 – Design 2

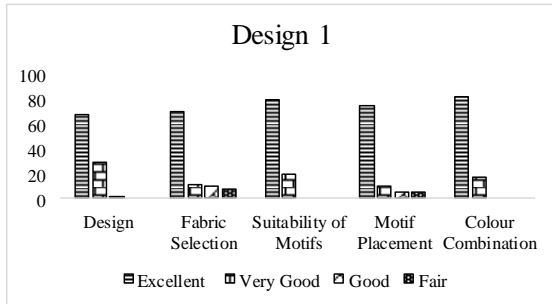


Fig. 12 – Design 3

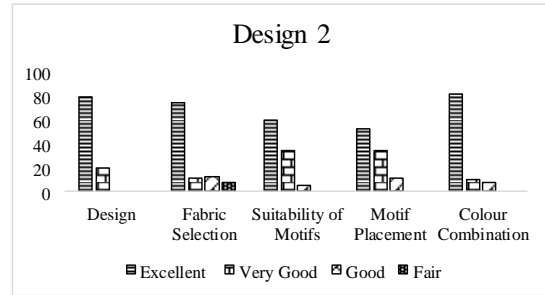


Fig. 13 – Design 4

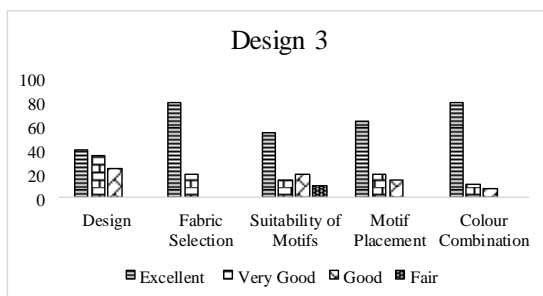




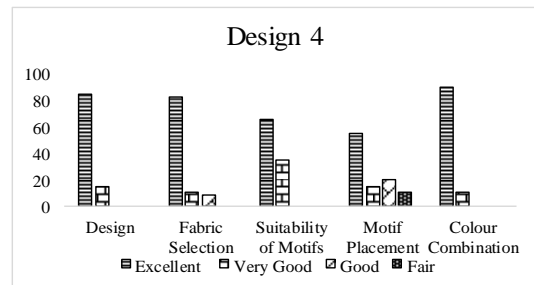
Graph 1 - Design 1



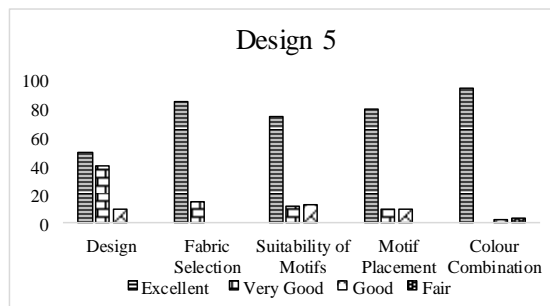
Graph 2 - Design 2



Graph 3 - Design 3



Graph 4 - Design 4



Graph 5 - Design 5

The above graphs show the acceptability of design, fabric selection, suitability of motif, motif placement, and colour combination of all 5 bags. It is also evident that all the products were well appreciated by the respondents.

Graphs 2 and 4 show that the design characteristics were well rated in the case of designs 2 and 4, which was above 80 %, where design 2 is a simple sling bag with a single compartment with a zipper closure for easy accessibility, which is considered a must accessory for women today. Design 4 falls into the same category as the bag but has more compartments than design 2 with an extended flap, which provides more security to the belongings carried inside it. From graphs 1, 2, 3, 4 and 5 it is known that 70 to 85 % of the respondents liked the idea of using jute fabric in the designed collection, which shows that people are willing to accept fabric made of natural fibre for accessories. Fabric suitability is an essential consideration in the case of apparel or bag, so it was imperative to understand customers' opinions on this. Graphs 1 and 5 show that designs 1 and 5

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were appreciated most for the motifs. In design 1, a female holding lamp in the palm symbolically represents worshipping the God in Hindu tradition representing spirituality. In design 5, only the face part was chosen from the whole Phad story from the centre and represented in an abstract design pattern. Motif placement is another creative aspect of design, and one needs to be very careful while combining design elements using guidelines or principles. In the case of design 1 a lady offering lamp to the God motif is repeated $\frac{1}{4}$ drop diagonally, which seems unique and gives a feeling of rhythm in eye movement. In design 5, face of the king is represented with his facial expression without compromising on his squiredom. These designs were appreciated for the placement of the motifs as well. Colour is a visual element and a critical consideration in designing anything. It is evident from the above study that colour combinations used for all the products were well appreciated because the colours used were primary and secondary colours, which are very familiar in all cultures. These bright colours give a rich look to neutral background on fabrics like jute.

CONCLUSION

Phad painting is one of the popular art forms of folk painting from Rajasthan known for its distinctive style of visually narrating courageous acts and genealogies of Indian God and Goddess performed by singing and dancing. Other than conventional forms, it is necessary to present such art forms in contemporary versions to make their way faster into the universal stores. Though there is a western influence on the lifestyle of every Indian, there is always an unconditional fondness noticed towards our traditional art forms, practices, artistry and morals. Among many alternative eco-friendly materials, jute is promising because it is comparably inexpensive and available across tropical countries. Hence, the jute bags designed with contemporized Phad painting motifs for women will serve as a means of expressing traditional art forms in the modern context, which is an imperative requirement of current young consumers. Such pursuit helps in retaining and revival of Indian traditional art forms. There is an exigency of such innovations in changing socio-economic conditions to broaden the scope of these art forms on a global platform.

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An Assessment of Prevalence of Motivation for Education among Girls Enrolled in Schools in Akbarpur District

Dr Neetu Singh

Assistant Professor

Nitishwar Mahavidyalaya,

Babasaheb Bhimrao Ambedkar Bihar University

Muzaffarpur

HASI Membership Number- HASI-2022-BH-1066-LF

Present research” An **Assessment of prevalence of motivation for education among girls enrolled in school in Akbarpur district**” was conducted to assess the motivation among school going girls. The study's sample included 200 girls from low socioeconomic level between the ages of 5-8 in primary school and 9-12 in middle school (100 from primary school and 100 from middle school). Km Roma Pal's multidimensional motivation test scale was used to evaluate student motivation. Contributions from those who participated were solicited via the questionnaire. The survey had 100 questions, and answers were scored on a 5-point scale, with 1 being the strongest disagreement and 5 being the strongest agreement. This study demonstrated how driven students were to continue their education. According to the findings, middle school pupils scored less highly on motivation than their elementary school counterparts.

Key words- Assessment, Motivation, Education, Students, Primary and Middle School

INTRODUCTION

In order to engage in academic activities, students must be motivated. How someone chooses how they allocate their leisure time, how much work they put in, how they are feeling and thinking about the activity, and how long they stick with it are all influenced by their motivation. One of among the most intricate components of human thought and behaviour is motivation. The quantity of effort and time that students invest in their schoolwork, their perseverance in completing tasks, and their ability to overcome obstacles during the learning process are all examples of motivational indicators (Bakar, 2014).

Luthans (2012) claims that motivation is an approach that begins with a physical or psychological desire and then ignites an action or desire that is focused on a positive outcome or goal. It is for this reason that motivation is commonly describe as "the reasons for fundamental behaviour". Inspiring kids to study in school and do well on tests is one of the major problems in education. These days, educators are really worried about this problem. Student motivation is a crucial aspect of high-quality education.

As reported by Hadre et al. Motivation is one of the key elements that determine a student's academic success or failure. One of a teacher's teaching-learning techniques should be to encourage pupils to participate in academic activities if they want the learning environment to produce high-quality results. The student must have a motivation to make an attempt in any challenges. A motive is a reason why someone wants to do something (Makokha & Ongwae, 1997). That motive drives one to act in a particular manner. The motive will include elements such as objectives, attitudes, and interests. Seifert and Sutton (2009) classified these reasons and their sources into the following categories: I. reasons for changing behavior; II. reasons for setting

objectives; III. reasons for pursuing interests; IV. reasons for success; V. reasons for believing in one's own ability to succeed; VI. reasons for using one's right to self-determination.



(www.google.com)

Motivation is essential for pupils to achieve academically in educational institution. Since motivation has been associated with the amount of intellectual energy that is often applied to learning tasks, it was assumed that motivation may be treated as a constant attribute of the learner, on par with personality. A person's motivation determines whether they want to study, act, grasp, believe in, or acquire particular knowledge, skills, attitudes, or values. As they strive to achieve their academic objectives, students are inspired by a range of objectives. Numerous factors can influence motivation. These factors include the social circle, desires, requirements, and enjoyment of the student as well as the instructor's teaching style and the classroom environment. In order for kids to think critically, concentrate, and learn well, they need to be motivated. In order to boost students' motivation, the teacher needs to take a few factors into account. Establishing a clear purpose, proving the course's relevance, piquing and keeping learners' interest in the session, and raising likelihood of success are a few of these.

According to Seifert and Sutton (2009), students' motivations are influenced by the goals they set for themselves, regardless of whether those goals are focused on competency, accomplishment, rejection, evasion, or interpersonal or mutual relations. Additionally things are influenced both by the respondent's unique passion and the context in which they are being studied. They are influenced by the terms that students use to describe success and failure, such as whether they attribute failure to talent, effort, a challenging assignment, or luck.

Palmer (2007) listed a few characteristics of motivated students, including paying attention, starting tasks right away, asking questions and offering their knowledge, and appearing cheerful, ready, and passionate to learn. This demonstrates how motivational techniques can improve students' learning both inside and outside of the classroom.

Young people that have inspiration are passionate, active, and innovative; they recognize the importance of all that they've been discovering and are committed to achieving their objectives. The causes that support a person's willingness and volition to act are referred to as motivation. While intrinsic motivation is motivated by one's own joy, interest, or pleasure, extrinsic motivation is governed by reinforcement contingencies. Students who are significantly more driven to learn perform better in class and on assessments, persevere longer, and exert higher-quality effort. He'll

be inspired to realize his own goals. A motivated individual would be content with his position. Motivating someone will help them grow as a person.

To inspire children, it is critical to identify the root of their lack of motivation. A person should identify the need that is making them feel demoralized, in accordance with Maslow's theory of the hierarchy of needs. Issues at home, at school, with one's health, having low self-esteem, having a learning disability, etc. are a few examples of these prerequisites. Once the problem has been recognized, educators can take the required actions to inspire kids. Like students, teachers must regularly assess their methods of instruction and make any required modifications.

The Attention, Relevance, Confidence, and Satisfaction (ARCS) theory of motivation, developed by John Keller in 1983, suggests that teachers can drive pupils through a variety of techniques and strategies. For instance, a student has to feel confident that they can master the material, that it is being addressed, and that it is relevant. One shouldn't be afraid to set high expectations for their students, as the expectancy theory has shown. Teachers must frequently reassure their students that they are trusted, and they must make an effort to provide them challenging but manageable tasks. Additionally, they require resources.

JUSTIFICATION FOR THE STUDY

The general growth of a person's personality and thinking depend greatly on their level of motivation. Along with that, it makes a person active and competitive. The efficiency and motivation to accomplish the goal both increase as a result. Stability and progress at work follow from it. In the educational setting, motivation aids kids and teenagers in concentrating on a major objective or result. As a result, individuals are less easily distracted by outside stimuli and can focus for longer periods of time. The behaviors of motivated students are goal-oriented.

OBJECTIVES

- 1) To investigate the degree of educational motivation among students attending government primary schools
- 2) To determine the degree of educational motivation among students attending middle government schools.
- 3) To compare the degree of educational motivation among students attending primary and middle government schools.

METHODOLOGY

The purpose of the present research was to evaluate the motivation of female students in primary school and middle school at Prathamik Uchha Vidyalaya, Bardha Bhiura, and Uchatar Madhyamik Vidyalaya, Gohana in the Ambedkar Nagar District of Uttar Pradesh. For the purpose of later interpretation, systematic procedures were followed for the selection of the sample, tool testing, data collecting, and statistical analysis of the data. Under the following subheadings, the methodology for the current study has been described.

Research design

The research investigation was carried out using a descriptive research approach.

Locale of the research

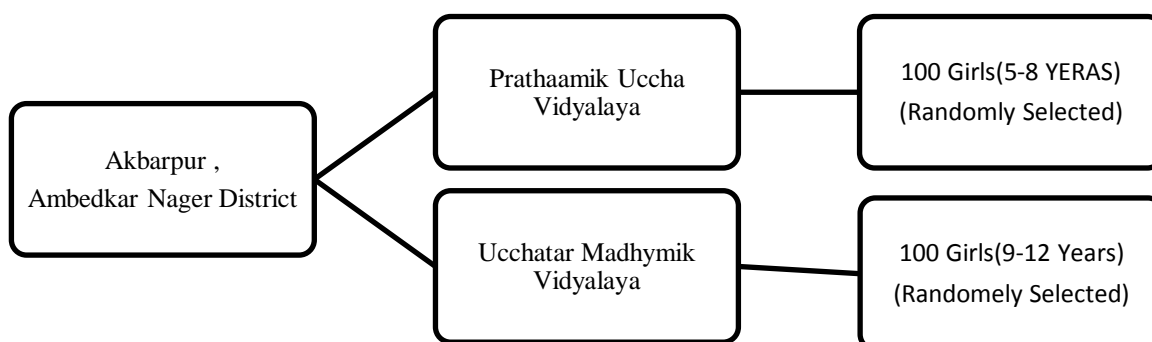
The research study was carried out in Akabarpur Ambedkar Nagar area of Uttar Pradesh at the Prathamik Uccha Vidyalaya, also known as the Ucchatar Madhymik Vidyalaya.

Details of Preliminary Survey

S.No	Description	Total
1	Preliminary Survey Proforma Distributed	400
2	Preliminary Survey Proforma Received	332
3	Eligible Samples	200

Selection of the sample

The study's sample included 200 girls (100 from primary school and 100 from middle school), aged between 5-8 years for primary school and 9–12 years for middle school, who were from low-medium socioeconomic backgrounds. The date of birth of each student was obtained from school records, and a list of them was created. 200 girls were chosen at random from this sample of these listings.



Tools for data collection

The following tools/tests were used for collecting the information from the respondents.

Multidimensional motivation test scales

The motivation of students was evaluated using Km Romapal's multidimensional motivation test scale, which included the following dimensions: interest, relevance, expectancy, persistence, intensity, and satisfaction.

Students in primary and middle schools were asked to fill out the questionnaire. Students and professors were both given an explanation of the study's purpose.

Administration – There is no predetermined time limit. However, it took only 30 minutes to complete.

Scoring- Each item received a minimum score of 1 and a maximum score of 5 on a five point rating scale

Interpretation of scale

Score	Interpretation
5 score	Strongly approve
4 score	approve
3 score	Neither approve Or Disapprove
2 score	Disapprove
1 score	Strongly Disapprove

Interpretation of scores

Raw scores	interpretation
53-123	Low
124-194	moderate
195-265	High

COLLECTION OF DATA

The researcher contacted the chosen respondents at Prathamik Uchha Vidyalaya and Uchatar Madhyamik Vidyalaya in Akbarpur, Ambedkar Nagar District, Uttar Pradesh. Both the respondents and the teachers were made aware of the study's objective. They were asked to respond truthfully and given the assurance that their identities would be kept private and that the data they supplied would only be utilized for their studies.

Statistical analysis of data

To draw conclusions that were meaningful and pertinent, the acquired data were categorized and collated in accordance with the objectives. These statistical tools were used to examine the data.

Frequency and Percentage

To determine how respondents were distributed among primary and middle school pupils based on their level of motivation, frequency and percentages were calculated.

Percentage

Simple comparisons were conducted using the percentage in a given cell's frequency multiplied by 100 and divided by the total respondents in the group to which they belong.

$$P = \frac{n}{N} \times 100$$

Where

n= frequency a particular cell.

N= total number of respondent in that particular category.

P= percentage.

RESULTS AND DISCUSSION

A motivating classroom setting helps make it lively. It is made more engaging by a stimulating teaching environment. As a result, individuals pay more attention and express a desire to repeat an activity. It increases students' enthusiasm in learning a certain subject. Additionally, motivation increases a student's energy level, which encourages them to put up more effort. Educational

psychologists assert that motivation improves learning results for students by lengthening their attention spans and memory capacity. Such driven students not only produce a stimulating learning environment for themselves, but their enthusiasm also contributes to the growth of a positive attitude towards teachers, who are likewise inspired to give their all to teaching. Because enthusiastic teachers have a positive effect on learning, it also benefits the students. This leads us to the belief that individual could be influenced by their enthusiasm for a topic, past academic achievement in a particular curriculum, an ambition to impress their family member or professors, or just their personal will to succeed. Learners should be pleased with what they have learned and achieved in order to continue to be highly motivated. In addition to outside recognition schemes or accolades, a sense of fairness, a sense of success, value, or inherent pleasure of education can all help people feel satisfied.

In Akbarpur, Ambedkar Nager District, Uttar Pradesh, the motivation levels of school-going girls were examined in the current study. According to the methodology chapter, information was gathered for this purpose from Prathamik Uccha Vidyalaya and Ucchatar Madhyamik Vidyalaya of Akbarpur in Ambedkar Nagar. The statistically analyzed data was then used to interpret the findings, which were then presented and discussed under the following headings:

Section A

Background Details

- 1) Percentage distribution of respondents according to their personal information
- 2) Percentage distribution of respondents on the basis of composition of family

Section B

Assessment of Level of Motivation for Education

1. Percentage distribution of primary school respondent according to prevalence of motivation for their education.
2. Percentage distribution of middle school respondent according to prevalence of motivation for their education.
3. Comparison among primary school students and middle school students according to prevalence of motivation for their education.
4. Overall percentage distribution of girls according to their level of motivation.

Section A': Background Details of the Sample

This section provides a thorough overview of the background data that was selected to represent the sample in the current study. 200 females in all, 100 from elementary school and 100 from secondary school, made up the total sample selected for the current study. Information on 200 students was categorized based on factors including family size, number of family members, parental occupation, income, etc.

The socio-personal characteristics of the chosen respondents are covered in this section. The information in Table 1 illustrates the distribution of respondents in relation to particular background characteristics.

Age of respondents

Table 1 reflects that data from primary school, 54 per cent and 25 per cent were falling in the age range of 6-7 years and 5-6 years respectively, whereas 21 per cent respondents were falling in the age range of 7-8 years. Similarly, in middle school 40 per cent respondents and 39 per cent respondents were falling in the age range of 10-11 years and 9-10 years respectively, whereas only 19 per cent respondents were falling in the age range of 11-12 years.

Family structure of the respondents

Table 1 depicts that 74 per cent respondents and 26 percent respondents from primary school were coming from joint and nuclear families respectively whereas in middle school majority of the respondents i.e. 62 per cent were coming from joint families and 38 per cent were coming from nuclear families.

Family occupation

After the close perusal of the data regarding monthly income of families of primary school respondents, it was noticed that major occupation of families were involved in farming i.e. 61 per cent, whereas 35 per cent were having private jobs and only 4 per cent families were having government jobs, similarly in data of middle school, it was also observed that 58 per cent families were doing farming and 36 percent and 6 per cent were having private and government jobs respectively.

Family income (per year)

Data regarding family income, it was observed that for primary school respondents, 49 per cent respondents had family income less than 3 lakhs per year whereas 39 per cent and 12 per cent families had family income between 3-5 lakhs and more than 5 lakhs respectively. Similarly data for the middle school respondents reveals that more than half of the families i.e. 51 per cent were having family income less than 3 lakhs per year whereas 40 per cent and 9 per cent families had family income between 3-5 lakhs and more than 5 lakhs respectively.

Table 1: Percentage distribution of respondents according to their personal information

Age of the respondents			
Primary school (%)		Middle school (%)	
5-6 years	25%	9-10 years	39%
6-7 years	54%	10-11 years	40%
7-8 years	21%	11-12 years	19%
Family structure of the respondents			
Primary school		Middle school	
Joint family	74 %	Joint family	62%
Nuclear family	26%	Nuclear family	38%
Family occupation of the respondents			
Primary school		Middle school	
farming	61%	farming	58%
Government jobs	35%	Government jobs	36%
Private jobs	04%	Private jobs	06%
Total family income of the respondents			
Primary school		Middle school respondents	
Less than 5 lakhs	49%	Less than 5 lakhs	51%

5-10 lakhs	39%	5-10 lakhs	40%
More than 10 lakhs	12%	More than 10 lakhs	09%

Section B

Assessment of Level of Motivation for Education

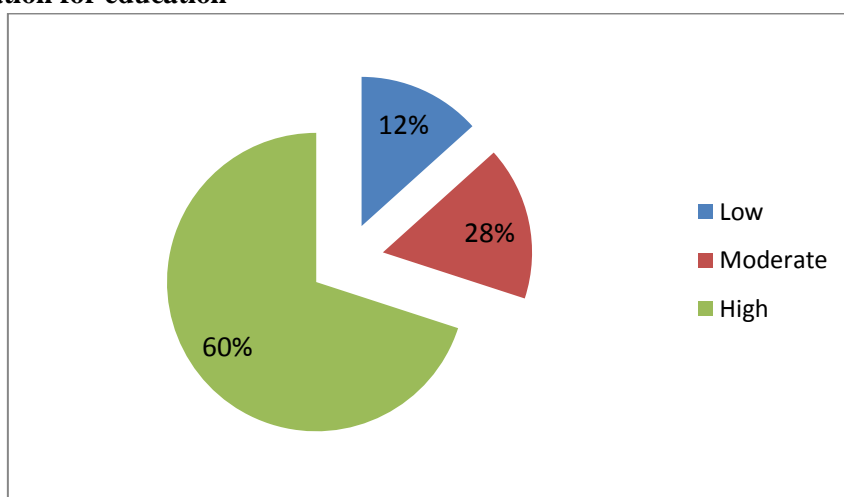
1) Assessment of students (Primary School going) according to their motivation for education

According to Table 2 findings, the majority (60%) of girls in primary school were highly motivated to learn. According to the results, just 12% of females had poor motivation for their education, compared to 28% of girls who had moderate drive.

Table.2 Percentage distribution of primary school students respondents according to their motivation for education

Percentage Distribution of primary school students according to their motivation for education (n= 100)		
Categories	Frequency (f)	Per cent (%)
Low	12	12 %
Moderate	28	28%
High	60	60%

Fig.2.1 Percentage distribution of primary school going students respondents according to their motivation for education



Motivation is one of the requirements for managerial performance, according to Analoui (1999-2007). He used an illustration to further clarify that "motivation is the internal drive necessary to steer people's activities and behaviors towards attainment of same goals." The Latin verb "movere," which means "to move," is the basis of the term motivation, much as Luthans (1995) described the phrase. He argues that appreciating the motivating process requires an awareness of what needs are, what they mean, and how they connect to one another. According to

him, the process of motivation starts with a psychological or psychological desire, deficit, or desire that prompts behavior or a drive towards a goal or rewards.

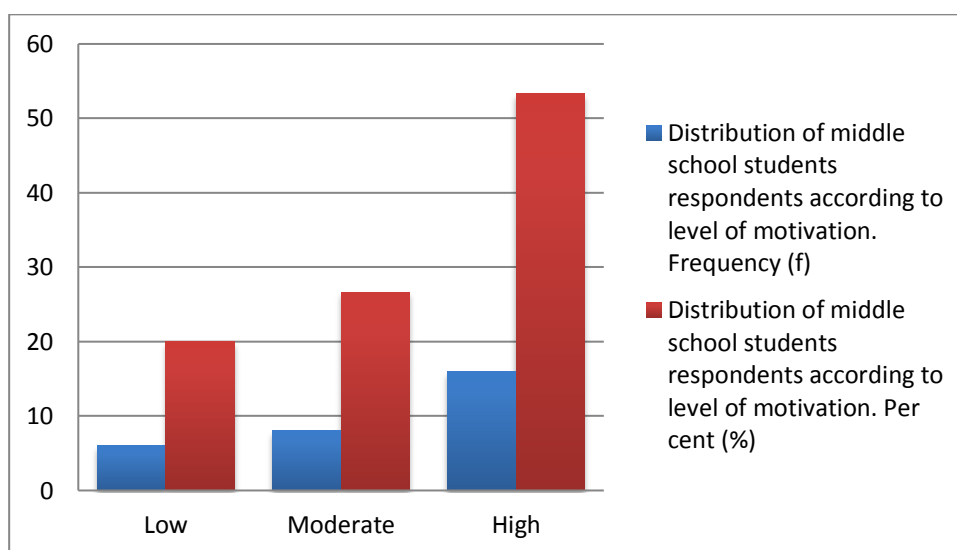
2. Percentage distribution of middle school going respondents according to their motivation for education

According to information from Table 3, 53% of girls who studied in the middle class were very motivated to further their education. Additionally, it was shown that whereas 18% of girls had little enthusiasm for their studies, 29% of girls showed moderate drive.

Table 3- Percentage distribution of respondents according to their motivation for education (n=100)

Percentage Distribution of middle school students according to their motivation for education		
Categories	Frequency (f)	Per cent (%)
Low	18	18
Moderate	29	29
High	53	53

Fig.2.2. Middle school students are distributed in percentages based on their desire to learn.



Based on Aminabhavi's 2007 study, mom employment significantly improves adolescent children's emotional maturity and drive for success. Additionally, it was noted that the daughters of mothers with jobs have a strong concentration on achievement and that they have significant emotional maturity.

3) Comparison between primary school and middle school going student for their motivation to education

Table 4 data reveals that 29% of middle school girls and 28% of elementary school girls who were enrolled in classes exhibited moderate motivation for their studies. Additionally, data shows that whereas 53% of middle school girls felt great motivation for their studies, 60% of elementary

school students did not. Only 12% of elementary school students and 18% of middle school girls were found in the Table to have low motivation for their academic work.

Table 4 - Comparison between primary school and middle school students for their level of motivation for education

Categories	Primary school students(n= 100)	Middle school students(n=100)
Low	12 %	18 %
Moderate	28 %	29 %
High	60 %	53%

The research backs up Chaturvedi's (2009) assertion that the school environment has a major impact on young adolescents' academic achievement and motivation. Following the conventional wisdom, Gauge and Berliner (1992) compare drive to the motor and the wheel of a vehicle because they feel that inspiration and drive creates the behavioral limits in every person. Regular quizzes help pupils develop more aspiration, which contributes to their expression of greater success.

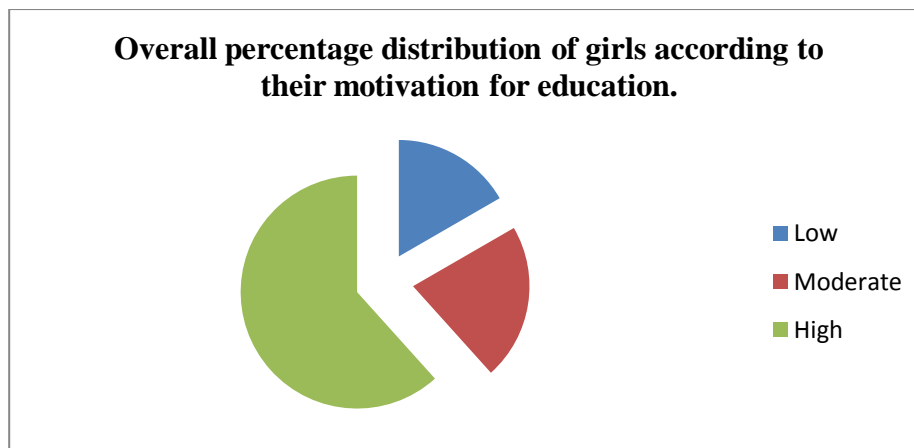
4) Overall interest in education among girls

Table 5 demonstrates that 56.5% of females had a high level of motivation for their academics. Additionally, just 15% of students reported having low motivation for their academics, compared to 28.50% of students who reported moderate motivation.

Table 5. Overall percentage distribution of students according to their motivation for education. (n=200)

Overall percentage distribution of girls according to level of motivation.		
Categories	Frequency(f)	Percentage (%)
Low	30	15%
Moderate	57	28.5%
High	113	56.5%

Fig-Overall percentage distribution of girls according to their motivation for education



Learning inspired youth, and learning motivates youth to focus more intently on a primary goal or outcome. Due to their increased resistance to possible distractions, they can concentrate for longer periods of time. Focused on objective behaviors are displayed by enthusiastic individuals. It is possible for an experienced teacher to pique students' interest in a topic or body of work, but motivating students to become better students and work to the best of their ability can be challenging, especially as motivation is typically an unintentionally behaviors. Students who aren't motivated typically get disengaged or demoralized, which can lead to harmful behaviors.

CONCLUSION

Children are driven to persevere despite challenges or problems. They are given the vigor they require to realize their greatest potential. Young people that are motivated are dedicated, engaged, and creative; they understand the significance of what they have been learning and are dedicated to reaching their goals.

We must guarantee effective universal provision in order to encourage student motivation. A child's learning environment and the top-notch training they have access to are both aspects of universal provision.

Every school needs a strict rule behavior that promotes wellbeing and motivation. This will ensure that youngsters are mentally prepared to learn. The importance of social skills in the classroom should be emphasized because strong peer relationships can affect students' motivation. All of the pupils will benefit from this by learning to love, care, understand, and encourage one another. Children can better comprehend what is demanded of them when they enter courses or contribute to class discussions if school procedures are uniform. These practices lessen unpredictability, which is a significant source of anxiety.

Desire is what propels learning. Even the simplest chores without it could be difficult or impossible to do. Therefore, it is critical to comprehend how to adjust and foster desire in educational contexts. In schooling, intrinsic as well as extrinsic drives had an appropriate place and can coexist peacefully. Implementing tactics to extrinsically motivate students may be necessary before creating an environment of achievement and accomplishment. Once a learning environment was

created, schools can eventually begin to replace intrinsic drives with external influences to encourage pupils to learn

For future researches

1. A comparative study can be undertaken between high, middle and low income group.
2. Comparative research may be done in other diverse places, such as rural areas, small towns, and urban areas.
3. Girls' and boys' levels of motivation for pursuing higher education may also be the subject of a comparative study.

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INFLUENCER MARKETING AND THE YOUNG ADULTS: A STUDY IN DELHI-NCR

Prachi Batra¹ and Professor Sarita Anand²

¹Research Scholar,² Supervisor

Department of Development Communication and Extension,

Lady Irwin College, Sikandra Road, New Delhi 110001

Email id: prachibatra26@gmail.com

sarita.anand@lic.du.ac.in

HSAI Lifetime Membership Number SARITA ANAND: 97/A-4/ LF

HSAI Membership Number PRACHI BATRA: HSAI-2023-DL-265-TM

ABSTRACT

The study titled 'Influencer Marketing and the Young Adults: A Study in Delhi-NCR' aimed to learn about the impact of influencer marketing on young adults. It attempted to understand their motivations for following an influencer. It examined their buying behaviour and whether it changed due to following specific influencers. The study also aimed to know young adults' opinions on influencers' role in enhancing brands' popularity. Another aspect of the study was understanding influencers' perspectives and how brands collaborate with influencers. Six influencers from five different niche segments were interviewed. The research was conducted through a questionnaire to understand young adults' behaviour toward influencers and an interview to understand the influencers' perspectives. The research used a descriptive research design. The study was conducted online with young people residing in Delhi-NCR. The sample for the study was 134 young people, 70 females, and 64 males, in the age bracket of 18-25 years. The study's findings indicate that young adults are influenced by influencers and reveal their motivations to make purchase decisions based on their recommendations.

Keywords: Social media, Instagram, Influencer, Influencer Marketing, Brand Collaboration.

INTRODUCTION

According to the global digital report 2021, there are 4.20 billion social media users worldwide (Kemp,2021). The increasing popularity of social media has prompted marketers to consider it alongside traditional marketing functions. The influencer market has grown by \$8 billion between 2016 and 2020, it reached \$13.8 billion in 2021 and with steady growth, reached \$16.4 billion in 2022.

Influencer marketing allows brands to reach a wider audience while helping small businesses expand their visibility. This was indicated in a survey in 2019 done by Mediakix ("Influencer marketing survey results: 2019 industry benchmarks," 2019); around half the brands believe that influencer marketing has a better return on investment than other marketing strategies.

Brands gaining Popularity because of Influencers

Brands leverage influencers to increase awareness, build trust, and ensure reliability, providing measurable results without appearing like traditional advertising (Delgado Ballester & Luis Munuera Alemán, 2001; Platon, 2015). Social media has become a critical marketing channel for brands, with influencers' authenticity and trustworthiness making them attractive partners (Hanna, Rohm, Crittenden, 2011). Social influencers earn recognition by drawing attention to what they share on social media and developing a genuine brand (Khamis et al., 2017).

Influencers and Young People

Among the various social media, Instagram is one of the more popular platforms for young adults. As young adults spend more time on social media, it is vital to understand why they do so and what they gain from it.

Working with influencers helps brands move more fluidly across the funnel, where marketing has typically concentrated on driving customers through the funnel to make a purchase.

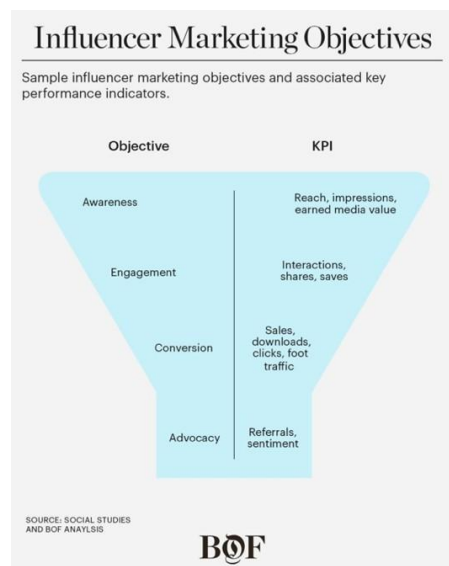


Figure 1: Influencer Marketing Objectives Funnel

Source:

<https://www.instagram.com/p/CbXRrB3smt/>

Human Behaviour and Influence

Bandura's Social Cognitive theory proposes that people can learn and be motivated by observing others. Influencers model behaviors, offer support, and inspire confidence, among followers leading them to believe they can do the same. Social behavior is learned through observation and imitation, and followers are more likely to imitate influencers' actions on social media. The followers also try endorsed products and services to gain social acceptance.

Consumer Attitude and Purchase Behaviour Based on Products Endorsed by Influencers

Social media influencers influence their followers' attitudes, decisions, and behaviors by sharing updates from their daily life. McKinsey & Company's studies in India have shown that influencers can impact consumer behavior, with 80% of consumers considering a new company based on an influencer's suggestion. Through their involvement and visual and spoken material in social media posts, influencers can induce positive attitudes toward products, leading to increased purchase intention and brand awareness (Riedl and von Luckwald, 2019).

OBJECTIVES

1. To examine the motivations of young people for following social influencers.
2. To know the opinions of young people about the role of influencers in enhancing the popularity of brands.
3. To gain insight into the consumer behaviour of young people with respect to products or services endorsed by social media influencers
4. To understand the perspective of influencers and gain insights from them about influencer marketing.

METHODS

The research utilized a descriptive research design. The study was conducted with young people aged 18-25 residing in Delhi-NCR, India. The sample consisted of 134 individuals, with 70 females and 64 males. The researchers used the snowball sampling technique to approach the respondents and their opinions were sought through a questionnaire. Based on the respondents' views, five niche segments followed by them were identified. A few influencers from these segments namely, Lifestyle, Food, Entertainment, Soft Skills Trainer and a Life coach were approached and an interview was scheduled with the ones who agreed to share their insights.

FINDINGS AND DISCUSSIONS

1. Reasons and motivations as cited by the young adults for following social influencers

Table 1: Reasons of young adults for following influencers

Parameters	Female n=70	Percentage	Male n=64	Percentage	Total n=134	Percentage
Follow New trends	49	70.00	31	48.44	80	59.70
Connect with the Influencer	30	42.86	27	42.19	57	42.54
Many existing young followers	7	10.00	6	9.38	13	9.70
Content and its relevance	0	0	6	9.38	6	4.48

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(Knowledgeable, Funny and relatable)						
Learn new stuff, give information	1	1.43	3	4.69	4	2.99
Interest and gaining new experiences	1	1.43	1	1.56	2	1.49
	88	125.71	74	115.63	162	120.90

The respondents could give multiple responses for the options given in the questionnaire.

Table 1 highlights the reasons why young people follow specific kinds of influencers. The research findings show that 59 % of young adults follow influencers who follow new trends, while 42 % follow selected influencers because of their content. It can be inferred that young adults seek freedom, control, and connection in their lives, and social media provides an outlet for these. Influencers play a significant role in shaping the preferences and behaviours of young adults. This presents opportunities and challenges for influencers to engage with this demographic by offering authentic and relevant content while keeping up with the fast-paced digital landscape.

Table 2: Motivations to follow an influencer

Parameters	Female n=70	Percentage	Male n=60	Percentage	Total n=134	Percentage
Information Sharing and Seeking	42	60	36	56.25	78	58.21
Relaxing Entertainment	41	58.57	36	56.25	77	57.46
Cool and New Trends	30	42.86	17	26.56	47	35.07
Boredom/ Time Pass	28	40	28	43.75	56	41.79
	141	201.43	117	182.81	258	192.54

Both reasons and motivations provide insights into the act of following influencers. The reasons indicate the rationale young people have and how they consciously decide whom to follow. While, the motivations of young adults to follow are rooted in personal desires, needs, and aspirations.

More than half of the respondents (58 %) followed influencers for the information they shared, while 57 % followed them because they found their content relaxing and entertaining as per Table 2. Additionally, social influencers provide a sense of companionship and social engagement for young adults, with 35 % of them following influencers to blend in with their friends.

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Overcoming boredom is another reason why young adults follow influencers, with 42 % of respondents doing so. These findings align with the findings of Croes & Bartels (2021), who reported that young adults follow social media influencers for various reasons, including knowledge sharing, emerging trends, entertainment, camaraderie, aimless scrolling, and seeking information. These findings have implications for social media marketing strategies targeting young adults, emphasizing the importance of providing valuable content that is entertaining, informative, and relatable.

Table 3: Type of influencers followed

Parameters	Female n=70	Percentage	Male n= 64	Percentage	Total n=134	Percentage
Fashion/ Beauty	49	70.00	20	31.25	69	51.49
Travel/ Lifestyle	40	57.14	41	64.06	81	60.45
Bloggers/ Vloggers	33	47.14	30	46.88	63	47.01
Others (Comedians, Coders, Educational, Financial, Fitness, Dancers, Business, Entrepreneurs, Influencers who give reviews)	6	8.57	7	10.94	13	9.7
	128	182.8 6	98	153.1 3	22 6	168.6 6

Based on the responses, it can be noted that most respondents follow influencers because they share a common interest with the influencer. Young adults also gain inspiration from influencers they follow.

2. Opinions of young people about the role of influencers in enhancing popularity of brands.

According to Elli and Berberidis (2017), customers are strongly influenced by engaging with influencers, resulting in altered buying behavior and increased purchases. From the responses, it was understood that followers are convinced by the credibility (43 %) and authenticity (40 %) of influencers when endorsing a product. Females (47 %) tend to prioritize authenticity, while males (46 %) prioritize credibility. These findings highlight the importance of influencer marketing strategies that prioritize building genuine connections, trust, and reliability between influencers and their followers.

Why do you think a brand needs an influencer?

134 responses



Figure 2: Why do brands need influencers?

Influencer marketing has a significant impact on brand perception and can help create buzz and shape brand perception. Almost 40 % of respondents believed that influencers were necessary for creating a buzz about the brand, while one-third believed that influencers helped shape brand perception based on their credibility as per Figure 2. This highlights the importance of leveraging the trust and credibility of influencers to communicate brand messages effectively and elicit a positive response from followers. By aligning with the right influencers and crafting focused messaging, brands can effectively reach and engage their target audience through influencer marketing.

As a result, it was noted that the majority of the respondents, i.e., 73 % believed that sometimes brand recall increased after the influencer promoted a particular brand. As per 24% of respondents, brand recall always increases after an influencer promotes the brand. Influencers often become mediators for brands to interact with their target market creatively.

Sometimes the rapport between the influencer and the followers raises awareness about a particular brand as per 68 % of the respondents. One-third of respondents believed that this always happens, and only 1 % believed it never happens. It can be understood that maintaining consumer involvement is the major driver of a brand's success on social media platforms. This is accomplished by employing influencers to establish brand trust through influential word-of-mouth (WOM) marketing (Delgado Ballester& Luis MunueraAlemán, 2005; Jaakonmäki et al., 2017).

When brands engage with influencers, better awareness among consumers leads to increase in sales?

134 responses

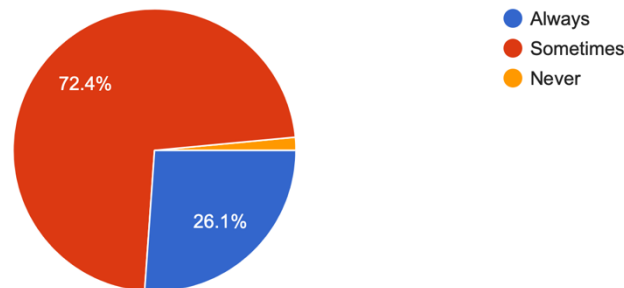


Figure 3: Influencer engagement boosts consumer awareness and sales

Figure 3 shows that the majority of the respondents, i.e., 72 % believed that sometimes there is better awareness among consumers which leads to an increase in sales when brands engage with influencers. With influencer marketing, consumers pay attention to the messages that brands convey through the voice of someone they believe in (Botelho & Ferreira, n.d.). According to 26 % of respondents sales and awareness always increase when brands engage influencers.

Brands take support of influencers to connect with the followers for the following reasons (you may mark one or more choices)?

134 responses

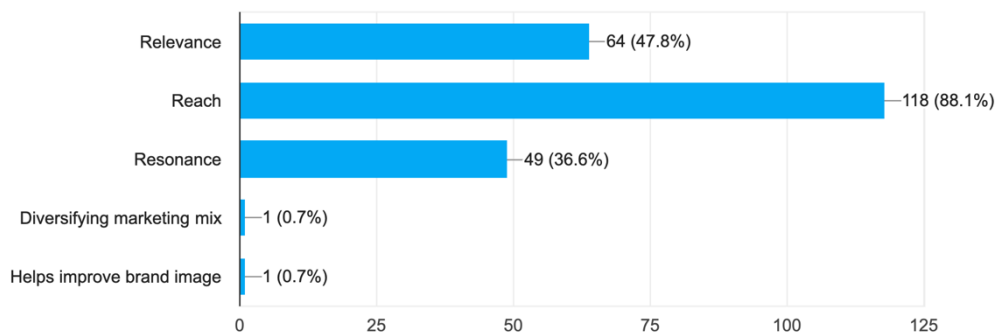


Figure 4: Brands taking support of influencers to connect with audience

As per Figure 4, 88 % of respondents believed that brands take support from influencers for a wider reach among a specific audience. Influencers communicate regularly with their followers to establish a connection and communicate their views. They become trusted brand ambassadors by introducing the brand to their followers. Owing to the relevance of the influencer, the brands take support as per 47 % of respondents.

Trusting influencer reviews vs brands description of the products

Opinions on trusting influencers who endorse products over producers vary. Some respondents believe influencers give honest reviews and followers trust their authentic

recommendations, as they only endorse products they use and like. Respondents highlighted examples of Ankur Warikoo, an Indian entrepreneur and one of the leading content creators with a following of 2.3 million, and how when he shares an affiliate link to the educational content on Udemy, it increases the brand's authenticity. Similarly, Malvika Sitlani, a beauty influencer who has 646k followers on Instagram, promotes products she uses daily and genuinely likes, often without sponsorship, creating trust among her followers. Influencers are also seen as instrumental in promoting brands and helping them reach more people.

However, other set of respondents believed that influencers may promote products excessively for financial gain, eroding trust in their endorsements. An example shared by the respondent is how the brand Mama Earth endorses a lot of influencers, but the brand quality is poor. In this case, followers may prefer to rely on the brands for technical information while turning to influencers for experiential insights. As per, 77 % of the respondents, influencers sometimes have a favourable impact on brand image, while 22 % believed it always has a favourable impact. Consumers recognise and follow experienced and skilled influencers, whose advice can influence purchasing decisions. The influencer's image and values can also impact the brand's image and the degree of alignment between their values.

3. Insight into the consumer behaviour of young people with respect to products or services endorsed by social media influencers

Do you feel that influencers are able to compel you to engage with the content they post?
134 responses

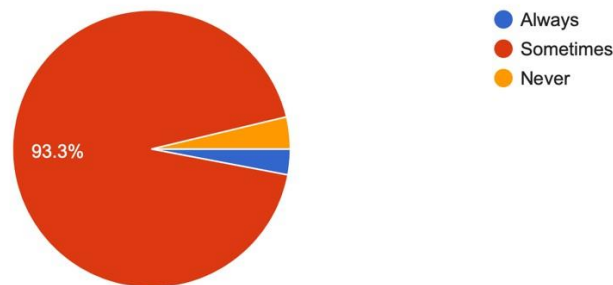


Figure 5: Engaging techniques of influencers

The research indicated that 93 % of the respondents, 92 % females and 93 % males, felt compelled to engage with the content being posted by the influencers as shown in Figure 5. Almost 3 % believed that they were always compelled and 3.7 % believed that they were never compelled to engage with the content.

Table 4: Perception of authenticity

Parameters	Female n= 70	Percentage	Male n=64	Percentage	Total n=134	Percentage
Insights from their personal lives	24	34.29	16	25	40	29.85
Interaction with followers	14	20	15	23.44	29	21.64
When influencers give unbiased reviews	31	44.29	32	50	63	47.01
Content which is relatable or interesting	1	1.43	1	0	2	1.49
	70	100	64	100	134	100

Table 4 shows that 47 % of respondents believed that when influencers gave unbiased reviews then it was viewed as ‘authentic’. Insights from the influencers’ personal lives were also appreciated by the viewers, as almost 30 % of respondents believed this. Social influencers take the time to get to know and communicate with their fans, making 21 % of respondents view the influencers as authentic.

Table 5: What erodes your trust in an influencer

Parameters	Female n= 70	Percentage	Male n= 64	Percentage	Total n=134	Percentage
Too many sponsored posts	44	62.86	55	85.94	99	73.88
Using stereotypical influencer phrases	34	48.57	29	45.31	63	47.01
Promoting too many similar products	17	24.29	27	42.19	44	32.84
Not sharing enough about their everyday life	9	12.86	4	6.25	13	9.70
Others (No authentic content, Following trends for the sake, giving superficial advice, show off)	5	7.14	1	1.56	6	4.48
	190	155.7	116	181.25	225	167.91

Table 5 highlights 73 % of respondents believed that too many sponsored posts reduced the influencer's credibility, leading to questions about the authenticity of their opinions. It can be understood that the distinction between genuine recommendations and sponsored content is becoming blurred. Using stereotypical influencer phrases decreases the influencer's credibility according to 47% of respondents. It is crucial for influencers to acknowledge sponsored content appropriately to maintain the trust of their followers. If not done correctly, influencers may lose their followers' faith. (Carr & Hayes, 2014; Woods, 2016). These findings emphasize the importance of maintaining authenticity and transparency in influencer marketing strategies.

Buying Behavior

Table 6: Buying Behaviour- Influencer advocacy, trigger to purchase

Parameters	Female n= 70	Percentage	Male n= 64	Percentage	Total n=134	Percentage
Agree	30	42.86	18	28.13	48	35.82
Strongly Agree	4	5.71	9	14.06	13	9.70
Neutral	30	42.86	31	48.44	61	45.52
Disagree	6	8.57	3	4.69	9	6.72
Strongly Disagree	0	0	3	4.69	3	2.24
	70	100	64	100	134	100

Table 6 shows that 45 % of the respondents had a neutral opinion that influencers' advocacy for a brand triggered their desire to buy. Influencer Marketing has a significant impact on customer purchase decisions - resulting in impulse buying (Baird & Parasnis, 2013; Jaakonmäki et al., 2017), it has also been established to maximise trust.

Change in consumption or purchase behaviour

According to the respondents, following influencers can impact purchase behaviour, but the extent of the influence varies. Some felt their consumption behaviour changed as influencers helped them narrow down options and try new products. They were influenced by perceived authority and social presence, such as Virat Kohli's promotion of MRF ZLX tires. However, other respondents felt that their purchase behaviour had not changed as they usually follow influencers for content and do their research before making any purchasing decisions. They believed one size does not fit all and were not swayed by influencer endorsements.

Almost 62% of respondents sometimes looked up influencer reviews before making a purchase, while 24 % always referred influencer reviews, and 13 % never looked at the reviews. Targeted messaging to a carefully selected group of consumers who are likely to be interested in the product/service, a brand can reduce the number of negative sentiments generated (Zhang et al, 2013).

How often do you buy a product/ service recommended by an influencer?
134 responses

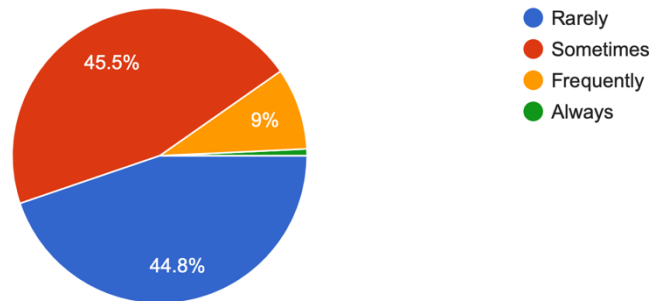


Figure 6: Purchase a product/ service based on influencer recommendation

Figure 6 shows that 45 % of respondents expressed they sometimes tend to buy a product based on the recommendation of an influencer, while 44 % rarely went by the recommendation of the influencer. As per the article, what is influencer marketing and its benefits, 2020, the followers develop a faithful relationship with the influencers. As a result, people trust their judgments and recommendations and become more responsive to the brand. This also leads to unplanned purchases as a result of influencer recommendations. The findings revealed the diverse perspectives of the respondents on buying unplanned items based on influencer recommendations, with some following influencers' advice, while others stayed true to their convictions. Nevertheless, many businesses benefit from credible influencer marketing, which establishes trust with followers. This connection with the influencer applies to both business-to-consumer (B2C) and business-to-business (B2B) markets, with influencers becoming a critical component due to distribution. Therefore, influencers will continue to play an essential role regardless of the market.

Reasons to feel doubtful about purchasing a product being promoted by the influencer

A viral product creates curiosity amongst consumers about its hype, increasing the want for that particular product. An influencer's credibility and authenticity are crucial factors in determining whether their followers purchase recommended products. Biases towards certain brands and a lack of knowledge or usage of endorsed products can decrease an influencer's credibility. Young adults see influencers as role models who are relatable and trustworthy due to regular interaction with followers and shared experiences. Influencer marketing allows for targeted and budget-friendly advertising while providing an opportunity for creativity and building trust with potential customers.

4. Perspectives of influencers and gain insights from them about influencer marketing.

Influencers' opinions about their role on social media platforms

Interviews were conducted with six influencers online from five different niches: Lifestyle, Food, Entertainment, Soft Skills Trainer, and Life coach. All the influencers exhibited authenticity within their respective niches and consistently shared niche-specific content that resonated with their audience.

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The discussions highlighted the motivations, methods, and challenges of Instagram influencers. Influencers aim to impact social media positively, entertain, share important information, and create a sense of community. They engage with their followers through interactive stories, groups, and conversations.

Brands reach out to influencers through intermediaries or Instagram/email. Collaboration involves agreeing on deliverables, negotiating, approving concepts, and posting content. Influencers prioritize brand alignment, popularity, and professionalism. Quality matters more than followers, and recognition is appreciated. Some deals are unpaid barter, and paid ones can be seen as inauthentic. Influencers feel responsible to engage with followers, navigating Instagram's algorithm, and balancing brand partnerships with authenticity.

The fast-changing influencer marketing

The influencer industry is constantly evolving, and influencers believe that it is changing for the better with new guidelines and regulations. One of the most misunderstood aspects of influencer marketing is that it is a glamorous and effortless job, while in reality, it requires hard work and dedication. Being transparent and creating relevant content is crucial for influencers to engage with their followers and maintain credibility. Influencers should take inspiration from real-life events and regularly review their posts' performance to determine what content resonates best with their audience.

CONCLUSION

Influencer marketing is the most popular marketing method right now, and it has much potential for engaging a highly relevant audience and creating genuine content. In conclusion, influencers hold significant influence over the preferences and behaviours of young adults. Around 58% of respondents in this study followed influencers due to the valuable information they shared, indicating a strong impact on their audience. Additionally, followers often identified with influencers who shared common interests, further solidifying their connection. The power of influencer marketing in shaping brand perception was evident, 40% of respondents recognize their role in creating buzz and shaping brand image. Credibility (43%) and authenticity (40%) emerged as crucial factors for followers when influencers endorsed products, influencing their purchasing decisions. Moreover, 72% of respondents acknowledged the positive impact of brand-influencer collaborations on consumer awareness and increased sales. To maintain their influence, influencers should draw inspiration from real-life events and continuously evaluate their content's performance to deliver what resonates best with their audience.

SUGGESTIONS FOR FUTURE RESEARCH

- To analyse if influence is temporary or leads to sustained brand loyalty.
- To understand cognitive, emotional, and social factors that contribute to the persuasive powers of influencers.
- To explore the emerging trends and innovations in influencer marketing

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A QUALITATIVE STUDY EXPLORING THE MENSTRUAL HEALTH AND HYGIENE AMONG THE WOMEN LIVING IN RURAL AREA OF GHOGRAPAR, ASSAM

Supriya Pathak¹ and Dr. R. Jansi Rani²

¹PhD Research Scholar, Department of Home Science Extension Education, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, Tamil Nadu

²Assistant Professor (SS) (HOD) i/c, Department of Home Science Extension Education, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, Tamil Nadu

*corresponding author postal address: Avinashilingam University, Coimbatore-641043, Tamil Nadu, India

Email IDs: supriya.pathak.1996@gmail.com

jansirani_ext@avinuty.ac.in

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ABSTRACT

Rural Health and Hygiene were important factors through which various issues related to women in terms of menstruation could be considered. Menstruation played a significant role in women's lives. Menstruation was still considered taboo, so people did not know about the scientific facts related to menstrual hygiene. Globally, billions of women did not have access to proper sanitation and hygiene facilities, which affected them a lot. The study was done to learn about their health and hygiene issues that they faced during their menstruation period and to learn about their knowledge regarding proper sanitation. A study for one month was done in the Ghograpar area of Nalbari District, Assam, among 60 female respondents aged 18 to 30 years, and the purposive sampling method was used. The tool used was the Interview Schedule, and primary data was collected for the proposed research. The knowledge of menstrual health was found to be low. Incidents of health problems such as menorrhagia, menstrual cramps, vaginal rashes, etc. were commonly found among the women. The study also found out that the water, sanitation, and hygiene (WASH) and dustbin facilities for disposal of sanitary napkins were missing in the area. Whether proper menstrual health and hygiene practices were followed by the girls or not could be found through the education of the parents, and as parents, they should play a major role in guiding their daughters, especially the mothers, who should guide their daughters regarding menstruation from childhood itself, which would help them in the future to avoid the diseases that might affect them and also to live a healthy life by maintaining their health and hygiene.

Keywords: Menstruation, Menstrual Health, Menstrual Cycle, Women's Health.

INTRODUCTION

For humans' survival, health was an important factor to be considered. The knowledge, concepts, infrastructure, and skills for healthcare had been evolved through the evolution of human civilization in varied societies. "Health can also be defined as mental, physical, and social well-being, and even as a resource for living a full life. It refers not only to the absence of disease, but also to recover from illness and other problems." (WHO, 2006). "There are some important factors

to be considered for good health, which include genetics, environment, relationships, and education.” (Felman, 2017).

The term “menstruation is surrounded by many barriers, including psychological and religious barriers, due to the lack of knowledge regarding the scientific menstrual process, and also because many girls in slum areas are unaware of the menstrual cycle process.” (Deshpande et al., 2018). “The reproductive health of an adolescent girl is necessary so as to control the health of future generations, which will help them when they turn into womanhood.” (Dudeja et al., 2016).

For the World Health Organization (WHO), “women’s health has always been a concern, but in today’s society it has become an urgent priority. It involves their emotional, social, and physical well-being.” Women’s health was mostly determined by their location, position, and status in the family and society at large. A woman’s overall health was determined by socio-political and economic factors, as well as her biological well-being. “Hygiene-related practices of women during menstruation are of considerable importance, as they have a health impact in terms of increased vulnerability to reproductive tract infections (RTI). The issue of menstrual hygiene is inadequately acknowledged and has not received proper attention.” (Ghimire, 2017).

Even though Indian women at large were suffering from various nutritional deficiencies, the health conditions of a rural woman were more deplorable than those of her urban counterpart. Women’s health in rural areas was compromised as a result of some interrelated factors running at different levels, which include longer emergency response times, a unique financial situation, limited or no public transportation, limited access to women’s shelter, and also limited health care, etc. But the most common problems faced by women in most of the areas were a lack of food, fuel, water, fodder, and health facilities.

JUSTIFICATION OF THE STUDY

Menstruation and menstrual health issues, which were one of the main areas of concern in reproductive health, affect an outsized number of girls throughout their reproductive lives, starting in adolescence. From menarche to menopause, most women passed half of their lifetime with a monthly period. “The girls should be educated about the significance of menstruation and the development of secondary sexual characteristics, the selection of sanitary menstrual absorbent, and its proper disposal.” (Mahajan & Kaushal, 2017). “Women basically experience an average of 400 menstrual cycles. The average menstrual cycle lasts for about 5 days, with approximately 67 months of menstrual bleeding over a lifetime.”

Menstruation played a significant role in women’s lives. Menstruation was still considered taboo, due to which women did not know the scientific facts related to menstrual hygiene. Globally, billions of women did not have access to proper sanitation and hygiene facilities, due to which they might suffer from many diseases like anaemia, amenorrhea, menstrual cramps, hepatitis B, etc. “Inadequate and inappropriate water, sanitation, and hygiene facilities in schools, especially in rural areas, also come in the way of managing their menstruation healthily, safely, and with dignity. These affect their health, and they sometimes suffer from reproductive and urinary tract infections due to ignorance about proper menstrual hygiene practices.” (Sarkar et al., 2017). “Good hygienic practices, such as the use of sanitary pads and adequate washing of the genital area, are essential during menstruation.” (Sonowal & Talukdar, 2019).

OBJECTIVES

1. To know about the socio-demographic profile of the respondents.
2. To learn about the education of the parents and respondents.
3. To find out the pattern of menstruation among the women respondents.
4. To analyse the menstrual hygiene practices that the women follow during their menstrual cycle.
5. To assess the different health problems or diseases faced by women during their menstrual cycle.

LIMITATIONS OF THE STUDY

1. Limited to female respondents only.
2. Limited to women from 18 to 30 years old.
3. Limited to women with menarche.

METHODOLOGY

The Ghograpar area in Assam's Nalbari District had been chosen as the study area. 60 female respondents in the age range of 18 to 30 years were selected as samples using the Purposive Sampling Method. The sample was contacted through verbal communication with the help of the structured Interview Schedule. A pilot study for one month was done to collect information regarding menstrual health and hygiene issues faced by women during their menstrual cycle and also to find out whether proper hygiene practices were followed or not within the particular area during the menstruation period. The education of both the parents and the respondents was taken into account.

Primary data has been collected for the proposed research through an Interview Schedule. Secondary data has also been collected from various journals and websites related to the study.

The collected data was then tabulated and presented using appropriate figures and tables. The data was analysed through frequency, percentage analysis, and mean value with the help of Excel and SPSS software.

RESEARCH DESIGN

For the proposed research, the Interview Schedule had been used to collect qualitative data.

Sample and Population of the Study

The Interview Schedule had been used to collect qualitative data for the proposed research. The sample was selected using the Purposive Sampling Method. The study population comprised 60 female respondents in the age range of 18 to 30 years from the Ghograpar area of Nalbari District, Assam.

Procedure of Data Collection

A structured Interview Schedule was prepared by the investigator to know the menstrual health and hygiene issues faced by women. With the help of the structured schedule the female respondents were interviewed personally through verbal communication. After a pilot study for one month, the data had been collected for research to know about the various problems that the

women faced regarding menstrual health and hygiene. 60 female respondents gave their will for the interview and accordingly they were interviewed for the proposed research.

FINDINGS AND DISCUSSION

The study was conducted among 60 female respondents, aged 18 to 30, in the Ghograpar area, located in the Nalbari District of Assam.

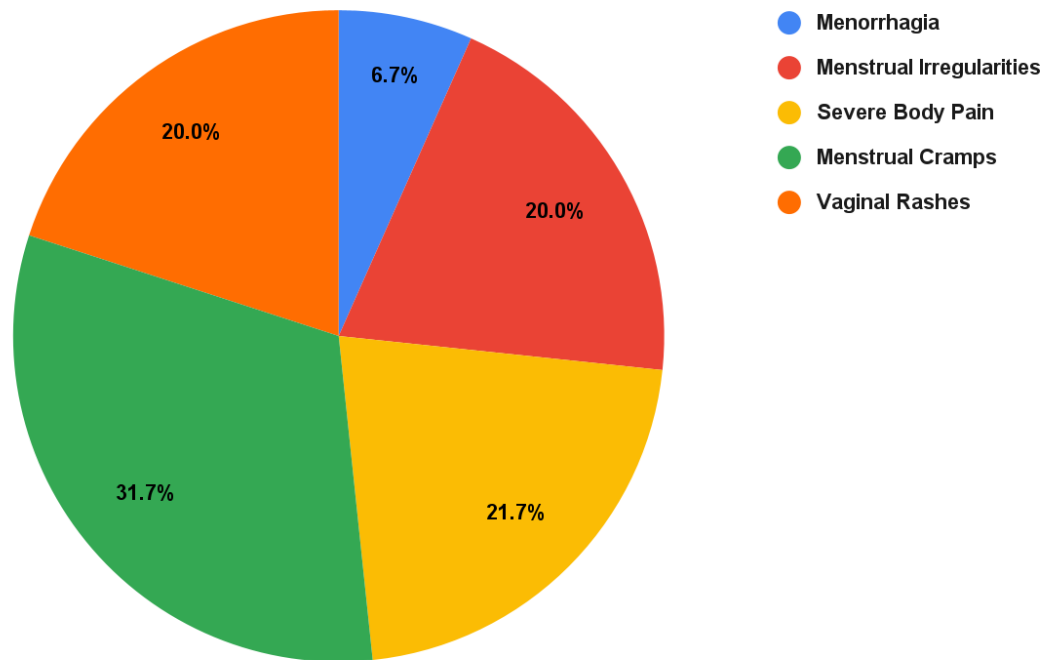


Fig.-1: Health Problems or Diseases faced by Women Respondents

Through Figure-1, we found out the different health problems or diseases faced by female respondents. There were many health problems faced by women, like menorrhagia, menstrual irregularities, severe body pain, menstrual cramps, and vaginal rashes, and the highest was the menstrual cramps faced by women in the particular area, which was 31.7 percent. If it occurs for two or three days, then it is considered normal during the menstrual period, but if it continues until the end of the period, it can be considered something serious that needs immediate treatment. On the other hand, 6.7 percent of the women experienced menorrhagia, which increases the risk of iron deficiency anaemia, which causes their skin to appear pale and causes weakness and fatigue. To avoid this, a proper diet should be followed, and if necessary, a doctor's consultation should be sought immediately.

Table-1: Profiling of the Women Respondents in Relation to Socio-Demographic Factors

n=60			
Socio-economic Profile	Category	Number of Response (n=60)	Percentage (%)
Age Groups (in years)	18-22	18	30
	22-26	20	33
	26-30	22	37
Religion	Hindu	55	92
	Muslim	5	8
Type of Family	Nuclear	54	90
	Joint	6	10

According to the socio-demographic factors of the respondents depicted in Table-1, about 37 percent of the respondents belonged to the age groups of 26-30 years, which is the highest in comparison to other age groups; another 33 percent of the respondents belonged to the age group of 22-26 years; and only 30 percent of the respondents were under the age groups of 18-22 years. In terms of religion, Hindu respondents were higher at 92 percent compared to Muslims at only 8 percent. Nuclear families outnumber joint families by 90 percent in this area, while joint families account for only 10 percent.

Table-2: Education wise Distribution of Parents and Respondents

n=60			
Educational Status	Category	Number of Response (n=60)	Percentage (%)
Education of Respondents	Primary	23	38
	Secondary	22	37
	Higher Secondary	7	12
	Graduation	2	3
	Illiterate	6	10
Education of Mother	Primary	18	30
	Secondary	16	27
	Higher Secondary	15	25
	Graduation	2	3
	Illiterate	9	15
Education of Father	Primary	10	17
	Secondary	18	30
	Higher Secondary	17	28
	Graduation	6	10
	Illiterate	9	15

Education was very important in today’s world. It helped us grow and develop each day. Without proper education, there could not be any growth in society, and now it is important enough for the women to get themselves educated so that they did not had to lag behind in some fields. Through Table-2, the education of the respondents and their parents was taken into consideration. In terms of the respondents, a maximum of 38 percent of the respondents studied till the primary level, and a minimum of 3 percent studied till graduation. In terms of the education of the mother, 30 percent of the mothers studied till primary level, and only 3 percent of the mothers studied till graduation level. Mothers played an important role in guiding their daughters regarding menstruation and its practices, so for that, the mothers should be knowledgeable enough to guide them in the right way so that the girls know how to properly maintain their menstrual health and hygiene now and in the future. In terms of the education of the father, 30 percent studied till the secondary level, and only 10 percent of the respondents studied till graduation.

Table-3: Pattern of Menstruation among the Women Respondents

Menstrual Period Patterns	Category	Number of Response (n=60)	Percentage (%)	n=60
				Mean
Age of Menarche (in years)	10	4	7	10
	11	15	25	
	12	23	38	
	13	7	12	
	14	7	12	
	15	4	6	
Regularity of Periods	Regular	54	90	30
	Irregular	6	10	
Duration of Blood Flow	1 to 3 days	16	27	15
	4 to 6 days	29	48	
	6 to 8 days	7	12	
	More than 8 days	8	13	
Amount of Blood Flow	Moderate	35	58	20
	Scanty	18	30	
	Heavy	7	12	

Table-3 showed the menstrual cycle patterns of the women respondents. The maximum age of menarche in this area was 12 years, with 38 percent, and the minimum age was 15 years, with 6 percent. In terms of regularity of periods, 90 percent of the respondents had regular periods, which is good, but another 10 percent had irregular periods due to some health problems like excess consumption of medicines, body weight, etc. The duration of blood flow was 4 to 6 days among 48 percent of respondents, which was the highest, and the amount of blood flow was moderate among 58 percent of respondents, which was normal for a menstruating body compared to other respondents who had a duration of 1 to 3 days and with a scanty blood flow, and this mostly happens because people did not have the proper knowledge of blood flow in a human body, which results in health problems like pain, fatigue, etc. in the future. The highest mean value was found to be 30 in terms of the regularity of periods.

Table-4: Practices Followed by Women for Menstrual Hygiene

Particulars	n=60					Mean
	SA n=60 (%)	A n=60 (%)	N n=60 (%)	D n=60 (%)	SD n=60 (%)	
Frequently change sanitary napkin	15 (25)	30 (50)	-	8 (13)	7 (12)	12
Wrap in paper while discarding the pad	10 (17)	9 (15)	8 (13)	17 (28)	16 (27)	12
Proper use of dustbins for disposal of pad	-	6 (10)	-	6 (10)	48 (80)	12
Properly wash the sanitary napkin	8 (13)	34 (57)	14 (23)	4 (7)	-	12
Throws the pad openly	-	6 (10)	-	54 (90)	-	12
Flush pads in toilet	-	12 (20)	-	48 (80)	-	12
Hand wash with both water and soap after disposing the pad	5 (8)	18 (30)	15 (25)	22 (37)	-	12

*SA-Strongly Agree, A-Agree, N-Neither, D-Disagree, SD-Strongly Disagree

From Table-4, we found out the practices followed by women for menstrual hygiene, and with this, 50 percent of the women respondents agreed that they change their sanitary napkins frequently, while another 12 percent strongly disagreed with the statement. 28 percent of female respondents disagreed that they wrap the pad in paper before discarding it, while another 13 percent did not. In terms of the proper use of dustbins for pad disposal, 80 percent of the women strongly disagreed with the statement due to the lack of a nearby dustbin facility. 57 percent of female respondents agreed that they properly washed their sanitary napkins before disposing of them, while 7 percent disagreed. 90 percent of respondents disagreed that throwing the pads openly was good for the environment, and 80 percent disagreed that they did not flush pads down the toilet. In terms of handwashing with both water and soap after disposing of the pad, 37 percent of the respondents disagreed with the statement, while only 8 percent of the female respondents strongly agreed with it. With this, it can be found that hygiene was not maintained properly in the area, which might lead to serious infectious diseases and was also harmful for the environment. The mean value was found to be 12 in all the statements mentioned.

CONCLUSION

Menstrual health and hygiene were important issues that most women faced in their lives. Some knew about it, while others did not. There should be proper implementation of menstruation and menstrual hygiene management. Parents, especially the mothers, should be educated enough to

teach their daughters about proper hygiene and the use of sanitary napkins, along with the diseases that might affect them if they did not take proper care. Mothers played a very important role in a daughter's life in terms of menstruation, so a proper guide should be given to the girls so that they get an idea of how to properly maintain their menstrual health and hygiene. Teachers should be educated as well in order to teach students about menstruation and menstrual hygiene management, beginning in elementary school. There were many government policies, the latest information on menstrual products, and so forth that should be known and adopted by the women of today's generation so that they did not face any health issues in the future.

Rural people should be given education regarding menstrual hygiene management and so forth. Proper information on the disposal of used menstrual products should be given to all girls and women. Dustbins with proper lids should be kept available in the toilets and in public places wherever necessary so that girls and women could use them when needed without affecting their health or the environment. A proper diet was also very necessary for girls and women, especially during their periods. They even need to be extra careful and should take extra care of themselves so that they did not face any health issues in the future.

This study also revealed that there was a lack of knowledge about the use of menstrual products and proper hygiene, which caused women to suffer from a variety of health problems. Also, for some illiterate mothers, it became difficult to teach their daughters the right way of maintaining their menstrual health and hygiene, which affected the mother as well as the daughter. This goes on for generation after generation, and so the health issues were increasing each day. As a result, there was a strong need to address these issues as soon as possible so that women did not have to suffer further in terms of menstrual health and hygiene later in life.

SUGGESTION FOR FUTURE RESEARCH

In this proposed research menstrual health and hygiene issues and its various problems faced by the respondents in a selected area had been covered up. Various health problems were faced and hygiene facilities were not followed by many respondents though some followed it in a proper way. There should be more education given to everyone from school level itself so that girls as well as boys come to know about the side effects and also about the benefits including food habits, health issues and hygiene facilities to remain in a healthy way. Health had always been a most important factor and not only women, in today's century men should equally understand about it.

There should be more research regarding this field and proper guidance which should be given by future researchers, health workers, teachers, parents etc. through discussions, presentations or by the use of any means which becomes helpful for the target group to understand. Mostly in rural areas there had been 'no talks' regarding this topic and even many did not want to talk about it openly so the health workers, NGOs who worked for the development of the women should make a clear observation and perform accordingly.

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EFFECTS OF COVID 19 ON MICRO, SMALL AND MEDIUM ENTREPRENEURS OF VADODARA DISTRICT

Dr. Varsha Parikh¹, Dr. Dhara Bhatt² and Ms. Urmi Patel³

¹Associate Professor ² Assistant Professor ³ Research Scholar

Department of Extension and Communication,
Faculty Family and Community Sciences,
The Maharaja Sayajirao University of Baroda,
Vadodara, Gujarat, India

Email: (1)varshaparikh-extcomm@msubaroda.ac.in

(2) bhatt.dhara-extcomm@msubaroda.ac.in

HSAI Life Member No.: (1) GJ 03/P-I/LF

(2) GJ1122-LF

ABSTRACT

The COVID-19 pandemic outbreak has transformed the way business is done and placed people in circumstances that we may never experience again. In order to maintain their businesses, business owners, retailers, and entrepreneurs must overcome obstacles. Thus, researchers conducted a study on how COVID-19 affected Micro, Small, and Medium (MSM) entrepreneurs in the Vadodara district. Purposive and snowball sampling methods were used to select the 110 MSM entrepreneurs for the sample. According to study results, men predominate among entrepreneurs in terms of percentage distribution between genders and MSM entrepreneurs' lives, were clearly affected by COVID-19. The overall effect of COVID-19 was noticeable in people's lives, especially in the lives of MSM Entrepreneurs. COVID-19 had moderately affected their personal lives. They agreed that they valued time spent with their family, which was a sign that it had a beneficial effect on their daily personal lives. Both positive and negative effects on personal life were determined to be moderate. The COVID-19's effects on entrepreneurs' families were found to have a positive and a negative impact. By spending time together, the entrepreneurs said that it strengthened family ties. They also concurred that to meet necessities, their family has begun to compromise. However, they also concurred that the load placed on them by children's online education had increased. Further, COVID-19 had high to moderate effect on the company. These outcomes revealed their business's preparedness plans for a pandemic. The study came to the conclusion that while entrepreneurs faced a variety of problems on a higher level, they also did not perceive government restrictions, changes in the workplace that are seen as the new normal, disturbed supply chain management, and a lack of manpower due to worker migration as serious issues for their companies.

Key words: COVID-19 effect, MSM Entrepreneurs, Vadodara, Personal, Family, Business

INTRODUCTION

Defining Micro, Small and Medium Enterprise (MSME)

Micro, small, and medium-sized businesses operate with lower capital expenditures and turnover. The Indian government introduced the micro, small, and medium enterprises development act in 2006. That established the maximum investment and revenue threshold for MSMEs. After fourteen

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years, it was changed in July 2020. Micro, Small, and Medium-Sized Enterprises (MSME) are currently defined as Manufacturing Enterprises and Enterprises providing Services. The restrictions for manufacturing and service-providing businesses were distinct and outlined. The MSME definition was altered to provide the SME, which had previously had a low upper limit, one. The MSME entrepreneurs also received other perks in addition to this. They were-

- Collateral free automatic loans for up to Rs. 3 lakh crores
- Subordinate debts for MSMEs worth Rs. 20,000 crore
- Equity infusion through MSME Fund of Funds worth Rs. 50,000crore
- Global tenders capped - to be disallowed up to Rs. 200 crores.

Effects of COVID 19 on Business

Outbreaks of the virus, COVID-19, led to several companies closing and thus causing unprecedented economic disruption in most industry sectors. In short, retailers and brands were faced with a wide range of short-term challenges in the areas of health and safety, supply chain, workforce, cash flow, consumer demand, sales and marketing. There is no longer a large number of markets, especially in the tourism and hospitality sectors. Priority and cost optimization, or postponement of tasks that do not add value in the current environment, shall be the aim of all organizational functions. An unlimited hiring freeze has been imposed by companies, notably small and medium sized enterprises. And, in parallel, there's massive growth of communication via the Internet, digital entertainment and shopping on the internet.

Effects of COVID 19 on Personal Life

COVID-19 (Corona virus) has affected day to day life and is slowing down the global economy. In less than a century, COVID-19 has changed our daily lives, businesses, world trade and movement with unprecedented speed. The causes of this disease affect the different industries and sectors. It is essential that the disease be identified at an early stage to control transmission of the virus, because it has very rapid spread among humans. As well as affecting the world's economic situation, this virus is having a significant impact on people's daily lives. COVID-19 has a wide range of impacts, which have major consequences for daily life.

Effects of COVID 19 on Family Life

The novel corona virus pandemic had a profound impact on everyone, some more drastically than others. This could result in significant changes to the daily routine for several families, because of financial difficulties. In other families, this could mean increased distress for children, tension between parents or general fear. From March 2020 to May 2020, a nationwide quarantine was imposed due to an outbreak of COVID-19. This will have a profound impact on the lives of Indian families.

Challenges Faced by Entrepreneurs during Pandemic

The pandemic caused by the novel coronavirus affected almost all the sections of the community. This pandemic is forcing the world to face up to a new normal way of life. This has had influence in people's personal and professionals' lives. COVID 19 has changed a lot of things, i.e., from the use of sanitizers and masks at household level to virtual conferencing and maintaining social distancing in professional settings. There are a lot of things happening in the market sectors, too, with this new normal. Therefore, businesspeople, retailers, entrepreneurs are facing challenges to sustain their business.

Chaudhary and Sodani et. al 2020 mentioned that India cannot have a real and sustainable growth without having a thriving MSME sector. The COVID-19 crisis had impacted the businesses

nationwide and almost all the business houses had undertaken the preventive measures like reduction, reducing the staff and so on to lessen these effects. Therefore, government should make funds available to the business sector and should take the action to empower MSME. This also became the concern for the Government of India.

JUSTIFICATION: The number of MSME in Vadodara as per the 2011 census data was 15,534, employed over 1,23,055 workers. It is understood that there are many MSMEs in the Vadodara district working under various trades. Therefore, it become important to study the effects of COVID-19 pandemic on these MSM entrepreneurs, in order to understand their present situation in the market and also to find out their combating strategies for the COVID-19 effects on their enterprises. Hence, an investigation was undertaken to study not only the effects on their business but also focused on their personal as well as family life.

OBJECTIVES OF THESTUDY

- 1) To study the profile of selected MSM entrepreneurs of Vadodara district.
- 2) To study the effects of COVID-19 on MSM entrepreneurs residing in Vadodara district in relation with aspects viz.; (i) Personal life, (ii) Family life and (iii) Business in relation to the selected variables viz., (a) Gender (b) Age (c) Type of Enterprise (d) Span of Business (e) Usage of Media during COVID-19
- 3) To study the differences in the overall effect of COVID-19 on selected MSM entrepreneurs of Vadodara district in relation with above selected variables.
- 4) To study the challenges faced by selected MSM entrepreneurs of Vadodara district during COVID-19 pandemic.

NULL HYPOTHESIS OF THE STUDY

There will be no significant difference in the overall effect of COVID-19 on selected MSM entrepreneurs in relation with selected variables viz., (a) Gender (b) Age (c) Type of Enterprise (d) Span of Business (e) Usage of Media during COVID-19

METHODOLOGY

The sample was drawn using purposive and snowball sampling technique. For the study, **one hundred and ten** MSM Entrepreneurs were selected as the sample from Vadodara district basically from service, manufacture and production enterprise. The tool used for data collection was a **structured questionnaire**. For data collection **google forms** were sent through email or WhatsApp and filled. A **survey** was conducted using questionnaire and MSM entrepreneurs were contacted through incubation centre.

FINDINGS AND DISCUSSION OF THE STUDY

Table – 1: Percentage distribution of the respondents as per background information of the selected MSM Entrepreneurs of Vadodara district.(n=110)

Variable	Category	%
Age	Young Entrepreneur (19-40)	56.36
Gender	Male	76.36
Education Qualification	Moderate Level	61.81
Marital Status	Married	83.64

Little more than half of the respondents were young entrepreneurs (56.36%) and little more than forty percent of them were senior entrepreneurs (between 41-61 years). Majority of the respondents were male (76.36%). Majority (61.81%) was having either graduate or had diploma in varied fields moderate level of education.

Table – 2: Percentage distribution of the selected MSM Entrepreneurs of Vadodara district as per their business profile. (n=110)

Variables	Category	%
Type of Enterprise	Service	32.73
	Manufacture	51.82
Year of Establishment	Old (1960-1988)	32.73
	Recent (1989-2017)	58.18
Entrepreneurial Experience	Less Experience (1-10 Years)	27.27
	Moderate Experience (11-20 years)	44.55
	More Experience (21-30 Years)	28.18
Daily Working Hours	Moderate Working Hours (8-14 hrs.)	70.00
Establishment of Enterprise	Established by Family	41.82
	Established by Self	38.18
Business Expansion	Within the City	21.82
	Within the District	30.91
	Within the State	31
Benefits availed from Govt.	Did not Availed	85.45

The above table-2 reveals the business profile of the selected MSM entrepreneurs of the study. Little more than half of them were having Manufacturing units (51.82%) and nearly one third of them were providing diverse services through their enterprise (32.73%). More than half of the enterprises were established in recent years (58.18%) followed by one third of them as ‘Old’ enterprise (32.73%) (Established between years 1960-1988). Majority of them had moderate working hours (70%) i.e., 8 hours to 14 hours per day. More than forty percent of the respondents shared that their enterprise was established by their family (41.82%), whereas a little less than forty percent of them established their enterprise themselves (38.18%). Higher percentage of the respondents had their business expansion within the state (31%) and within the district (30.91%). One fifth of them were doing business within the city (21.82%). Very high majority (85.45%) of the respondents did not avail the benefits from the government schemes and programmes for MSMEs.

Usage of Media for Business by MSM Entrepreneurs

Table – 3: Percentage distribution of the respondents according to their overall media usage (n=110)

Overall Usage of Media	%
Low Usage	46.36
Moderate Usage	5.45
High Usage	48.18

Figure-1: Percentage Distribution of the selected MSM Entrepreneurs of Vadodara district according to their overall media usage for their business. (n=110)

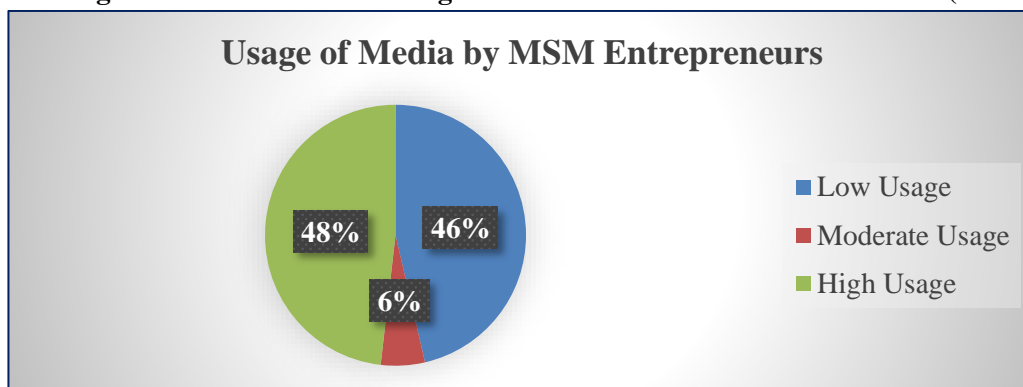


Fig.1 Overall media usage for business by selected MSM entrepreneurs

Above table 3 and fig-1 reveals data regarding overall media usage for business purpose by selected MSM entrepreneurs of Vadodara district. The data revealed that a little less than half of the entrepreneurs had high media usage (48.18%). However, more than forty percent of them showed low media usage (46.36%). Moderate usage of media was noted among very few of the entrepreneurs (5.45%). Overall, high usage of media was observed among the MSM entrepreneurs.

Effects Of Covid-19 On Msm Entrepreneurs:

Table – 4: Overall and Aspect-wise Percentage Distribution Of the Respondents According To the Effect of COVID-19 On Them. (n=110)

Effect of COVID-19 on MSM Entrepreneurs	Effects	%
Overall Effect of COVID-19	High Effects	74.55
Effect of COVID-19 on Personal Life	High Effects	41.81
	Low Effects	47.27
Effect of COVID-19 on Family Life	High Effect	50
	Low Effect	42.73
Effect of COVID-19 on Business	High Effects	46.36
	Low Effect	50.91

Figure-2: Percentage Distribution of the Selected MSM Entrepreneurs According To Their According To the Effect of COVID-19 on Them. (n=110)

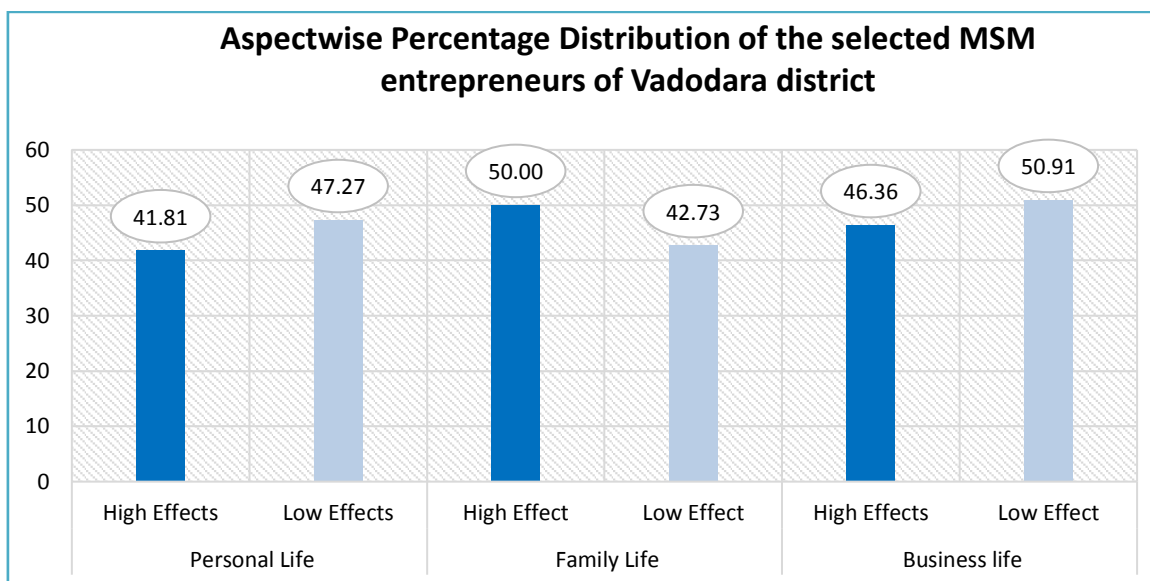


Fig.2: Effect of COVID-19 on MSM Entrepreneurs

Table -4 revealed the data regarding the **overall effect** of Covid-19 on MSM entrepreneurs showed that high majority of them had high effects (74.55%) of it.

Table-4 and fig-2 revealed that, higher percentage of the respondents had low effects (47.27%) of Covid-19 on their **personal life**, followed by high effects (41.81%) of the same. Half of the MSM entrepreneurs were highly affected (50%) by Covid-19 with respect to their **family life** followed by low effects (42.73%) on them. More than forty percent of the MSM entrepreneurs' **business** were highly affected (46.36%) followed by half of them with low effect on their business (50.91%).

Effects of Covid-19 on selected Aspects

1) **Personal Life:** Intensity indices show the high effects on the respondents' **personal life** that ranged between (2.71-2.00). On the positive side it highly affected their routine personal life as they agreed to great extent that they cherished moments spent with their family (2.71), and they took interest in socialization (2.13). The occurrence of pandemic also showed positive high effects on the entrepreneurs' personal life as they became more aware about importance of health (2.31), as well as considered themselves as the more responsible citizen (2.25). On the negative side it showed high effects on their mental health. The respondents agreed that they started feeling lonely, fear of uncertainty, and increased stress level after the emergence of Covid-19.

Intensity indices highlights, that the respondents' positive moderate effects as they have become more patient (1.72), started doing meditation (1.75), improved appetite (1.84). Moreover, its moderate effects on negative side showed that the entrepreneurs were indulged in negative thoughts often and developed fear of going out (1.84), problem in maintaining work-life- balance (1.78).

The low effects on the negative side were noted for the items viz Developed problem of insomnia, increased screen time and increased expenses for internet, However, it made them conscious for the saving money and spending it thoughtfully (1.23)

II) Family Life: The highest intensity index was for strengthening the **family** bond by spending time together (2.85). They also agree to the great extent that their family member had started saving money (2.45), understood each other well (2.42). The entrepreneurs consider them as bigger emotion support. However, they got help from their spouse in managing their business (2.10). Furthermore, on the negative side they face frequent quarrels (2.26), unable to concentrate (2.23), disagreements among family members (2.20), disappointment due to postponement of family event (2.04).

It showed low effect as they agreed that their family have started compromising to fulfilling basic need. However, they also agreed that the Online education of children has increased burden on them (1.32).

III) Business Life: The intensity indices ranged between 2.55 to 1.67. This showed high to moderate effect on their **business**. The overall mean score (2.08) also indicates the high effect of Covid-19. The following are the positive effects of it that showed higher intensity index for items viz., learnt new skills for my business. (2.55), understood the relationships with my vender's & clients. (2.53), changed marketing platform for business; and changed marketing platform for my business. (2.44), increased faith in government initiatives (2.16)

They agreed to great extent that they used technology-based solution to deal with crisis (2.35), changed their business model (2.25), concern for employees increased their commitment at work (2.22), learn to optimize the resources (2.05). However, on the negative side it affected the business highly as employees became apprehensive to work due to salary issues (2.06), reduction in salary led to dissatisfaction among staff (2.01), frequent manpower crisis (2.00). These effects, at one side helped in keep the business on track; it also affected the production and finances.

Furthermore, it showed moderate effects for remaining listed items. The item that showed highest score in this section was lost of routine client (1.99), staff members were stressed to deal with pressure in the market and problem of clearing the backlogs of material and delivery (1.92), reduced manpower and disrupted supply chain, delayed loan repayment (1.88), delayed delivery of products/ services (1.79), spent more money to follow the government guidelines to run the workplace (1.76).

Differences in Effects of COVID-19 on MSM Entrepreneurs:

Table -5: T-Ratio Showing Difference On Overall Effect of COVID-19 on Selected MSM Entrepreneurs According To Their Age (n=110)

Age	N	Mean	SD	T	Df	Sig. (2-tailed)
Young Entrepreneurs	62	8.13	0.06		108	0.00139**
Senior Entrepreneurs	48	7.82	0.4	3.28101		

P <0.01**

Table-5 indicates the differences in the overall effect of COVID-19 on selected entrepreneurs according to their age. A significant difference was found in overall effect of COVID-19 on selected entrepreneurs according to their age.

Table-6: T-Ratio Showing Difference On Overall Effect of COVID-19 on Selected MSM Entrepreneurs According To Their Social Media Usage. (n=110)

Source	SS	Df	MS	F Ratio Value	p value
Between-treatments	1.6577	2	0.8288	3.29263	.040955*
Within-treatments	26.9345	107	0.2517		
Total	28.5922	109			

*p<0.05

Table-6 showed that there were significant differences in overall effects of COVID-19 existed among entrepreneurs in relation with their social media usage. It indicates that the varied use of social media may have affected the type of effects that the entrepreneurs faced during pandemic. Therefore, the null hypothesis stating that there will be no significant difference in the overall effect of COVID 19 on selected MSM Entrepreneurs in relation with their social media usage was not accepted. It is understood that those who had high social media usage showed higher mean scores for the overall effect of COVID-19. This could be due to the technological change that they might have adapted to cope up with the situation. There was **no significant** difference found in the overall effect of Covid-19 on selected entrepreneurs according to their **gender, Span of business and type of enterprises**.

Challenges Faced by The MSM Entrepreneur:

The entrepreneurs had faces varied challenges in their business due to Covid-19. The intensity indices for the challenges ranged between 4.13-2.29 that showed more to less challenges that the entrepreneurs had to face. The highest intensity index was found for the challenges occurred due to financial stagnation in the market (4.13). The least challenging task as indicated by the entrepreneurs was nationwide lockdown (2.29). This indicates that the spirit of the entrepreneurs to take part in controlling the global crisis by risking their business and finances. The other items that showed more challenging covid-19 times were as follows-no market mobility (3.99), did not get time to plan for crisis (3.90), financial crisis in business. (3.83), restricted working hours after the unlock (3.80), difficulty in dealing with the uncertainty of the market (3.74), maintain health and safety standard according to government norms were difficult. (3.74), interrupted cross border communication and maintaining work life balance (3.65).

SUMMARY, CONCLUSION, IMPLICATIONS

The study data illustrates the overall effect of Covid-19 on MSM entrepreneurs of Vadodara district, which revealed that the vast majority of them (74.55%) had high effects, followed by moderate effects (25.45%). Aspect-wise data also revealed that a nearly equal amount of respondents (41.81%) expressed positive and negative effects of Covid-19 on their personal lives. Covid-19 had a significant impact on half of the MSM entrepreneurs' family lives (50%) and on more than forty percent of the MSM entrepreneurs' enterprises (46.36%). COVID-19 had a moderate impact on both positive and negative aspects of the selected entrepreneurs' aspects viz, personal as well as family lives. Spending time together, according to the entrepreneurs, helped to enhance the family tie. They also agreed that their family had begun to make adjustments in order to meet fundamental needs. They did, however, agree that online education for youngsters had increased their workload. The results showed that Covid-19 has a significant and moderate impact

on entrepreneur's businesses too. The fact that they used technology-based solutions to deal with the situation was intriguing. These consequences, while helpful in keeping their enterprise/ firm on track, also had an impact on productivity. The majority of entrepreneurs faced challenges as a result of market financial decline and reduced personnel as a result of worker migration was a major concern for their firms.

So, it can be concluded that, during COVID-19, the majority of MSMs of Vadodara district were struggling with access to capital, marketing of their products, lack of manpower which were basic which must be addressed on a long-term basis by the government. Due to extensive COVID-19 turmoil, the government must develop an ongoing supportive and monitoring mechanism by providing emergency relief measures to restore confidence in the MSMs sector. MSMs should be encouraged to connect to the internet, and tax rebates should be increased for this sector. The never say die attitude of entrepreneurs of Vadodara district have encouraged them to deal with the situation and helped them face with great courage however, the state as well as government of India should take a variety of steps to improve Indian MSMEs.

RECOMMENDATION FOR FURTHER STUDIES

- ▶ A similar study can be taken up women entrepreneurs, working women, Street vendors and people working in unorganized setup residing in Vadodara District.
- ▶ This study can lead to further studying the new business models post lockdown and emerging market trends.
- ▶ A training program can be designed to help entrepreneurs cope with the new normal markets and new age business skills.

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OUTCOMES OF THE SOLAR HOME SYSTEM OUTREACH PROGRAM ON THE RECIPIENT OF COIMBATORE CITY

C. Anupama¹, Dr. M. R. Thilakam²

¹P. hD Research Scholar, ²Professor

Resource Management Department

Avinashilingam Institute for Home Science and Higher Education for Women

Coimbatore-641 043, Tamil Nadu

Email I.D Anupamacoduri@gmail.com, dr.m.r.thilakam57@gmail.com

HSAI life time membership number:

(1) HSAI-2019-TN-488-LF; (2)93/T.5/LF president

ABSTRACT

A shortfall in consumers' knowledge of solar energy technologies leads to low acceptance of solar home systems and slow growth of the solar industry. Consumer awareness is crucial in popularizing the use of solar home systems. As a result, the major objective of the study was to spread awareness on solar technology through a three-day outreach program on the importance of using solar home systems and their different applications, in the city of Coimbatore during December 2021. Convenience and purposive sampling was used in the selection of the samples. The program sought to increase the recipient's understanding of solar energy technology and the products that are available in the market. Also, develop an optimistic outlook and drive to purchase at least one solar home system. At the end of the study the statistical tool was used to evaluate the impact of the outreach program. The study results stipulate that the outreach program emerged as success because recipients improved and gained knowledge on solar home systems.

Keywords: Awareness, Coimbatore city, Solar home systems, Outreach program

INTRODUCTION

According to Rai and Sharma (2014), only 13% of the samples they investigated were really using solar energy gadgets, even though 59% of them were aware of it. The authors came to the conclusion that there is a shortage of supply, distribution, and communication to account for the low proportion of solar products. They recommended advising suppliers that solar products have significant potential in rural regions since they can provide power, substitute expensive fuels, and aid in water irrigation. This would help them access the rural market. When aiming to boost sales of solar products, it is essential to reach out to rural people, knowing their demands, showing the demonstration of the solar products and telling them the relevance of solar devices in their lives.

In 100 houses, Brindha and Sumathi (2017) carried out a descriptive study on consumer perceptions of and attitudes regarding solar water heaters. They have examined consumer perceptions and understanding in order to make appropriate recommendations for enhancing the use of solar water heaters in homes. They said that consumers are unaware of solar energy demand and solar water heaters. They recommended that solar water suppliers raise consumer awareness with assistance from the government.

To find out how much people in Kurukshetra, Haryana, are aware of solar energy, Saini and Devi (2019) conducted a survey. According to their study, government policies and program made

people aware of solar energy, which encouraged them to use solar-powered devices. They examined additional variables such as age, education level, and other that affect rural and urban residents' understanding of solar devices. They showed that individuals with higher levels of education had more knowledge, awareness, and a favourable attitude toward solar energy systems. Due to its accessibility compared to other informational and media sources, this study further confirmed that the internet is the most impacting source of information.

Kalpanadevi (2016) organized a study on awareness of solar products to study the respondents' demographics and awareness levels among hundred samples regarding solar devices. The study revealed no significant relationship between the area of residence and the respondents' awareness. Still, there is an important relationship between gender and the educational status of the respondents. The author stated that the Government must take immediate steps to impart knowledge and awareness among people because when consumers cannot believe the advantages of solar power over current sources, the adoption of solar technology is unlikely.

JUSTIFICATION

Although few consumers are aware of solar home systems, they are still reluctant to choose them because of the risks associated, their lack of expertise with the technology, and the expensive installation. Consumers do not know about the techniques and products on the market since knowledge is not being shared with those who need it. In addition, the companies focus solely on one product that they deal with. Consumers must be aware of the environmental changes brought on by our lifestyle and how solar energy can be used to mitigate these changes. An outreach program will inform consumers about how solar home systems can help them save money and the environment. Also, consumers will know the advantages of solar energy as an alternative energy source to meet their daily energy needs.

OBJECTIVES

- To know the solar devices possessed by the households of the Coimbatore city.
- To know the limitations faced by the households while operating the solar devices.
- To assess the awareness level of the households before and after the outreach program.

Hypothesis

H₀ There is a significant variation in the mean awareness scores among respondents with different qualifications.

H₁ There is no significant variation in the mean awareness scores among respondents' different qualifications.

METHODOLOGY

The present study was conducted to gather information on the use of the solar home system by households of Coimbatore and to create awareness among them on the present energy scenario and solar technology. Finally, the impact of the outreach program was analysed. Creswell *et al.*, (2011) stated that in a single research work, when the researcher gathers, analyses, and integrates both

quantitative and qualitative data then it is known as mixed methods research. As the present study as involved more than one method in conducting the study it is mixed-method research.

Phase 1: Conducting a Household Survey

1.1 Selecting the area

The study was carried out in Coimbatore District, Tamil Nadu. The reason Coimbatore city was chosen because abundance of solar energy and its rapidly growing solar market. Realizing the need and importance of renewable energy, the Government of Tamil Nadu had set up a separate agency, namely, Tamil Nadu Energy Development Agency, in early 1985. It is responsible for promoting renewable energy such as solar, wind, biomass, etc. (<https://teda.in/>). Also, familiarity of the investigator with the city was the rationale for choosing the area.

1.2 Household survey

The researcher acquired information on families implementing at least one solar device of the study via the TEDA website for the household survey. Wolff (2015) stated that household surveys are questionnaires distributed to a sample of households in a population so that interviewer gets a great deal of discretion about the information. The researcher selected these houses because she believed that only those who own and use solar devices could provide insight into the limitations and workings of a solar home system, from July 2019 to January 2020. TEDA website enlisted one thousand three hundred households in Coimbatore city using solar home systems.

1.3 Sampling technique

Sampling is the process of obtaining a small sample from a larger population to serve as a framework for a meaningful result pertaining to the larger population (Gupta and Kabe, 2011). Purposive sampling is when the samples are purposefully chosen by the researcher based on their ability to clearly explain the answers to the questions that have been asked to them (Schutt and Check, 2011). Hence, purposive sampling was used to select the samples. Due to time, resource, and time constraints, the investigator only surveyed 400 of the households that responded.

1.3 Research tool

The researcher used a meticulously planned interview schedule to carry out the interview. A verbal interaction between the researcher and the household is an interview schedule to gather the necessary information (Bearman, 2019). The researcher gathered data on the socio-demographic profile, solar devices possessed, number of devices possessed, years of owing the device, limitations faced while operating solar home systems, awareness level and willingness to learn more on solar technology.

1.4 Executing research work

At the convenience of the households, the interview was performed one-on-one over personal contact. After developing rapport with the households, the researcher carried out the interview. Finally, after explaining the goal of the study, the necessary data was acquired and recorded. The interview was completed in 30-45 minutes for each household. Finally, the researcher carefully examined the interview schedule to confirm that the respondent had addressed every question.

1.5 Analysing the data

Data analysis, according to Wilkinson and Bhandarkar (2018), is the process of arranging data so that the reader may easily interpret it. Data was analyzed using the SPSS (20.0) version. Apart from basic percentage analysis, chi-square, t-test and ANOVA was used to analyse the data.

Phase 2: Administering the outreach program

Phase 2 of the study involved conducting an outreach program to educate the targeted audience about the importance of using solar home systems, their availability on the market, and government actions to encourage their usage.

2.1 Selecting the participants

Only 150 of the 400 participant's surveyed samples said they would be willing to participate in a program. The researcher initially planned a community-based outreach program in the outlying area of Coimbatore. However, the Covid-19 outbreak made a community-based program impractical. As a result, the researcher set up the program at her home while taking all necessary safety procedures. Using convenience sampling, a total of 50 participants, took part in the program, which was conducted in Thoppamapti, in the Coimbatore North zone, in January 2021. Ten individuals were divided into five separate batches as the researcher followed social distance standards.

2.2 Designing and drafting the learning module

To improve participant knowledge, educating them on the benefits of solar technology, and describe where to get solar devices on the market, a learning module for the program was developed. It is an assist that presents course information logically and methodically to help participants understand the program's content in an engaging way, according to Dewi and Primayana (2019). Table 1 shows the learning module of the outreach program.

Days	Title	Specific content	Method	Aids
Day 1	Significance of using unconventional energy sources Description of solar energy	Explanation on the need for using unconventional sources Detailed explanation on solar energy. Benefit of using solar energy	Oration	Powerpoint presentation
Day 2	Residential solar energy usage	Solar A.C. Solar cooker Solar lighting Solar water heater	Oration Discussion	Powerpoint presentation Slides Exhibiting
Day 3	Residential solar energy usage (cont.)	Solar pumps Solar fans Solar charger Solar U.P.S.	Oration Discussion	Powerpoint presentation Slides Exhibiting

Table 1: Learning module

2.3 Administering the outreach program

Fifty participants were the intended audience of the awareness campaign. The program's primary goal was to disseminate information and refine the perspective of the participants regarding solar home systems.

The program was administered in five sessions, each lasting an hour, on days that were convenient for the participants. The researcher shared material with participants through one-on-one interactions, oration, and group discussions. Fliers, handouts, and brochures as well as other communication strategies such as Power point presentation to improve and enhance the participant's knowledge were used.



Plate 1: Conducting outreach program

2.4 Impact analysis of the outreach program

Bamberger (2012) delineated impact assessment of any program substantiates a correlation between intervention study and its outcomes: it also computes the change in magnitude. The most commonly practiced assessment type is outcome evaluation. Thus, the researcher appraised the impact of the awareness campaign on knowledge and perspective of solar technology before and three months after conducting the campaign. To determine the significant differences between the participants' knowledge and perspectives, the paired t-test was used.

RESULTS AND DISCUSSION

A. Outcome of the household survey

Socio-demographic characteristic

The researcher gathered data on the socio-demographic features of the households in order to document essential information on the respondent's age, gender, qualification, locality, and occupation.

Table 2. Socio-demographic characteristic

S. No.	Characteristic	Categories	n=400	Percentage
1.	Age (years)	25-35	123	30.8
		36-45	122	30.5
		46-55	67	16.8
		56-65	64	16.0
		66-75	24	6.0
2.	Gender	Male	189	47.3
		Female	211	52.3
3.	Qualification	Illiterate	90	22.5
		School	111	27.8
		Graduate	122	30.5
		Postgraduate	77	19.3
4.	Location	Urban	229	57.3
		Semi-urban	171	42.8
5.	Occupation	Full-time homemaker	97	24.3
		Govt. service	40	10.0
		Pvt. Service	92	23.0
		Business	81	20.3
		Retired	45	11.3
		Agriculture	45	11.3

Age

Age affects an individual's perception of a particular facet, which in turn affects how they act. Hence it was crucial to determine the respondent's age to know how they perceived solar energy. The majority of responders ranged in age from 25 to 35 or from 36 to 45. In all, 30.8 percent of respondents were between the ages of 25 and 35, and 30.5 percent were between the ages of 36 and 45 (Table-2).

Gender

According to Mitchell and Walsh (2010), males and females have different expectations, wants, needs, and lifestyles that influences purchasing behavior because of their upbringing and socialisation. Hence, the variable age was investigated. A maximum of 52.8 percent of respondents were females, while the remaining 47.3 percent were male.

Qualification

Individuals with a high literacy level evaluate a variety of things before purchasing a product. As a result, the investigator inquired about the variable literacy status. According to the study, 50 percent of those who responded to the survey had a high level of education, with either a post-graduate degree (19.3%) or a graduation (30.5%).

Location

The location of the house is thought to have an impact on solar home system purchases. Hence, the researcher set out to examine the location of the respondent. Respondents living in urban areas were 56.3%, and the remaining ones were situated in semi-urban areas (42.8%).

Occupation

Owning expensive products communicates status of a person living in the city. Despite the fact that there were more women than men among the respondents (52.3%), 24.3 percent of them worked full-time at home. The remaining female respondents were both employed and homemakers. Amongst all the respondents who had jobs, 23 percent of the men and 23 percent of the women worked in private employment, 20.3 percent ran their own businesses, and ten percent were employed in government agencies.

Solar home systems possessed by households

The industry now offers a wide variety of solar gadgets as a result of technological advancement. An effort was made to know the solar home systems possessed by the respondents.

Table 3. Solar home system possessed

S. No.	Devices	n=400	Percentage
1.	Solar lighting	282	70.5
2.	Solar water heater	194	48.5
3.	Solar pump	8	2.0
4.	Solar A.C.	4	1.0
5.	Solar chargers	3	0.8
6.	Solar UPS	2	0.5

Percent increases due to multiple responses

According to the Table-3 solar lighting (70.5%) and water heaters (48.5%) were the most common household. The solar charger and solar UPS, with response rates of only 0.8 and 0.5 percent, respectively, were the least well-liked products. The investigation also discovered that although solar pumps, solar chargers, and solar air conditioners were available on the market, consumers did not favour these devices. Homeowners were reluctant to install these devices because of a lack of familiarity with them and a concern of buying obsolescent equipment.

Limitations faced while operating solar home systems

Table 4 shows the percentage of households that have faced limitations while operating solar home systems.

Table 4. Limitations faced while operating solar home system

S. No.	Limitations	n=400	Percentage
1.	Dependent on the intensity of sunlight	114	57.9
2.	Consumes time	99	50.3
3.	High cost	76	38.6
4.	Needs extra space for storage	57	28.9
5.	Limited energy storage	56	28.4
6.	Any other specify	31	15.7

Percent increases due to multiple responses

From Table-4, it can be concluded that the major limitation faced by the households was that the operation of the solar home system depends on the intensity of sunlight (57.9%). They stated that when the intensity of sunlight decreases, the efficiency of the device also decreases which disturbs their daily routine. Nearly fifty percent of the households stated that generating electricity from the solar panels is time consuming, which is troublesome because they become late in other household activities. High cost of the solar home system is limiting factor for the respondents (38.6%) because they cannot afford to buy such expensive items and according to them costly items requires high maintenance. The installation of solar home systems, particularly SPV cells, requires a lot of space, which is not practical for those who live in small apartments and share their terraces with other tenants, as noted by nearly 28.9 percent of the households. Households expressing that solar home systems had insufficient energy storage, which caused them to run out of power were 28.4 percent.

Awareness level on solar energy technology

The researcher examined the awareness level of the households using five-point rating scale. The ratings were assigned as 1-Not aware, 2-Very low aware, 3-Low aware, 4-Moderately aware, and 5- Highly aware. The ratings given by each respondent was considered as the awareness score, households having higher scores have more awareness of solar devices.

Table 5. Awareness level on solar technology

S. No.	Statements		NA	VLA	LA	MA	HA
1.	Substitutes conventional sources	n	143	109	60	52	36
		%	35.8	27.3	15.0	13.0	9.0
2.	Benefits of using	n	97	138	69	47	49
		%	24.3	34.5	17.3	11.8	12.3
3.	Availability in the market	n	95	182	54	40	29
		%	23.8	45.5	13.5	10.0	7.2
4.	Subsidies provided by the	n	291	78	14	17	-

	organization	%	72.8	19.5	3.5	4.3	-
5.	Available brands	n	212	129	34	22	3
		%	53.0	32.3	8.5	5.5	0.8

Note: NA-Not aware VLA- Very low aware LA-low aware MA-Moderately aware HA-Highly aware

From the Table-5 it can be deduced that the awareness level of solar technology ranges from "not aware to low aware" for more than 50 percent of households. Print media and electronic media have not placed much emphasis on spreading awareness of solar technology among customers, which is the main cause of this low level of awareness. Yadav et al., (2020) examined public awareness of PV systems, included data from more than 700 semi-structured household surveys performed in Uttar Pradesh, India. They discovered that existing awareness-raising campaigns and subsidies for promoting PV technologies in rural areas are ineffective. They proposed that, disseminating locally targeted audiences on advertisements that include information on product functioning, financing options for purchasing solar PV systems, and how this connects to subsidies, might be more successful in marketing solar PV in rural areas.

The mean awareness scores are found based on qualification of the respondents for which the results are given below in Table 6.

Table 6 Mean awareness score based qualification

S. No.			Mean	S.D.	n
1.	Qualification	Illiterate	6.19	1.57	90
		School	10.10	4.17	111
		Graduate	11.01	4.44	122
		Postgraduate	14.01	4.67	77
2.	Total		10.25	4.70	400

The mean awareness score for postgraduates was found to be 14.01 which is highest among all other education level out of 16.5 which is maximum score. Households with no literacy received the lowest mean awareness score of 6.19. Hasheem et al., (2022) reported that in comparison to the less educated group, highly educated groups have demonstrated a comparatively greater mean of awareness on solar devices. The situation is predictable because people with higher degrees of education typically have more exposure to different facts and figures that raise awareness levels.

ANOVA test was conducted to statistically test the difference among the awareness scores of all the qualification level and the following hypothesis was framed.

H₀ There is a significant variation in the mean awareness scores among different qualifications.

H₁ There is no significant variation in the mean awareness scores among different qualifications.

Table 7. ANOVA for awareness on solar technology based on qualification

	Sum of Squares	Df	Mean Square	F	Sig.	Critical value
Between Groups	2647.322	3	882.441	56.621	**	
Within Groups	6171.678	396	15.585			
Total	8819.000	399				3.832

** - significant at 1% level

At a 1% level of significance, the computed F-value for the qualification is 56.621, exceeding the critical value of 3.832. As a result, it may be concluded that there is a significant variation in the mean awareness scores of the various groups. This demonstrates the need to raise understanding of solar energy technologies, particularly among those who have not received a good education. Hence, the hypothesis is accepted.

B. Outcomes of the outreach program

Recipient's feedback on a program to increase awareness of solar home systems and their value

The paired 't-test was applied to differentiate the perceptions of the recipient regarding solar technologies before and after the awareness campaign, which is presented in Table 8.

Table 8: Participant's perception of solar energy technologies before and after the program

Variable	Awareness	n	Mean	SD	SE	't' value	P-value
Perception	Before	50	19.86	4.51	0.63	26.52	0.000***
	After	50	44.65	4.71	0.66		

***-significant at 0.001 level

The table no.8.conveys that with $p > 0.001$, there is a highly significant difference in participants perceptions of solar technology before and after the program. The table discloses that the mean perception score before the program was 19.86 and after the program was 44.65. As the mean perception score after the program is higher, it can be admitted that the outreach program has emerged as a positive shift in the recipient's perception of solar energy technology.

The outreach program effect on the public outlook on solar technologies

A paired t-test was implemented to gauge the participant's outlook on the availability and benefits of solar home systems before and after the outreach program. The results are given in Table 9.

Table 9: Participants' understanding of available solar home systems and their benefits before and after the program

Variable	Awareness	n	Mean	SD	SE	't' value	P-value
Understanding	Before	50	3.34	1.13	0.15	43.11	0.000***
	After	50	9.74	0.45	0.08		

***-significant at 0.001 level

Before and after the program, the mean score on an understanding of the availability and benefits of solar home systems was 3.34 and 9.74, respectively. Succeeding the program, it was noticed that at the $p < 0.001$ level, there was a remarkable gain in the understanding of the available solar home systems and their benefits.

CONCLUSION

Though, the government has successfully utilized solar energy resources to overcome energy crisis. However, studies focusing on assessing consumers' awareness to utilize solar energy are scarce in the country. The study addressed the research gap by analyzing the before and after outreach program perception of the consumers to utilize solar energy for household purposes. Combined with the existing consumers' knowledge, the study has also contributed in augmenting solar energy benefits and developing an optimistic outlook and drive to purchase at least one solar home system among the participants. The findings disclose that the outreach program of solar energy devices and its benefits imparted positive effects on consumers' willingness to utilize solar energy.

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A STUDY ON THE SOCIO- ECONOMIC ENVIRONMENT OF WOMEN TEA PLUCKERS OF ASSAM

Kalyani Deka¹, Dr.D.Sumathi²

¹Research Scholar, ²Assistant Professor

Department of Resource Management,

Avinashilingam Institute for Home Science and Higher Education for Women,

Coimbatore, Tamil Nadu-641043

E-mail ID- kalyanideka37@gmail.com

ABSTRACT

The majority of India's tea plantations are found in the country's north-eastern states, mainly Assam and the southern states. The working class in Assam's tea gardens arguably the most oppressed in the organized economy. Tea manufacturing requires a lot of labor as well as land. Since its inception in the early 19th century, low pay, subpar housing, and a lack of social safety have been persistent issues. This study has made an effort to investigate the living circumstances of women tea pluckers of Assam. The study analyses the working conditions and socioeconomic and demographic profiles of the women who pick tea leaves. A sample of 100 women tea pluckers were selected by using a random sampling method from Dibrugarh and Jorhat district, Assam. A self-developed interview schedule was used to elicit the required information for the study which covered all aspects mentioned in the objectives. The result revealed that most of the women tea pluckers were low waged permanently employed workers with inadequate personal protective equipment and tools. Their working environment of them was poor with insufficient wages and more work pressure.

Keywords: Socio-economic Environment, Tea-plantation, Work condition.

INTRODUCTION

India is the world's second-largest tea producer. In addition to being well-known in the global tea industry, Assam has grown the tea business and tea tourism. The tea industry is India's most significant industry. Assam and West Bengal provide the majority of the country's yearly tea output, accounting for 83% of the total in northern India in 2021-22. India is one of the world's top five tea exporters, accounting for around 10% of worldwide exports. India's total tea exports in 2021-22 were 201 million kg in volume. Teas from Assam, Darjeeling, and Nilgiri are among the greatest in the world. The tea garden employees are permanent employees, but because they are paid on a daily basis, they only receive income for the days that they work. Workers are unable to fulfil even their most basic needs due to extremely low wages, trapping them in a cycle of hunger, illiteracy, and poverty. Women employees have limited opportunities to better their life. Wage exploitation in the workplace and breaches of labour rules are frequent. Women make up the majority of the workforce in these areas; nevertheless, they tend to concentrate at the lower levels. Working is made tougher by power dynamics and gender prejudice. Women's commitments to their families are not diminished by their employment. Women are more susceptible in the work market due to views of the varied gender roles that apply

to men and women. Women work while also fulfilling culturally and historically required familial duties. Women must handle their regular occupations, work overtime, and domestic obligations over three shifts due to the gender division of labour. Tea garden women, socioeconomic difficulties - according to a research on Assamese tea garden women in the Sivasagar region (Borgohain, 2020), Assamese tea plantation women workers face poverty, ignorance, and illiteracy. Furthermore, these workers' socioeconomic challenges remained terrible.

NEED OF THE STUDY

The presence of numerous female employees on tea estates is notable in the context of the Indian tea sector. The majority of tea workers are women, particularly those who pick leaves. As a result, women's contributions in this sector are significant. The major themes of this study are women employees' socioeconomic backgrounds and work environments. With 6.5 lakh people on the job every day, more than half of them are women, the tea industry is Assam's largest single employment in the organised industrial sector (ILO, 2015). Women have worked alongside men as labourers in the tea business from its origins. These female employees confront limitations and obstacles at work. They must cope with discrimination at home as well as on the job. This group of women's economic and social roles have yet to be thoroughly researched. The information supplied does not reflect the current socioeconomic situations of women workers engaged in tea picking operations. The present study's purpose is to perform a complete and in-depth assessment of tea garden women's working circumstances and status.

OBJECTIVES

The objectives of study are as follows-

To,

- Study the socio-economic profile of the women plantation workers.
- Know the work pattern and types of tools and personal protective equipment used by the women tea pluckers.
- Find out the problems faced by the workers during their tea-plucking activities.

METHODOLOGY

Research approach

The purpose of the qualitative study was to understand more about the social and economic obstacles that female tea pickers confront. The study's goal is to investigate the socioeconomic issues and challenges that tea pickers, particularly women, face. Qualitative research is a systematic subjective strategy for describing and giving meaning to life events. The qualitative design might assist researchers in gathering information through everyday discussion and observation to assure an in-depth study of psychological, social, and economic elements of tea plantation workers' life.

Selection of study area

The research was carried out in the districts of Jorhat and Dibrugarh in Assam. These areas have a high concentration of tea gardens. Upper Assam has the highest number of tea gardens; hence four estates were picked from these two districts. Any ethnic group can be challenging to contact for a researcher from the majority community. While gathering data, the following factors were taken into account:

Inclusion criteria:

- Women tea pluckers who have experience of a minimum of one year.
- The age group should be 30-60 years.
- Willingness to participate in research.
- Permanent workers will be selected

Exclusion criteria:

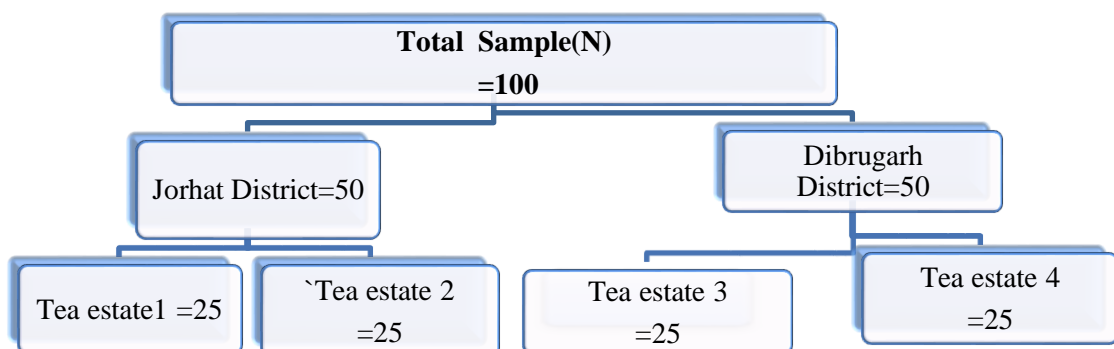
- Women worker who has any history of accident or illness which causes pain in muscles.
- Below 30 and above 60 years of age will not be considered.
- Temporary workers
- Women tea pluckers with less than one year of experience.

To choose the sample from tea estates, the researcher took the following factors into account:

- Personal connection with the tea garden authority
- Link with tea laborer's unions
- Association with organizations working in tea garden areas.

Selection of sample:

The population of the research comprised female tea pluckers who lived and worked on tea plantations. 100 women tea pluckers were chosen at random from four tea farms in Assam's Jorhat and Dibrugarh districts based on their availability and personal interests.



Method and tool of data collection

The primary data collecting methods were interviews and observations. Based on the literature analysis and the study goals, a thorough interview schedule was created. To gain insight into the

social and economic challenges faced by those engaged in tea-plucking activities, open-ended questions were devised with an emphasis on socioeconomic profiles, family features, and labour circumstances. The observation was conducted by taking note of their activities and work habits.

Data collection process

The researcher visited the women tea pluckers in their homes during non-working hours to collect data for the informal interview. Initially, the fundamental goal of the investigation was explicitly conveyed to them. The researcher conducted an informal interview in order to obtain the most accurate and dependable information. The casual interview was designed to help the women tea pluckers feel more at ease when answering questions. Uncontrolled on-site observations of the women tea pluckers to analyse their body postures was done. During the observation approach, a Rapid Entire Body Assessment sheet was utilised as a postural analysis tool combined with a video recording of their job to observe every minute details of their task

Analysis of data

The acquired data was organised, analysed, and interpreted in accordance with well-established qualitative and quantitative research principles and practises. Following data collection, audio recordings and recorded data were transcribed and analysed using the framework of the decent work method. The demographic data was analysed using Microsoft Excel while keeping the study's objectives in mind. As qualitative data, the respondents' explanations and arguments were utilised to support the quantitative data. The data was evaluated and analysed in preparation for discussion, and conclusions were reached in light of the study's objective.

RESULTS AND DISCUSSION

This study used both qualitative and quantitative approaches to create fresh and updated information and empirical data on the working conditions of tea plantation employees. The findings are expected to be useful in identifying issues and implementing appropriate responses to ensure that tea plantation workers fully enjoy fundamental principles and rights at work, safe working conditions, and fair remuneration, without discrimination on the basis of ethnicity, identity, social origin, disability, or other grounds. The findings are expected to be valuable in ensuring decent and productive employment for tea plantation women employees.

Socio demographic attributes of the women tea pluckers

Socio-demographic variables such as- age, level of education, employment status, profession, marital status, number of family members of the women tea pluckers as mentioned in Table 1.

Table– 1 Socio demographic characteristics of respondents

Aspects	Percentage (%) (N=100)
Age	
30 -40	84

41-50	4
51-60	12
Marital Status	
Married	67
Unmarried	12
Widow	21
Family Type	
Nuclear	90
Joint	10
Educational Qualification	
Illiterate	48
Pre-primary	19.
Primary	33
Monthly Income(Rs)	
Below 5000	100

The aforementioned table shows that 84 percent of respondents were between the ages of 30 and 40. 67 percent of respondents (more than half) were married. 90 percent of the respondents came from nuclear families, making it challenging for them to maintain a joint family because their income is very low and their expenses are higher which also aid in their improvement of financial stability. Due to poverty 48 percent of the women who picked tea were illiterate. They prioritized earning money over studying since they needed it to support their families to fulfill their necessities. Only 19 of the respondents had completed pre-primary school, and only 33% had finished primary school. The respondents' average monthly income was less than Rs. 5000. They received weekly wages from the management in the amount of approximately Rs1160 (i.e. 193 Rs/day), which was the standard wage. But it varies and depended on the amount of tea leaves they plucked.

Physical attributes of the women tea pluckers

The physical features of the women tea pluckers, such as height, weight, and BMI, were examined in order to determine their physical fitness. The body mass index was determined using the following formula: $BMI = \text{Weight in kg} / \text{Height}^2 \text{ in metre}$ (Deurenberg et al,1991). The outcomes are shown below-

Table – 2 Physical attributes of the respondents

Physical Attributes	Percentage (%) N=100
Height (feet)	
Below 4'5"	6

4'5"-5'	92
Above 5'	2
Weight(kg)	
Less than 45	30
45-50	62
More than 50	8
BMI	
Less than 18.5	14
18.5-24.9	86

According to the above table, the height of the majority of respondents was between 4'5" and 5' which is typically less than the normal height for their age. Only two percent of respondents were taller than 5'. The body weight of 62 percent of the respondents ranged between 45 and 50 kg. A noteworthy finding in this area is that the weights of 30 percent of the respondents were less than 45 kg. 86 percent of respondents had a normal BMI which is between 18.5-24.9, while 14 percent of respondents had a BMI of less than 18.5, which falls into the category of underweight (as per World Health Organization standard).

Economic attributes of the women workers

Workers in tea gardens often labour six days a week. The researcher inquired about the economic aspects of the women tea pluckers, such as work status (permanent or temporary), earning members in the household, and source of revenue, which are listed in table.3.

The table-3 indicates that cent percent of the respondents were permanent workers. Most of the respondents (52%) had multiple numbers of working family members because individually they were earning less amount of money. So, to fulfill their day-to-day needs and maintain a stable financial condition they had more than one earning person in their family. The majority of the respondents had tea plucker job as their only source of income though the payment was less. This was mainly due to a lack of education and other professional skills.

Table-3: Economic attributes of the respondents

Economic status	Percentage (%) N=100
Type of employment	
Permanent	100
Earning member in family	
Single	48
Multiple	52
Source of Income	
Plantation	72
Plantation and others	28

Tea garden employees are entitled to different sorts of leave under labour legislation, including casual leave, sick leave, and festival leave. Leave is typically permitted in the garden, although the entire situation is contingent on management's willingness. Around 57% of respondents claimed that they receive leave when needed, whereas just 43% stated that they did not receive leave when needed.

Occupational attributes of the women tea pluckers

The occupational characteristics of the women tea pluckers, such as the year they started working, their experience as a tea plucker, and other aspects of their jobs, such as the duration of their work, the amount of loads carried by them, tools and personal protective equipment used during their tasks, were displayed in the tables below (Tables - 4 and Table-5). This knowledge helped the researcher comprehend their task more thoroughly.

Table-4 Occupational attributes

Aspects	Percentage (%) N=100
Starting age of work (years)	
Below 20	56
20-30	32
30-40	12
Working experience	

1-5 years	16
More than 5 years	84
Mode of travelling	
By walk	100
Weight of tea leaves /day	
Below 20kg	18
20-25 kg	20
25-30 kg	62

According to the data above, 56 percent of female tea pluckers began their profession while they were under the age of 20. They began working as tea pluckers at a young age, when they could have been studying, in order to financially support their family and meet their basic necessities. Eighty-four percent of those polled had more than five years of job experience. This suggests they were more skilled at their job and more used to it. Because the worker colonies were near to the tea gardens, 100% of the respondents opted to walk to work. The majority of responders (62%) picked 25-30 kg of tea leaves every day (197 Rs-202 Rs/day). If they could pluck 20 kg (193 Rs a day), the standard payment was provided; however, if their plucked leaves were fewer than the standard need, the payment was deducted. If they plucked fewer than 20kg of tea leaves each day, they were charged Rs 1 per kg. If the responders picked 21 kg-30 kg in a day, they received an extra Rs 1 per kilogramme. Those who picked more than 31 kg and up to 35 kg received Rs 1.50 per kg, while those who plucked more than 35 kg received Rs 1.75 per kg. Despite having multiple family members who worked, their earnings were insufficient to meet their day-to-day needs, which is why they preferred to carry more loads than the standard load (i.e. 20kg), despite the fact that it was beyond their physical limitations and could be harmful to their health. Most women tea pluckers started work at 4 a.m. and finished at 10 p.m., after which they went to bed. On working days, they would conduct home tasks from 4 a.m. until 7.30 a.m. before heading to work at 8 a.m. At work, they had an hour lunch break from 1 pm to 2 pm, which they occasionally missed in order to reach daily plucking objectives, working until 4 pm.

Table-5-Occupational attributes

Aspects	Percentage (%) N=100
Working hours	
8 hour	83
More than 8 hour	17
Breaks during work	
Gets Break	100
Time for break	
Half to one hour	100

Types of tools & PPE	
Basket& any other	69
Only basket for plucking	31
Type of basket material	
Plastic net	72
Bamboo	28
Cushioning in Basket	
No	100
Problem with basket	
Yes	63
No	37
If yes, problem	
Transportation issue	38
Feels too much of weight	7
Handling issue	18
All of the above	37

It is discernable from Table -5 that a maximum of 83% of the respondents worked for 8 hours and very few (17%) of the respondents worked more than 8 hours per day (i.e. 10-12 hours). But they did not get any increment for overtime (i.e. more than 8 hours) work because their payment was only based on the number of tea leaves they plucked on per day basis. Almost all of the respondents had a break of half an hour to one hour during their work time. 69 percent of the respondents had baskets and other tools and personal protective equipment such as umbrellas, and sleepers during their plucking work. On the contrary to a very less percentage of them had only baskets during their plucking time without any PPE. The majority of the respondents (72%) had only plastic net bags to keep their plucked leaves. The season when the data was collected, was not peak season for tea cultivation means very less amount of tea leaves were available at that time. They preferred material as plastic net bags to the heavy traditional bamboo basket. The traditional bamboo basket was mostly used in peak season when tea cultivation was more. Women tea pluckers (28%) had only bamboo baskets for tea plucking. None of the respondents had cushioning attached to their basket to feel less stress in their bodies while carrying the basket. According to most of the respondents, 63 percent faced problems while carrying the basket with tea leaves. Among them, 38 percent of the respondents had problems especially while carrying the basket from one place to another during the plucking of tea leaves. Sometimes the plastic net loaded with tea leaves was ruptured while carried by the women tea pluckers.

Table-6: Problems faced by the respondents during work

Any pain in body during or after work	Percentage (%)
	N=100
Yes	94

No	6
Faced accident while working	
Yes	18
No	82
If yes how often?	
Occasionally	78
Every time	22

The table -6 clearly stated that most (94%) of the respondents have to face body pain during or after their plucking work which is due to the prolonged standing work hours with huge baskets with filled tea leaves which they have to carry around for the whole day. 18% of the respondents had faced accidents during work. The reason behind it is the tea weight carried by them with that they have to jump through the drains which are in between the field and improper personal protective equipment. 78% of them occasionally faced accidents. Animal attacks, leech bites, and snake bites were also prevalent among them during tea plucking works apart from cuts and bruises.

CONCLUSION

Women tea plantation workers are an important component of the tea business, accounting for half of the workforce. Studying their difficulties will reveal the gaps that women confront in this enormous tea plantation industry. The study's key result was that their incomes were insufficient to cover their daily costs. The tea basket they carried was too heavy for their physical capabilities, yet they ignored their bodily concerns and carried the basket to earn extra money. This demonstrated that obtaining money was more important to them than their health. Most of them had many family members who earned money, but their combined earnings were insufficient to support them. There are no higher education institutions located near tea gardens. This was also the primary cause of their illiteracy and lack of education. Aside from that, they lacked adequate personal protection equipment, such as gloves, boots, or body suits, to prevent cuts, bruises, bug bites, and pesticide exposure while working. As a result, they experienced accidents or injuries on the job. If tea estate management is more concerned about difficulties involving women tea pluckers, these issues may be handled with suitable procedures and rules.

Suggestions for future research

- To get more insight into their body discomfort level or body pain a body mapping or Nordic questionnaire can be used as a tool for the study.
- Studies related to government welfare activities for women tea pluckers can be done.

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CUSTOMERS' SATISFACTION WITH SELECTED THEME RESTAURANTS OF DELHI

Dr. Mayanka Gupta¹ and Ms. Mehak Madhok²

Assistant Professor¹ and Research Scholar²

Department of Resource Management and Design Application,

Lady Irwin College, Sikandra Road, New Delhi 110001

mayanka.gupta@lic.du.ac.in,

HSAI Membership Numbers :(1) 14/UP/G-1/LF

ABSTRACT

In the hospitality sector, the concept of customer happiness is crucial since it affects the standard of the services or goods provided. Recently, there has been a sharp surge in theme restaurants, which are primarily created to provide customers with novel dining experiences. Substantial literature has been written about customer satisfaction, but little is known about attributes that affect customer satisfaction in the restaurant segment to direct restaurant owners and managers to provide quality service and goods. The study sought to identify the attributes that are significant and have an impact on customer satisfaction. Sixty customers from two theme restaurants participated in the survey to determine which attributes are important and exceed their expectation for choosing a restaurant to dine at and influence their intent to return. Environment, food quality, service quality, and new eating experiences attributes were examined. According to the findings, customers prioritized food and service quality over novel eating experiences when choosing a theme restaurant. Customers were happy with unique dining experiences but not with the food quality and the service.

Keywords: Theme restaurants, Customer satisfaction, Restaurant attributes, Dining experiences

INTRODUCTION

Restaurants serve as establishments where customers can purchase and enjoy food and beverages in a sit-down setting (Revfine, 2022). However, theme restaurants have gained popularity by offering unique dining experiences that allow customers to immerse themselves in different cultures and cuisines (Wan Nawawi et al., 2018). These restaurants seek to give both a satisfying meal and a memorable experience (Weiss et al., 2004) by utilizing strategic space planning, interior design, and entertainment arrangements (Lee et al., 2015). The ambiance, creative décor, music, and lighting play a significant role in creating an engaging atmosphere and enhancing the overall dining experience (Yüksel & Rimmington, 1998). For theme restaurants to thrive in the market, it is crucial for managers to focus on customer satisfaction and loyalty programs, as attracting new customers alone is insufficient.

Customer satisfaction refers to the extent to which customers are content with their purchases (Oliver, 2020). Service quality is a crucial factor that determines a company's long-term performance, and restaurants rely on customer satisfaction to predict repeat business (Bateson & Hoffman, 2001). To satisfy customers, you must understand and anticipate their wants, provide excellent goods and services, and emphasise their values (Bagli, 1998). Customer satisfaction

boosts an organization's reputation, resulting in repeat business, brand loyalty, and new customers (NG, 2001). Research by Dube, Renaghan, and Miller (1994) revealed that various aspects of the dining experience significantly impact customers' intentions to revisit theme restaurants. Factors such as atmosphere, accommodating and attentive servers, menu diversity, wait time, reliable food, and delicious cuisine were found to have a considerable influence on customer satisfaction and intention to return (Dubé & Renaghan, 1994). Key factors that contribute to customer satisfaction in theme restaurants include:

Food Quality: Consistently proven to be a strong predictor of customer satisfaction and intention to return, food quality encompasses aspects such as safety, appeal, and dietary acceptability (Oh, 2000; Qu, 1997; Pettijohn et al., 1997).

Atmosphere: The environment, in which the service is provided, particularly in theme restaurants, significantly influences customer perceptions and satisfaction (Bitner, 1992).

Service Quality: The quality of service plays a crucial role in shaping customers' behaviors, emotions, and social connections in restaurants (Yuksel & Yuksel, 2002).

Price and Value: Customers consider pricing and value as integral components of the overall service package, and perceiving value for money influences customer satisfaction (Johns & Howard, 1998; Yuksel & Yuksel, 2002).

Novelty: Customers seek sensory and cognitive experiences through their purchasing decisions, and the desire for new experiences and stimulation drives brand loyalty in the service sector (Hirschman, 1984).

By focusing on these factors and ensuring high levels of customer satisfaction, theme restaurants can enhance their competitiveness, build customer loyalty, and drive business growth.

Research objectives

The primary goal of this study is to ascertain attributes that may be used to the theme restaurant business to assess and evaluate customer satisfaction.

1. To measure and evaluate customer satisfaction levels in selected theme restaurants across four key attributes: food quality, service quality, environment, and novelty experiences.
2. To identify specific areas of improvement within the theme restaurants based on customer satisfaction data, pinpointing attributes that receive lower satisfaction scores.

Relevance of the study

Comprehensive understanding of the attributes that significantly influence customer happiness is crucial for managers in the vibrant restaurant scene of Delhi. Existing studies have not effectively addressed this restaurant business niche, underlining the need for further research. By gaining insights into the attributes that impact customer satisfaction, managers can evaluate performance, implement effective customer service strategies, and enhance the overall dining experience. This knowledge allows for informed decision-making, optimal resource allocation, and creates memorable experiences that foster loyalty and attract new customers in the highly competitive restaurant market. Understanding customer satisfaction enables data-driven decision-making, continuous improvement, and theme restaurants performance in delivery assessment, exceeding customer expectations, sales, profitability, and workplace culture (Kandampully & Suhertanto, 2003).

METHODOLOGY

Study location

The descriptive study was conducted in Delhi, India, due to its urban setting and the recent emergence of numerous theme restaurants. Delhi boasts a vast culinary landscape, including both professionally run establishments and independent ones. According to a study by Khosla (2022), there are over 95,187 restaurants in Delhi, out of which 32,777 are organized and hold valid certifications such as the FSSAI number and GST registration. This abundance of restaurants provided a suitable backdrop for investigating customer satisfaction in theme restaurants.

Sampling frame

The target population consisted of fine dining theme restaurants in Connaught Place, Delhi, operating for at least five years. A list of 20 such restaurants was compiled using online directories, review websites, and local recommendations.

Sample selection

Two restaurants were randomly selected from the list to ensure unbiased representation and generalizability of findings.

Sampling method

To minimize interference and disruption, a systematic sampling approach was employed. Every 10th customer (over 18 years) during lunch and dinner hours was approached to participate in the survey.

Sample size

The final sample included 60 customers, 30 participants from each selected restaurant. The average footfall (weekly) of the restaurant was 620 and 590 respectively. The sample size was determined based on available resources and time constraints, aiming for a diverse range of perspectives.

Data Collection

With permission from the restaurant owners, surveys were conducted over a week, twice daily, covering the entire weekly cycle of the restaurants. Data collection occurred during peak hours of lunch and dinner (1:00–3:00 pm and 7:00–9:00 pm) to capture varied customer experiences. Surveys were administered after customers finished their meal, ensuring an uninterrupted dining experience.

Participant diversity

The sample represented a diverse range of customers, including families, couples, business clientele, and students. No specific differentiation based on gender or age groups of the restaurants was made to capture a broad customer base.

Research tools

Direct Observation: It was conducted to record the general ambiance, cleanliness, meal serving time, staff-customer relationships, promptness of service, food appearance, and restroom upkeep. Photography was used to aid the observation. Observation sheets comprised a checklist of the varied restaurant attributes.

Customer Satisfaction Questionnaire: The questionnaire was adapted from the "Dining Experience Survey" developed by Kivela, Reece & Inbakaran (1999). It focused on four key aspects food quality, service quality, environment, and novelty. The demographic profile, seven food and service questions, eight environment questions, and one novelty question comprised the questionnaire. Three final questions pertained to overall satisfaction with food, service, and

atmosphere. Participants were asked to rate their responses on a Likert-type scale, ranging from "did not meet the expectation" to "meet the expectation completely". The questionnaire also included a measurement of the participants' intent to return to the restaurant.

The research used direct observation and questionnaires for a comprehensive evaluation of customer satisfaction from objective and subjective perspectives.

Validity and reliability of the tool

Kivela, Reece & Inbakaran (1999) validated the research by conducting assessments to ensure construct validity, accurately measuring customer satisfaction. Furthermore, a panel consisting of diners, industry managers, and industry scholars reviewed the questionnaire items to validate their content. Cronbach's alpha was 0.50, suggesting that the questionnaire's reliability and internal consistency was moderate.

Ethical considerations

The study obtained ethical approval from the Technical Review Board (TRB) at a college of the University of Delhi. Forms of informed consent outlined the purpose and methodology of the research and ensured participants' anonymity and confidentiality.

FINDINGS AND DISCUSSION

Profile of the restaurants

The study examined two theme restaurants in Delhi, each with its unique concept. The first restaurant featured an upscale buffet with a rainforest motif, while the second restaurant embraced a Goan theme. The findings suggest that while both theme restaurants created unique dining experiences through their themed decor and ambiance, there were notable differences in cleanliness, kitchen practices, and service efficiency (Table 1).

Table 1: Summary of Restaurant Characteristics

Attributes	Restaurant 1	Restaurant 2
i. The decor matches theme	Matched the jungle theme	Matches the Goan theme
ii. Tables and chair set and orderly	Wooden tables and chairs orderly arranged	Bamboo chairs orderly arranged
iii. Restaurants appears clean and orderly	Clean and orderly	Did not look clean and fresh
iv. Clean restaurant and mopped regularly	Regularly cleaned and mopped	Not regularly cleaned and mopped.
v. Windows and other glasses were clean	Windows were not regularly clean. Cleaned twice a week	Windows were not regularly cleaned
vi. Lighting was appropriate	Green, Blue and yellow lighting matched décor and was well lit.	Poor illumination and upkeep. Replaced damaged bulbs seldom.
vii. Overall noise level was acceptable	Not acceptable because of animal sounds	Acceptable noise level
Kitchen		

viii. Separate vegetarian and non-vegetarian section	No separate section. Though cleansed before use, cooking ladles, chopping boards, tools, and silverware were the same.	No separate section. The ladles, chopping board, utensils, cutlery used for cooking was same
ix. Kitchen appears clean and hygienic	Hygienic, frequently wiped. Raw vegetables and fruits regularly washed. Working centres were sanitized.	Did not appear clean after cooking Sink and working centres including slabs were dirty. Vegetables and fruits were not washed before cooking.
x. Working in the kitchen appears smooth and orderly	Staff shouted and rushed to fill orders and buffet containers.	Working was not smooth and orderly. Orders were delayed due to staff disorganization.
Food		
xi. Food appeared fresh	Freshly prepared	Vegetables and fruits used for cooking seemed stale.
xii. Food appeared attractive and well garnished	Presentation of food was attractive and well garnishing	Presentation of food was attractive and well garnished
Service Staff		
xiii. Well Groomed and professional	Staff was well groomed, dressed professionally	Well-groomed and dressed staff. Served food and cutlery well, moved swiftly, and spoke positively.
xiv. Friendly, positive and seemed to enjoy their work	Friendly, upbeat, and enjoying their job at the service tables, yet chaotic in the kitchen.	Most of the staff was friendly, positive, seemed to enjoy their work
xv. Appeared neat and clean	Neat and clean service staff	Neat and clean service staff
Service		
xvi. Timely service in taking order	Orders taken quickly but pandemonium to finish	Timely service in taking orders
xvii. Efficient and timely service of the food items ordered	Timely buffet food refills and beverage delivery	Efficiently and timely delivery was not done.
xviii. Food served professionally	Food professionally served	Food served professionally
Restrooms		
xix. Toilet and sinks clean and in good condition	Toilets and sinks were clean and in good condition	Toilets and sinks were clean and in good condition
xx. Soap dispensers stocked and functional	Soap dispensers well stocked and functional	Soaps dispensers well stocked for future use
xxi. Restrooms smelled clean and sanitary	Restrooms were clean	Restrooms were sanitary and clean

Both establishments demonstrated attention to detail in their furnishings, interior design, and lighting, effectively creating an immersive dining experience that aligned with their respective themes. The first restaurant maintained high cleanliness standards, while the second fell short. In terms of food preparation practices, both restaurants lacked a separate area for preparing vegetarian

and non-vegetarian dishes. The same utensils and silverware were used for cooking both types of cuisine, albeit rinsed with water beforehand. Despite this, the kitchen in the first restaurant was observed to be immaculate, hygienic, and compliant with health and safety regulations. However, the second restaurant did not meet the same level of cleanliness and organization in its kitchen. Both restaurants demonstrated a commitment to providing excellent customer service. However, there were some variations in the efficiency and promptness of service. In the second restaurant, customers experienced delays in receiving their orders, indicating a potential need for improvement in streamlining operations and reducing wait times. The kitchen staff in the second restaurant appeared disorganized, leading to slower meal preparation and delivery.

The findings emphasize the importance of cleanliness, hygiene, and efficient service in theme restaurants. The first restaurant excelled in these areas, contributing to a positive customer experience. The second restaurant needs improvement in cleanliness, kitchen organization, and service efficiency. These insights can help managers and owners enhance customer satisfaction and loyalty.

Customer demographics

The sample consisted of a higher percentage of men (61.02%) compared to women (38.98%). The age range of the participants varied from 18 to 62 years, with 70 percent falling between the ages of 25 and 45. This age group was predominant due to the location of the restaurants, which attracted a significant number of working individuals. Among the customers, 59 % were college graduates. In terms of income, the majority (43.3 %) fell within the range of Rs 5,000,000 to Rs 10,000,000. Since these were fine dining restaurants, it is probable that older employees had more profitable jobs and are more likely to dwell in homes with multiple income contributors.

Usage pattern

61.6% of customers were not influenced by the theme when choosing a theme restaurant. Instead, 41.6% relied on their previous experience, while 37% considered word-of-mouth recommendations from friends and relatives. Only 8% were swayed by discounts, and 13% chose a restaurant based on proximity to their homes or workplaces. The average spending per visit ranged from 2000-4000 rupees, with customers typically spending more than 40 minutes at the restaurant. These findings highlight the importance of delivering consistent and positive dining experiences to attract repeat customers.

Satisfaction with restaurant attributes

The analysis (Table 2) provides insights into the satisfaction levels of customers represented by 26 items within four categories i.e. food, service, atmosphere, and novelty experience. The mean scores were ranked in descending order to identify the most and least satisfying attributes. Higher mean ratings indicate attributes that exceeded customers' expectations, while lower mean scores suggest areas of dissatisfaction.

Table 2: Customers Satisfaction with Restaurant Attributes of Selected Restaurants

S.No.	Attributes	Mean	S.D	Did not meet expectation	Meet expectation to a low extent	Meet expectation somewhat	Meet expectation to a large extent	Meet expectation completely
In percent								
1.	Offers new dining experience	4.46	0.61	-	-	5.9	41.6	51.5

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2.	Friendly staff	4.43	0.68	-	-	10.9	34.7	53.5	
3.	Restaurant appearance	4.28	0.86	2	1	11.9	36.6	47.5	
4.	Feels comfortable to eat	4.14	1.11	4	5	16.8	20.8	52.5	
5.	Greeting customers	4.03	0.90	-	3	29.7	27.7	38.6	
6.	Food presentation	4.03	0.89	1	1	28.7	31.7	36.6	
7.	Attentive staff	4.00	0.91	1	1.7	28	31.7	36.6	
8.	Food quality	3.90	1.11	3	4	36.6	11.9	43.6	
9.	Staff appearance	3.69	1.29	8.9	4.0	36.6	8.9	40.6	
10.	Food tastiness	3.68	0.90	2	7.9	25.7	47.5	15.8	
11.	Level of rest comfort	3.52	1.7	6	7.5	27	45	14.6	
12.	Willing to serve	3.43	1.67	21.8	13.9	8.9	8.9	45.5	
13.	Efficient service	3.48	1.18	6.9	5.9	48.5	7.9	29.7	
14.	Knowledgeable staff	3.34	1.01	5.9	10.9	36.6	34.7	10.9	
15.	Restaurant temperature	3.14	1.56	8	11.3	36.8	33	10.9	
16.	Rest cleanliness	3.26	1.63	26.7	4	22.8	7.9	37.6	
17.	Handling of complaints	3.25	1.63	20.8	19.8	11.9	6.9	39.6	
18.	Service of a consistent standard	3.1	1.50	20.8	21.3	11	6.9	39.6	
19.	Menu item variety	2.78	1.23	21.8	14.9	33.7	20.8	7.9	
20.	Food of a consistent standard	2.50	1.38	37	16	22	11	14	
21.	Food freshness	2.57	1.37	35.6	7.9	26.7	20.8	7.9	
22.	Food temp	2.10	1.32	42.6	29.7	13.9		12.9	
23.	Dining privacy	2.09	1.43	47.5	29.7	2	5	14.9	
24.	Noise level	2.03	1.52	47.8	29.9	2	5	14.7	
25.	View from restaurant	1.69	0.82	49.5	33.7	13.9	1	1	
26.	Nutritious food	1.28	0.84	80	16	2	1	1	
Overall Mean		3.23	1.19						

Among the attributes, the highest mean score of 4.46 was achieved by the attribute "restaurant offers a new dining experience," indicating that customers were highly satisfied with the unique

and innovative experiences. Several attributes related to service and atmosphere also received positive feedback. "Friendly staff," "overall restaurant appearance," "comforts to eat there," and "staff greeting their customers" all obtained mean satisfaction scores above four. This indicates that customers appreciated the welcoming and pleasant atmosphere created by the friendly staff and visually appealing restaurant settings.

However, there are areas that require improvement. The attribute "nutritious food" received the lowest mean score of 1.28, indicating customer dissatisfaction. Customers expressed concerns about the greasiness of the food and the lack of nutritional information or meal preparation instructions. Other attributes that received lower mean scores included "view from rest," "noise level," "dining privacy," "food freshness," and "food temperature." Customers reported limited views due to enclosed interiors, which affected their dining experience. The noise level in the restaurant was deemed disruptive, compromising conversations and privacy. Customers also expressed dissatisfaction with the lack of private seating options. Furthermore, they raised concerns about the freshness and temperature of the food, perceiving it as being served cold and questioning its freshness.

The overall mean score of 3.23 (S.D.=1.19) indicates that most attributes were slightly above the midpoint of the Likert scale. While these attributes met customer expectations, they did not significantly exceed them. This suggests that there is room for improvement to deliver exceptional experiences that go beyond customer expectations.

In conclusion, theme restaurants were successful in providing unique dining experiences and maintaining positive attributes such as friendly staff and appealing restaurant appearances. However, there is a need to address customer concerns regarding nutritious food, views, noise levels, dining privacy, food freshness, and temperature. By focusing on these areas and striving to exceed customer expectations, theme restaurants can enhance overall customer satisfaction and create memorable dining experiences.

Customer's intent to return to the restaurant

Customers' intent to return to the restaurant was analyzed, revealing important insights (Fig 1). Only 35 percent expressed optimism about returning, citing the novel dining experience and unique ambiance. However, approximately 42 percent stated they would not return, primarily due to inconsistent food quality and ineffective service. Ineffective service was another significant factor influencing their decision, with 21.3 percent of respondents expressing dissatisfaction with delays in order delivery, slow response from staff, and inadequate attention to customer needs such as water and cutlery. Additionally, issues related to noise levels and cleanliness contributed to their discomfort while dining. Some customers also mentioned high prices and perceived lack of value for money as deterrents to returning to the restaurant. This indicates that pricing strategies and ensuring perceived value are crucial factors in customer retention.

Overall, the mean score of 2.88 (S.D. =1.19) indicated a leaning towards not returning. The stated reasons for customers' intent to return or not return align with their satisfaction with the restaurant's attributes, reinforcing the link between customer satisfaction and their propensity to revisit. However, further statistical research is necessary to validate and strengthen these conclusions.

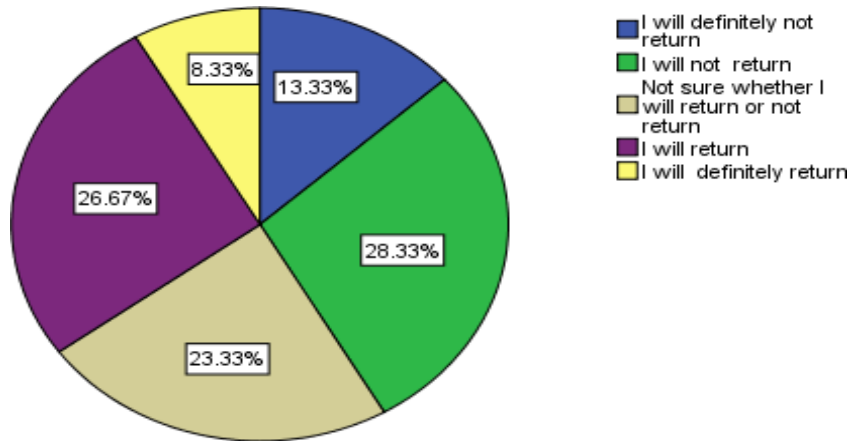


Fig. 1: Customer Intent to Return to Restaurant Again

CONCLUSION

In the highly competitive food industry, theme restaurants aim to provide a unique and satisfying dining experience to attract and retain customers. The findings suggest that customers' satisfaction with various attributes, such as food quality, service, atmosphere, and novelty experience, significantly influences their decision to revisit a restaurant. The study highlights the importance of offering a novel dining experience to customers, as it was positively correlated with the intent to return. However, it is crucial for restaurants to prioritize food quality and consistency, as customers prioritize these factors when choosing a dining establishment. Addressing concerns related to nutritional value, freshness, and standardization of the cuisine can enhance customer satisfaction and loyalty. Additionally, the study emphasizes the significance of effective service delivery, including promptness, attentiveness, and maintaining a comfortable dining environment. Cleanliness and noise levels were identified as areas for improvement, indicating the need for enhanced protocols and attention to detail.

Moving forward, managers and owners of theme restaurants can utilize these insights to improve their operations and meet customer expectations. This may involve implementing better training for kitchen staff, ensuring separate sections for vegetarian and non-vegetarian food preparation, providing clear nutritional information, and focusing on service consistency.

Future research can explore the relationship between customer satisfaction and loyalty, the impact of technology on customer satisfaction (such as mobile ordering and personalized recommendations), and the influence of nutritional information and dietary preferences on customer satisfaction. It is important to note that this study had limitations, including its focus on only two restaurants due to constraints in time and resources. Conducting similar research on a larger scale could provide more comprehensive insights into customer satisfaction and behavior in theme restaurants.

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EXAMINING THE FEASIBILITY OF REGENERATED BAMBOO FABRIC AND ITS BLENDS FOR HOME FURNISHINGS

Radhika Suppiah¹ and Dr. M.R.Thilakam²

¹Ph.D. Research Scholar, Professor, and HoD²,

Resource Management Department

Avinashilingam Institute for Home Science & Higher Education for Women,

Coimbatore, Tamil Nadu – 641043

(1) radhika.dec1@gmail.com (2) dr.m.r.thilakam57@gmail.com

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ABSTRACT

Modern bamboo fiber is lauded for being a novel, green, environmentally friendly textile material with significant medical potential. Bamboo fibers are unique due to their ability to absorb moisture, anti-bacterial, and elasticity properties. Thus, it may be utilized effectively in the manufacturing of apparel and home furnishings. This investigation seeks to assess the viability of regenerated bamboo fabric and its blends for home furnishings. In accordance with market availability, regenerated bamboo woven and knitted fabrics were predominantly selected for this analysis. The fabrics used in this research were bamboo woven (100%), bamboo cotton lycra (67/28/5), and bamboo cotton fleece (68/32). These materials were selected for the study because they are part of a new and emerging category of textiles that are not already accessible in the local market. Fabric performance properties have been determined by a number of tests, including those for flammability, absorbency, abrasion resistance, fabric thickness, drape measurement, stain resistance, pilling, tensile strength, and bursting strength. The results of the tests show that such fabrics have the necessary performance qualities to develop different home furnishing applications, which might have great potential to establish a new market in domestic and global levels. The purpose of this research is to determine whether bamboo-based materials have been used to make home furnishings.

Keywords: Feasibility, Regenerated bamboo, woven and knitted fabrics, home furnishings

INTRODUCTION

Regenerated bamboo is a recently introduced as a cellulose fiber for clothing and household furnishings (Gericke, and Pol 2010). Over the years, bamboo has been used for a variety of applications, including construction, decoration, slope management, and high-performance composites. Exceptional properties of bamboo fiber make it suitable for textile production. The regenerated bamboo fabric has extraordinary tensile strength, UV protection, antibacterial and biodegradable properties, high moisture absorption, softness, sheen, and high flexibility under flexible compressive loads. (Rathod, 2014). Regenerated bamboo cellulose filaments that are moisture-absorbent, breathable, and quick-drying offer superior comfort for a variety of applications. Micro-cracks and micro-holes dominate bamboo fiber's cross-sectional structure. This property contributes to fiber-reinforced materials' moisture absorption and permeability. Intimate apparel, such as sweaters and swimwear, and domestic textiles, such as blankets and towels, are increasingly fabricated from bamboo. Clothing made from bamboo fiber is absorbent

and comfortable. It has a pleasing luster and a vivid color (Chidambaram, 2012). Currently, intimate apparel, hygiene and sanitary products, nonwovens, and home furnishings utilize regenerated bamboo fiber.

Ramakrishnan et al. (2015) notify that bamboo textiles are in high demand due to their antibacterial properties, biodegradability, high hygroscopicity, suppleness, and UV protection. Regenerated bamboo is a cellulose fiber recently introduced to the apparel and household textile markets. Nevertheless, bamboo viscose is more expensive than other cellulose fibers. In addition to superior comfort and traction, it is advertised as having antimicrobial properties. (Gericke and Pol, 2010).

JUSTIFICATION

In India, bamboo textiles are still in the process of being developed and are only available in a few locations. Fabrics made from bamboo that has been regrown are unavailable on the local market. The availability of bamboo textiles on the market was not discussed in any of the reviews, despite the various benefits that these textiles offer. In addition to this, there is a lack of understanding among consumers regarding the exclusive fabric. Therefore, the objective of this study is to determine the viability of regenerated bamboo blend fabrics for home furnishings. This study investigates the performance characteristics of regenerated bamboo blend fabrics to ascertain their feasibility for use in home furnishings. The following objectives were upheld for the duration of this investigation:

OBJECTIVES

1. To analyze the performance characteristics of fabric constructed from regenerated bamboo fabrics.
2. Determine the feasibility of regenerated bamboo fabric and its blends for home furnishings.

MATERIALS AND METHODS

For the purpose of this study, regenerated bamboo and its blend materials were utilized. These blended fabrics were bamboo cotton fleece (68/32) and bamboo cotton lycra (67/28/5). The selection of the samples was made after considering all of the accessible possibilities on the market. Fabrics used for home textiles need to have characteristics such as resistance to light, resistance to seam slippage, resistance to pilling and stains, resistance to sponging, resistance to flame, and preservation of appearance. (Kashyap, 2015). The key qualities of furnishing fabric were used as a basis for conducting an analysis and carrying out measurements to determine the characteristics that are required for home furnishings. In addition to the drape measurement, other features of woven and knitted bamboo fabrics that are evaluated include water absorbency, flammability, and abrasion resistance, fabric thickness, bursting strength, tensile strength, and pilling properties.

The **fabric weight** (GSM) and **blend compositions** are tested through the (IS: 1964, IS: 667) method. And using a Martindale Abrasion tester, samples of woven and knitted regenerated bamboo blends were tested for their **abrasion resistance**. ISO 12947-2 method was used for the test. The **fabrics absorbency** was evaluated using a drop test in seconds. The **pilling preference** of fabrics

was tested using ISO: 10971(part):2011 Reaffirmed 2021) method at R.H.65.5% \pm 2% and temperature 27degrees C \pm 2%. The **thicknesses of fabrics were** tested in accordance with the ASTM D1777

(Reapproved 2019) standard at: R.H. 65% \pm 2% and Temp, 21 Degree C \pm 1Degree C for both woven and knitted regenerated bamboo and its blend fabrics. **The flammability test** was carried out using the vertical flammability ASTM D 6413 method.

The **bursting strength** of bamboo cotton fleece and bamboo cotton lycra was measured by using ISO 13938 – 1: 2019 method. Mullen Burst Strength Tester was used for measuring bursting strength. The **tensile strength** of bamboo woven (100%) tested using the strip method specified in ISO 13934:1999(2013), the sample was evaluated at R.H. 65.5% \pm 2.5% and Temp. 21degree C \pm 1.1%.ISO 105 – X12 unit, and the grading method used to determine the **color fastness** of all selected fabrics. And also the **stain resistance** of all samples tested by using AATCC Red 40 stain scale method. Grade was used to evaluate the samples. The most common method for evaluating the performance of textile materials during use and processing is the strength test. The **drape measurement** of bamboo woven 100% measured R.H.65% \pm 2% and Temp.21 degrees C \pm 1. The sample was conducted in accordance with the BS 5058 – 1973 method. According to the various test methods, the fabric performances are found to assess the feasibility of regenerated bamboo and its blend fabrics for home furnishings.

Bamboo woven Bamboo cotton fleece Bamboo cotton Lycra

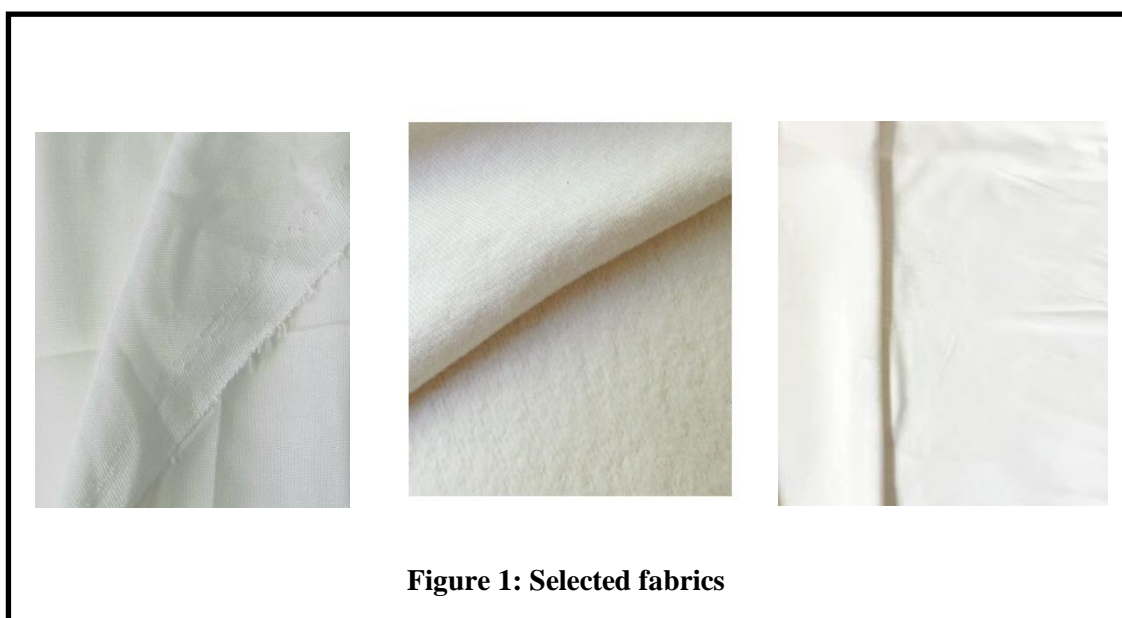


Figure 1: Selected fabrics

RESULTS AND DISCUSSION

The blend composition of the fabrics presented in Table 1; these are the specifications of the fabrics that were utilized in this investigation. As stated in Barker's (2007) the term "blending" is used by the manufacturers of yarn to describe the series of processes that are required in order to convert two or more different types of staple fibers. This has led to the blending of fibers in order to reduce

the overall cost of the product and achieve a balance in terms of its physical properties, such as its look, tensile strength, ability to retain moisture, level of comfort, and ability to recover from creases. The table 1 shows that the blend compositions of selected fabrics for home furnishings.

Table1: Blend Composition of Selected Fabrics

Type of fabrics	Blend composition in percentage
Bamboo woven	100% Bamboo
Bamboo cotton fleece (Knitted)	Bamboo 65.10, Cotton 34.90
Bamboo cotton lycra (Knitted)	Bamboo 66.71, Cotton 28.41 Lycra - 4.88

According to Table 1, bamboo cotton fleece is composed of 65.10 percent bamboo and 34.90 percent cotton fiber, whereas bamboo cotton lycra consists of 66.71 percent bamboo, 28.41 percent cotton, and 4.88 percent lycra.

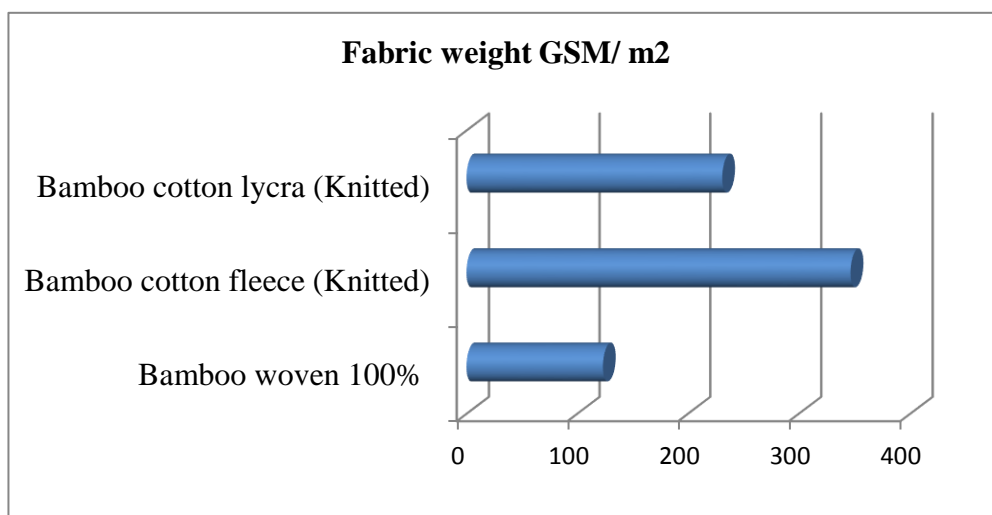


Figure2: Weights of the Selected Fabrics in GSM /m2

The figure 2 shows that, weight of the selected fabrics. The test result indicates that the weight of bamboo woven (100%) is 123.29 GSM, bamboo cotton fleece 346.59 GSM and bamboo cotton lycra is 231.10 GSM. The fabric weight influences the fabric's feel, i.e., the qualities that contribute to the fabric's warmth, fluffiness, drape, and comfort. It is expressed as either gram (ounces per square yard) or grams per linear meter and is calculated as the mass of fabric per unit area (ounces per linear yard). According to Kothari (1999), it is also expressed in terms of linear meters per kilogram with the specified width of the fabric. Rathod, (2014) indicate that the fabric weight of bamboo/cotton blends is greater than that of 100% bamboo fabric. The results of this study also designate that bamboo cotton has a higher GSM value than the other materials examined.

Table 2 shows the outcomes of tests for physical properties such as drape measurement, pilling rate, fabric thickness, and abrasion resistance of bamboo woven 100% and bamboo blends knitted fabrics such as bamboo cotton lycra and bamboo cotton fleece.

Table2: Physical Properties of Selected Fabrics

Tests	Bamboo woven (100 %)	Bamboo cotton fleece (Knitted)	Bamboo cotton Lycra (Knitted)
Drape measurement	58.32(Mean Drape Coefficient, %)	-	-
Pilling rate	4	4	2
Fabric thickness (mm)	0.26mm	1.35mm	0.64mm
Abrasion resistance	2	2	2

Mean Drape Coefficient (%) for regenerated bamboo woven fabric is 58.32 knitted fabrics are relatively floppy, so garments constructed from them tend to contour the body. Woven fabrics are more rigid than knitted fabrics, so they are used to create tailored clothing that hangs away from the body and conceals its contours. Curtains, and tablecloths, must have a good drape and aesthetic appearance. Good draping enables a fabric to be draped over a surface without wrinkling or tearing. The drape of a fabric is measured to determine its ability to drape in graceful curves (Wang and Hurren, 2008).The low value of the drape coefficient indicates that the fabric has good drape or a low percentage of the drape coefficient indicates that the fabric has good drape. (www.textileadvisor.com/2020/04/testing-of-drape-coefficient-of-fabric.html). The drape measurement test result indicates average drapery ability for use as home furnishings. This examination was conducted with RFD material. The co-efficient may change after the fabric has been dyed.

Sumon (2010) define pilling as bundles or balls of tangled fibers that are held to the fabric's surface by one or more. The rate of pilling for bamboo woven and bamboo cotton fleece is 4. Knitted bamboo cotton lycra is 2. According to ACT requirements, there must be at least three for upholstery fabrics. (Jamshaid et al, 2021). Except for bamboo cotton lycra, all of the bamboo-regenerated fabrics that were evaluated for pilling performance were deemed satisfactory by the test results. Hence it is appropriate for furnishing applications.

Bamboo woven fabric is 0.26mm in thickness whereas the thickness of bamboo cotton fleece is 1.35mm and bamboo cotton lycra is 0.64mm. It is observed that bamboo cotton fleece has a greater thickness. During rubbing, a 9kpa pressure was applied to the fabric for abrasion resistance of selected fabrics. 2000 cycles rub, was utilized for all samples. The abrasion resistance of regenerated bamboo blend fabrics yielded the expected result, with a rate of 2. Wang et al, (2009) mentioned that bamboo fiber has tremendous water and moisture absorbency, as well as better in pilling and abrasion resistance.

Table 3 shows the tensile strength of bamboo woven and bursting strength of both knitted fabrics which are selected for test.

Table 3: Fabric Strength of Selected Fabrics

Tests	Bamboo woven100 %	Bamboo cotton fleece (Knitted)	Bamboo cotton Lycra (Knitted)
Tensile strength	Warp strength 34.55, Weft strength 27.21,	--	--
Elongation	Warp elongation 16.54, Weft elongation 18.40	--	--
Bursting strength(kgs/sq.cm)	--	9.15	7.31

The results of the tensile strength test indicated that the cloth had warp strength of 34.55 kilograms and weft strength of 27.21 kilograms. The elongation of its warp was 16.54 percent, and the elongation of its weft was 18.40 percent. According to the Joint Industry Fabric Standards and Guidelines (2010), all woven fabrics are required to have a tensile strength of at least fifty pounds. The warp and weft values of woven bamboo cloth are both higher than 50. According to the performance specifications provided by ASTM, upholstery textiles are not required to meet any minimum or maximum elongation requirements. Table 3 reveals that bamboo cotton fleece has a higher bursting strength than bamboo cotton lycra. This is one of the observations that can be made from this data. The Table 4 represents the water absorbency, color fastness and stain resistance of selected fabrics.

Table 4: Water Absorbency, Colour Fastness and Stain Resistance of Selected Fabrics

Tests	Bamboo woven (100%)	Bamboo cotton fleece (Knitted)	Bamboo cotton Lycra (Knitted)
Water absorbency (mm)	Drop spreads up to 19mm diameter in a circle within 5 seconds	Drop spreads up to 7 mm diameter in a circle within 4 seconds	Drop spreads up to 7 mm diameter in a circle within 1minute
Colour fastness rate	4 -5	4 -5	4 -5
Stain resistance Rate	5	4	4

According to Manjit (2009), absorbency is the capacity of a substance to absorb moisture. The rate at which a fabric collects moisture and releases it through evaporation has a significant impact on health and comfort. The normal absorptive capacity of textile fibers varies, however absorbency can be improved through fabric manufacturing or finishing, as stated by Mohanram (2007).

The absorbency of regenerated bamboo and its blend fabrics are displayed in Table 4. The absorbency of the fabrics was evaluated using a drop test. Wetting and time affects moisture management properties of textile fabrics. In accordance with the test technique, the results indicate that a bamboo woven fabric drop spreads up to 19 mm diameter in a circle within five seconds, a bamboo cotton fleece drop spreads up to 7 mm within four seconds, and a bamboo cotton lycra drop spreads up to 7 mm during one minute. All samples have absorbency within the range of 30 seconds,

which implies a slow wetting time according to Hu et al (2005). Cellulosic fibers are generally perceived as comfortable mainly due to their excellent ability to absorb water (Gericke and Pol, 2010). The results indicate that bamboo cotton fleece absorbs more water than bamboo woven and bamboo cotton lycra. This investigation indicates that all samples had a high-water absorption rate. This performance attribute demonstrates the fabric's comfort and suitability for home furnishings. This research reveals that all samples are suitable for usage in furnishing applications.

A colour fastness test was conducted to determine the fabric's ability to retain its colour when exposed to various environmental factors. All of the samples fall within the range of 4-5. According to Jamshaidet al.(2014) the range from 1 very low colour fastness to 8 very high colour fastness. The outcome of the test indicates that all samples exhibit comparable levels of colour fastness. According to ASTM standards, these grades are recommended for use in furnishings. The stain resistance tests were conducted for all selected samples. Both the knitted fabrics received a heavy coffee stain. The stain resistance rate of both fabrics is 4. Due to its end use as a curtain, heavy dust is employed for bamboo woven (100%) fabric. The test result reveals a grade of 5. According to the AATCC Red 40 stain scale, grade 10 indicates no stain, while grade 1 is severely stained. Without dye the samples demonstrated average results; however, dyeing the fabric may increase its stain resistance.

Flammability of fabric refers to their burning behaviour and particularly to the ease of ignition and continued burning after ignition. Table 5 shows that the flammability results of the samples.

Table 5: Flammability of Selected Fabrics

Test	Bamboo woven (100%)	Bamboo cotton fleece (Knitted)	Bamboo cotton Lycra (Knitted)
Flammability (In second)	After flame 27.7, Afterglow 11.8	After flame 57.2, After glow 22.2	28.0 (Flammability in second)

The burn time, after glow time was determined by the vertical flame test method. The high amount of smoke and afterglow time indicates the hazard. Test results shows the flame time and glow time of all samples were within 60 seconds. The regenerated bamboo fabrics which are taken for this study could be used for home furnishing applications as the flammability results adhere to the standards.

CONCLUSION

The test results showed that regenerated bamboo fabrics such as bamboo fabric, bamboo cotton fleece, and bamboo cotton lycra have qualities suitable for usage in home furnishings. Therefore, the study concluded that these materials might be used for home furnishings. Particularly crucial to the durability of home furnishings is the fabric's breaking strength, abrasion resistance, flammability, water absorbency, pilling, drape measurement, and fabric thickness. The results of the tests show that bamboo cotton fleece has excellent performance characteristics and is hence highly recommended for usage as an upholstery fabric. The test results also showed that the bamboo100%woven had sufficient drapability, tensile strength, and color fastness grade, all of which are key quality attributes for curtains. Consequently, one may confidently suggest this fabric for use as window coverings. For a fabric to be considered ideal, it must meet several criteria, including being

soft to the touch, strong enough to last, easy to care for, and comfortable to use. Because of its antibacterial properties and the fact that it is a natural fabric, the regenerated bamboo fabric is soft, comfy, and completely safe to use. The cloth is also biodegradable and harmless to the environment. Therefore, it is appropriate for usage in indoors. Blending different fabrics is a common technique used to improve both the functional and aesthetic properties of textiles. According to the performance characteristics of regenerated bamboo blend fabrics are suitable for home furnishings.

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A STUDY ON THE SATISFACTION LEVEL OF JNNURM BENEFICIARIES

Sai Sudha Paravada¹ and Dr. V.Sarasvathy²

¹Research Scholar, ² Assistant Professor (SS)

¹HSAI Membership No. HSAI - 2019-AD-388-LF

Department of Resource Management,

Avinashilingam Institute for Home Science and Higher Education for Women,

(Deemed to be University), Coimbatore – 641043

Email: saissudhha06@gmail.com

ABSTRACT

The effectiveness of urban infrastructure and service delivery mechanisms, community involvement, and citizen accountability of ULB's/Parastatal agencies as the key points of attention, unveiled on December 3rd, 2005, the largest national urban project Jawaharlal Nehru National Urban Renewal Mission. Major initiative of the project was to support reforms and speed up planned development in 63 designated cities of the Nation. The goal of this study was to comprehend and study the levels of satisfaction of JNNURM beneficiaries'. 100 respondents who were residing in the JNNURM housing programme participated in this study. The findings demonstrated that the beneficiaries' levels of housing satisfaction varied, and that these variations were mostly dependent on the subsystems of basic amenities, housing, management, and community involvement. The amenities and facilities that are made available to the JNNURM plan beneficiaries determine how satisfied they are with the programme. The government must therefore work to provide the beneficiaries with an eco-friendly atmosphere.

Keywords: JNNURM, Housing scheme, Satisfaction level, Urbanization, Urban project.

INTRODUCTION

There are many programmes in India for the construction of urban infrastructure facilities. One programme put out by the Indian government is the JNNURM, which aims to accelerate urban redevelopment in 65 cities. Each city under this plan was subject to a separate set of project implementation restrictions. All JNNURM cities are required to develop a CDP as part of the inaugural phase (Ramachandran 2011). It serves as a document of perspective and vision for the city's future growth. According to MoUD (2012), "CDP is more concerned with developing economically productive, effective, equitable, and responsive cities".

Urbanization is a sign of the shift from traditional rural to modern urban economies (Pranati 2006, Das 2012 and Planning Commission 2012). "Even while cities and towns are crucial to socioeconomic development in any country, they frequently suffer significant infrastructure and service accessibility issues. The Government of India (GOI) established the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) to encourage local governments to take action to enhance the current service in a way that is financially viable" (Yojana 2010 and Kundu 2014).

"The Jawaharlal Nehru National Urban Renewal Mission (JNNURM), which was unveiled on December 3rd, 2005, is the greatest national urban project to promote reforms and hasten planned development of 63 designated cities. The main focus should be on the efficiency of urban

infrastructure and service delivery mechanisms, community involvement, and citizen accountability of ULB's/Parastatal agencies". These two entries, "Urban Infrastructure & Governance" and "Basic Services to the Urban Poor," together make up this document (Kundhu 2010, Kundu 2011 and Sivaramakrishna 2005 and Joshi 2021)

OBJECTIVES OF JNNURM

The JNNURM's major goal is to construct cities that are economically productive, efficient, equitable, and attentive to their residents' needs. In accordance with this purpose, the Mission will concentrate on the following:

- Accelerating the flow of investment into urban infrastructure services;
- Integrated development of infrastructure services;
- Securing linkage between asset creation and maintenance for long-run project sustainability;
- Planned development of cities including the peri-urban areas, outgrowths, and urban corridors;
- Renewal and re-development of inner city areas; and
- Universalization of urban services so as to ensure their availability to the urban poor.

Since providing housing for the impoverished is a top priority, the government has mostly concentrated on building lots of homes and distributing them to the underprivileged. A bank and the beneficiary will split the remaining costs after funds have been raised for the creation of these units. Due to rising urbanisation, there is an increase in demand for residential real estate among urban poor. Since there is a lack of land in cities, an efficient urban policy must be implemented to maximise appropriate land usage. This study focuses on the current JNNURM programme and beneficiary satisfaction.

The primary goals of the research are as follows:

- Determine the socio-demographic profile of the respondents
- Determine the level of satisfaction that JNNURM beneficiaries have with their housing
- Determine the association between the type of house and the level of satisfaction that beneficiaries have with their housing

From the study of the residents of JNNURM homes in Surat's West by Khalasi (2016) who indicated that beneficiaries' levels of housing satisfaction vary, and that these levels depend on the basic comforts of the home, neighbourhood, and management contact system. The level of beneficiaries' happiness with the neighbourhood and housing management was found to be significantly below average (dissatisfied), but their level of beneficiaries' contentment with the housing's basic amenities was found to be significantly above normal (satisfied). The study's conclusions suggest that while creating and developing new public housing buildings, planners and public housing organisations should pay close attention to the suggestions and preferences of public housing inhabitants.

According to Desai and Patel (2016), humans have three basic needs: food, clothing, and a place to live. A person's fundamental need is housing. According to the Government of India

housing data assessment in 2006, there would be a total of 26.53 million dwelling units needed throughout the 11th five-year plan period (2007-2012). Housing shortages will affect economically disadvantaged and lower income groups by 99% of this total. Even if the federal, state, and municipal governments have taken the appropriate actions, the deficit trend began after 1951 and is now growing in size. If the proper steps were not taken, this disparity will widen once again, aggravating the housing crisis. The central and state governments, builders, contractors, micro housing financial institutions, housing banks, etc. will have a significant problem in providing affordable housing.

Hamsa (2019) stated that, The GOI has introduced JNNURM to motivate local governments to take action to convey about a financially viable upgrade in the current service. Our opinion following the project's effective completion was that the recipients were, for the most part, content with the homes and other necessities provided by the government. Despite having sanitary latrines, they discovered that 256 (36.21%) out of 707 houses had all members of the family practising open defecation. He further added that he perceived a lack of a sense of community among the people, impeding government initiatives. Therefore, the implementation agency's commitment, expertise in community diagnosis, originality, and innovation are all necessary for such unique programmes to be successful. It should have enough time to modify the community's attitude toward social responsibility, which promotes self-sufficient, sustainable development.

METHODOLOGY

The current research study was carried out through purposive sampling technique. About 100 beneficiaries of JNNURM scheme was purposively selected in order to fulfill the research objectives. The chosen respondents were able to provide the needed information on the JNNURM scheme and it's satisfaction among the beneficiaries. A well framed interview schedule was made in order to collect the necessary data for the study. The schedule was distributed to the respondents. The responses received were collected, coded and edited using SPSS statistical tool. The study used simple percentage, frequency, ANOVA and regression analysis to interpret the findings statistically

FINDINGS OF THE STUDY

The findings made through the current study is been discussed as follows,

Table 1 - Socio – Demographic Profile

Variables		Percentage (n=20)
Age (In Years)	Less than 30	23
	31 – 40	45
	41 – 50	21
	Above 50	11
Gender	Male	39
	Female	60
	Transgender	1
Educational Qualification	Illiterate	10
	Primary	11

	Secondary	17
	High Secondary	29
	Higher Education	12
	Others	21
Occupation	Self-Employed	37
	Private	29
	Government	34
Monthly Income	Less than Rs.10,000	37
	Rs.10,001 – 20,000	39
	Above Rs.20,000	24
Type of House	Pucca	41
	Semi-Pucca	38
	Katcha	21

According to the respondents' age distribution, nearly half of them (45%) were between the ages of 31 and 40. 39 percent of the respondents were men, whereas 60 percent of the respondents were women. According to the respondents' educational backgrounds, around 29% have completed upper-secondary school. According to the respondents' occupation, roughly 37% of them were self-employed, and 39% reported having a monthly salary of between Rs. 10,000 and 20,000. According to the respondents' choice of housing, about 41% of them lived in pucca homes.

According to the respondents' socio demographic profiles, the majority of them were female, between the ages of 31 and 40, with upper secondary educations and self-employed status. They lived in a pucca-style home and made between Rs.10000 and Rs.20,000 per year.

Factor Analysis on Satisfaction level of JNNURM beneficiaries

According to the survey of literature, some elements are important for the JNNURM housing rating. Based on how the respondents interacted, the beneficiary's residential happiness was evaluated. Using a five point scale, from highly dissatisfied to highly satisfied, the level of beneficiary satisfaction with these components was determined.

The Cronbach's alpha test was used to assess the reliability of applying factor analysis, and the results are shown in the table below. It shows that the constructs' internal consistency was indicated by a Cronbach's alpha value of .987, which was higher than 0.6. As a result, the study's instrument earned a high dependability rating. To ascertain the underlying dimensions of the constructs, factor analysis was performed.

Table 2 - KMO AND BARTLETT'S TEST MEASURES

KMO and Bartlett's Test			
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.633	
Bartlett's Test of Sphericity		3986.792	5919.548
		190	136
		.000	.000

Source: Estimation based on Field survey

This survey sought to determine the respondents' major level of satisfaction. First, two tests were used to determine whether the association between the variables was significant or not: the Bartlett's Test of Sphericity and the Kaiser-Meyer-Olkin Measures of Sampling Adequacy (KMO). Bartlett's test for sphericity returned a value of 5919.548 and the estimated Kaiser-Mayer-Olkin measure of sample adequacy was 0.633, indicating that the selected variables factor analysis was suitable.

Table 3 - Factor Loadings for Satisfaction Level of JNNURM Beneficiaries

S.No	Inhibitors	Components			
		1	2	3	4
1	Electricity supply	.866			
2	Drinking water availability	.855			
3	Drainage system		.933		
4	Sanitation		.905		
5	Spacious housing			.891	
6	Ventilation facility			.888	
7	Individual garbage collection	.786			
8	Parking facilities				.924
9	Clean environment				.883
10	School facility	.801			
11	Hospital facility	.819			
12	Market facility	.802			
13	Grocery shop	.772			
14	Transport facility	.774			
15	Police station	.782			
16	CCTV availability	.736			
17	Friendly neighborhood	.721			
Eigen values		9.064	1.849	1.611	1.164
Percentage of variance		53.319	10.874	9.479	6.848
Cumulative percentage		53.319	64.193	73.672	80.519

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization,

Rotation converged in 4 iterations.

Source: Estimation based on Field Survey

From the table it is clear that core amenities with good infrastructure and social safety and security have more satisfaction by the respondents and it have significant loading for 11 variables namely electricity supply, drinking water facility, school, hospital, market, grocery, transport, police station, CCTV availability and friendly neighborhood facilities. Factor II have significant loading for 2 variables namely drainage and sanitation facility. Factor III have significant loading for 2 variables namely spacious housing and ventilation facility and factor IV have significant loading

for 2 variables namely parking facility and clean environment. Thus from the survey it is clear that the respondents have more satisfaction with various amenities, housing structure, infrastructure and with safety and security facilities by 81%.

The beneficiaries' degree of satisfaction with their housing facility was determined, and the following discussion is provided.

Table 4 – Beneficiaries satisfaction level with housing

Variable	Highly Satisfied	Satisfied	Partially Satisfied	Dissatisfied	Highly Dissatisfied
	Percentage (In %)				
Basic Amenities Components	19	17	41	12	11
Dwelling	16	23	38	12	11
Neighborhood Facility	26	19	29	12	14
Management	11	27	39	12	11

The respondents' identified satisfaction levels were categorised based on "Basic Amenities Components," which are related to water, sanitation, drainage, etc. This revealed that approximately 41% of the respondents were partially satisfied, while this figure was lower for the component dwelling (about 38%), neighbourhood (about 29%), and management of the environment (about 39%). This indicates that the JNNURM scheme's findings showed the chosen respondents were only partially happy with the amenities provided in their housing facility.

The relationship between the type of residence the respondents occupied and their level of housing satisfaction was investigated, and the findings are provided as follows:

Table 5 - Association between Type of House and Beneficiaries satisfaction level with housing

Variable	Mean	SD	SE	t-value	Sig.
Basic Amenities Components	3.58	1.52	0.4	9.856	.000*
Dwelling	3.98	1.33	0.4		
Neighbourhood Facility	3.12	1.12	0.4		
Management	2.98	1.01	0.4		

From the foregoing, it is clear that among the respondents who were chosen based on the type of housing in which they resided, they were statistically significant at the 1% level of significance for basic amenities, home, neighbourhood facility, and management. This demonstrated a favourable association between the type of home and the respondents' degree of housing satisfaction. Their degree of pleasure is observed to be high when the facility is good.

CONCLUSION

The goal of sustainable urban development is to lessen negative effects on the larger metropolitan environment while improving environmental quality. The initiatives presuppose that the city will only provide the most fundamental services. The modifications resulting from the introduced efforts make sure that the benefits enjoyed by the public are dispersed properly. This improves everyone's quality of life, regardless of socioeconomic standing. Despite the management and neighbourhood qualities being below average, the recipients' satisfaction with their housing, basic amenities, and residence is average. The results showed that there were differences in the beneficiaries' levels of housing satisfaction, and that these differences were mostly influenced by the subsystems of basic amenities, housing, management, and community involvement. How satisfied JNNURM plan beneficiaries are with the programme depends on the amenities and facilities that are provided to them. The government must make efforts to give the recipients a green environment.

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ENHANCING EMPLOYABILITY SKILLS OF THE SENIOR SECONDARY PASS OUT GIRLS

Smita¹ and Dr. Sarjoo Patel²

¹Ph.D Student and ²Assistant Professor (Stage III),

Department of Family and Community Resource Management,

Faculty of Family and Community Sciences

The Maharaja Sayajirao University of Baroda,

Vadodara (390002), Gujarat, India

Email: 19smita28@gmail.com; sarjoo.patel-fcrm@msubaroda.ac.in

HSAI Membership No. 12/GJ/P-2/LF

ABSTRACT

Women's empowerment is one of the major issues currently. Various sectors are working to uplift the status of women and provide them with employment opportunity. The hospitality and tourism industry is one among them. Employment in hospitality operations allows 12th pass girls to work, enhance their skills and develop confidence among them which may help in improving their knowledge and skills as well as the economic conditions. Housekeeping is one of the departments of the hospitality industry responsible for cleanliness, maintenance, aesthetic upkeep of rooms, public area, back area, and surroundings. It can be a bright career field for girls who are interested in the hospitality/tourism industry. Most of the girls cannot continue their studies after 12th because of financial problems or poor economic conditions of the family. Therefore the study was conducted to enhance the employability skills of the senior secondary pass out girls for housekeeping department. For the present study, the sample size comprised of 120, senior secondary pass-out girls from Surat City of Gujarat State selected through the Purposive Sampling Technique. The questionnaire was used as a tool for data collection. The findings revealed that 74.17 per cent of the respondents had low extent of knowledge about the different areas of the hospitality management operations. Therefore, the researcher developed various modules and provided training on Housekeeping Operations and it was found very effective in enhancing the employability skills of the senior secondary pass out girls.

Keywords: Housekeeping, senior secondary pass-out girls, employability skills, knowledge regarding housekeeping.

INTRODUCTION

One of the major issues currently is women's empowerment. It involves strengthening women's position and embracing their opinions or making an effort to achieve so. There are several ways to accomplish this, such as through training, literacy, awareness, and education. In our traditional patriarchal society, women have been assigned a secondary role, which is visible in the social, economic, and, political sectors (Singhand Singh, 2020). In India, the social and economic progress of the nation is significantly influenced by the education of women which can enhance the quality of her life.

In earlier times, the hospitality industry was male-dominated because of the heavy tasks including laundry, cleaning many rooms, bathrooms, corridors, and parking areas, shifting heavy furniture while cleaning, etc. But in recent years, women's involvement in the corporate sector has been growing. (Acharya and Siddiq, 2016). Women's significance in society and the workplace is

influenced by several social, cultural, and economic factors. The hospitality and tourism sector offers a lot of growth opportunities. The tourism and hospitality sectors are working to improve female acceptance (**Pant, 2020**). Women in this sector have gone through a period of tremendous change and transformation. They are focusing on management and other important duties in restaurants, hotels, catering businesses, resorts, etc. According to the International Labour Organization’s (ILO) ‘Women at work - Trends 2016’ Report, 25.8 per cent of women were employed than 76.4 per cent men in India in the last year.

There are various departments in a hotel and housekeeping is one of them. Housekeeping is an operational department in a hotel, which is responsible for the overall cleanliness and maintenance of the hotel. The housekeeping profession requires long working hours. Their primary responsibility is to assist the guests in the best possible ways and provide the guests with all of their basic needs. Cleaning surfaces, garbage disposal, dusting, and vacuuming are also considered to be part of housekeeping. Additionally, it may include performing outside duties like sweeping the outside area, washing the windows, removing the leaves, control of pests, etc.

Apart from these there are other duties of a housekeeping staff such as; it helps to establish a welcoming atmosphere and ensure reliable service from all the staff of the department, to ensure a high standard of cleanliness and general upkeep in all areas of the department, to provide basic amenities like linen, bed sheet, towel soap etc. in rooms as required, also to maintain an inventory for the same, to provide uniforms for all the staff and maintain adequate inventories, to cater to the laundering requirements of the hotel linen, guest clothing, to iron all the uniforms, to provide and maintain the flower decorations and maintain the landscaped areas of the hotel, to coordinate renovation and refurbishing when required, to deal with lost and found articles, to ensure training, control, and supervision of all staff attached to the department, to establish a good working relationship with another department, to ensure that safety and security regulations are made known to all staff of the department. The housekeeping is also responsible for handling keys of each floor, maintaining various types of registers in a hotel, etc.

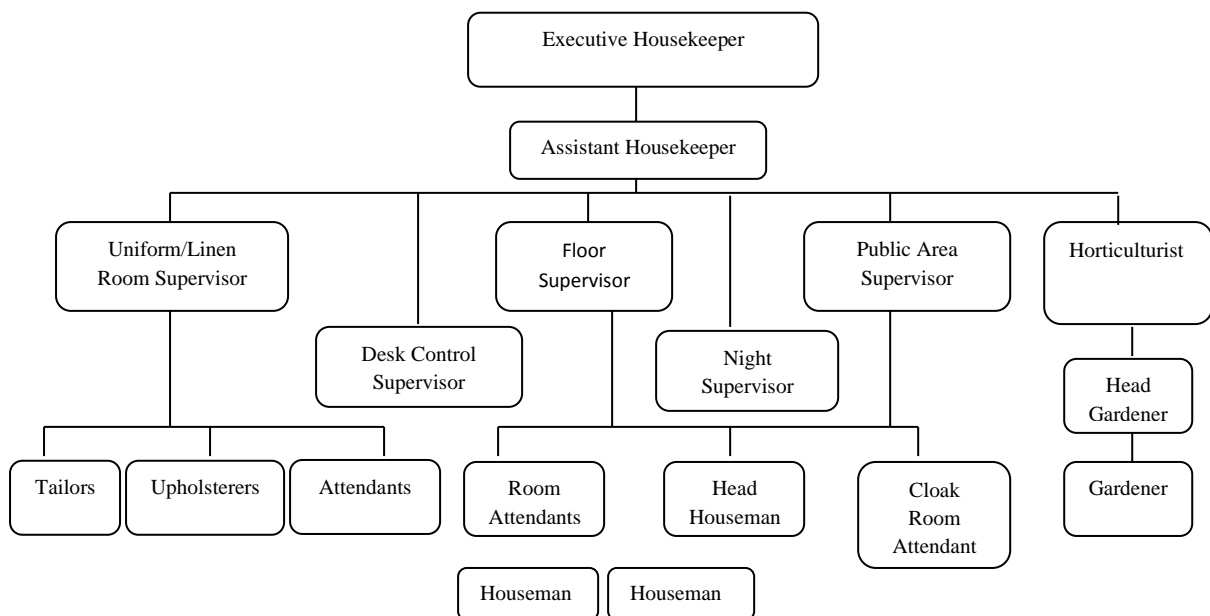


Plate 1: Organizational structure of a Housekeeping Department for large hotel (Andrews, 2000)

However, women carry a good knowledge of most of the tasks. Families especially those living in rural areas feel scared of sending their girl child to send for working and they get stuck between family responsibilities and most of the time, they sacrifice their career. Due to poor financial conditions, they were supposed to leave their school and were given basic education, and were expected to get married and because of this, they lack certain skills. But now the time has changed and women are also performing all the duties in which they are interested. Today girls are also given equal education as boys so that they can fulfil their dreams. The majority of females, although possess a variety of skills and talents still are unable to continue their education the due to their families' poor financial condition (**Smita and Patel, 2022**).

Employment in hospitality operations allows 12th-pass girls to work, enhance their skills and develop confidence amongst them which may help in improving their knowledge and skills as well as the economic conditions. Housekeeping plays a very important role in the hospitality industry in many ways. Women generally possess a good knowledge of housekeeping as compared to boys because they are trained in this field right from childhood. They perform all the household activities such as cleaning the room, decorating, and dusting, changing curtains, linens, bed sheets, etc. at their home so it has become their routine activity and they can perform these tasks very well. It can be a bright career field for girls who are interested in the hospitality/tourism industry. Women can learn these services easily with the help of modules.

Nowadays women are also taking up the initiative and playing an important role in varied fields which includes the hospitality and tourism sectors. Female employment in the tourism industry is higher than male employment (**Pant, 2020**). Women carry a good aesthetic sense which is considered very important in the tourism and hospitality industry (**Katirciogluand Tekin, 2021**). India's travel and tourism industry promotes employment generation for both highly skilled and less skilled workers (**Jacob, 2017**).

Various studies have been conducted for empowering women and training them for employment purposes in various fields but a dearth of studies was found for 12th pass-out girls in the field of housekeeping focusing on assessing the extent of knowledge of the respondents regarding housekeeping department and developing modules on housekeeping skills for 12th pass out girls for enhancing their skills. This motivated the researcher to conduct the present study.

Objectives

1. To find out the background information of the respondents.
2. To assess the extent of knowledge of the respondents regarding housekeeping skills.
3. To develop modules for enhancing the employability skills of senior secondary pass out girls on housekeeping management operations.

METHODOLOGY

The present study was carried out to enhance the employability skills of the senior secondary pass out girls of housekeepingmanagement operations. The sample size comprised of 120, senior secondary pass-out girls from Surat City of Gujarat State selected through the Purposive Sampling Technique and the respondents were contacted through Snowball technique. The questionnaire was used as a tool for Data Collection. The respondents were asked to respond on a 3 point Likert scale

in terms of Agree, Undecided and Disagree where 3, 2, 1 were the scores assigned to them. The scale comprised of total 21 statements on different areas of the Housekeeping Operations such as: cleaning and decoration of different areas and Linen and Laundry management. The minimum score of the scale was 21 and the maximum was 63. Minimum and maximum possible score were divided into 3 categories of equal interval to determine the extent of knowledge into Low, Medium and High category. Lower scores indicated low extent of knowledge of the respondents.

The study has been approved by the Institutional Ethics Committee and the ethical approval number for the study assigned is **IECHR/FCSc/PhD/2021/173**.

RESULTS AND DISCUSSIONS

Section I- Background Information of the Respondents

The findings of the study are presented below:

a) Background Information of the respondents.

Table 1: Frequency and percentage distribution of the respondents on the basis of their Background Information			
Background Information of the respondents		Distribution of the Respondents (n=120)	
		f	%
Locality/ community of the respondent	Sub-Urban	16	13.33
	Urban	8	6.67
	Rural	96	80.00
Type of family	Nuclear	68	56.67
	Joint	52	43.33
Monthly income of the family (in rupees)	Less than ₹5000	24	20.00
	₹5001 -₹10000	32	26.67
	₹10001 and above	64	53.33
Medium of Instruction in school	Hindi	48	40.00
	Gujarati	72	60.00
Person in family working in Hospitality Industry	Working	8	6.67
	Not working	112	93.33

The background information included the aspects such as locality of the respondent, family type, monthly income of the family, medium of instruction in school and person in family working in Hospitality Industry. It was found that 80 per cent were from rural area, followed by 13.33 per cent respondents from sub-urban and only 6.67 per cent respondents were from urban area respectively. It was also found that 56.67 per cent were living in Nuclear family whereas 43.33 per cent respondents were living in Joint family.

From the gathered data of the monthly family income of the respondents it was found that 53.33 per cent of the respondents belonged to ₹10001 and above, 30.83 per cent of the respondents

belonged to ₹5001- ₹10000 whereas only 4.17 per cent of the respondents belonged to Less than ₹5000 income group. The Mean monthly family income of the respondents was found to be ₹ 11,650. Results revealed that the medium of instruction in school for 60 per cent of the respondents was Gujarati medium and for 40 per cent respondents it was Hindi Medium. Results also showed that 93.33 per cent respondent's family members were not working in the Hospitality fields whereas 6.67 per cent were working in areas such as guest houses, restaurants, hotels, hospitals, resorts and other places as housekeeping staff, cook, as waiter etc. (table 1).

Section II- Extent of knowledge of the respondents regarding Housekeeping Management Operations

The knowledge about the various aspects of Housekeeping Management Operations such as: Cleaning of different areas and cleaning agents, Flower Arrangement and Decoration, Bed making, linen and laundry management, Maintaining registers and Housekeeping trolley was studied.

- **Cleaning of different areas and cleaning agents:** It was found that most of the respondents i.e. 61.67 per cent disagreed that regular cleaning of rooms is important, 57.50 per cent of the respondents disagreed that proper hygiene should be maintained at workplace. More than one-half of the respondents disagreed that there are different chemicals for different types of surfaces and disagreed that regular cleaning and dusting of different areas like bathroom, washrooms etc. are so important. The data revealed that 60 per cent of the respondents had low level of knowledge regarding cleaning and decoration of different areas
- **Flower Arrangement and Decoration:** The results showed that 70.33 per cent of the respondents disagreed that there are different types of flower arrangements, more than one-half of the respondents disagreed that the housekeeping staffs are responsible for creating a pleasant ambience in the hotel and having knowledge about different methods of flower arrangement is important and their extent of knowledge was found to be low.
- **Bed making:** The data revealed that 61.67 per cent of the respondents disagreed that knowledge about bed making is important for housekeeping staff, more than one-half of the respondents were undecided about tucking in all the corners by removing all the wrinkles is important in bed making. A little less than one-half per cent of the respondents were undecided that it is okay to use double sized bed sheet on a single bed. It was found from the gathered data that 50.83 per cent of the respondents had moderate level of knowledge about Bed making
- **Linen and laundry management:** The gathered data showed that one-half of the respondents disagreed that ironing of clothes is a duty of housekeeping staff and knowledge of different types of stain removal liquids and methods is important. 45per cent of the respondents disagreed that management of different clothes and laundry is an important part of housekeeping department.
- **Managing registers:** The findings of the study revealed that 60.83 per cent of the respondents disagreed that there is a place where all the lost and found items are kept in the hotel. A little less than one-half of the respondents disagreed that maintenance registers are used to keep track of all the tasks that need to be done in a room or any other public space and 35 per cent of the respondents disagreed that the housekeeping staffs are responsible for maintaining different registers in a hotel.
- **Housekeeping trolley:** It was found that 58.33 per cent of the respondents disagreed that every floor contains a housekeeping trolley. More than one-half of the respondents were undecided that the purpose of housekeeping trolley is to supply basic amenities in the guest rooms and

disagreed that there is no need to change room towels and bed sheets daily. The extent of knowledge of 51.67 per cent of the respondents regarding housekeeping trolley was found to be low.

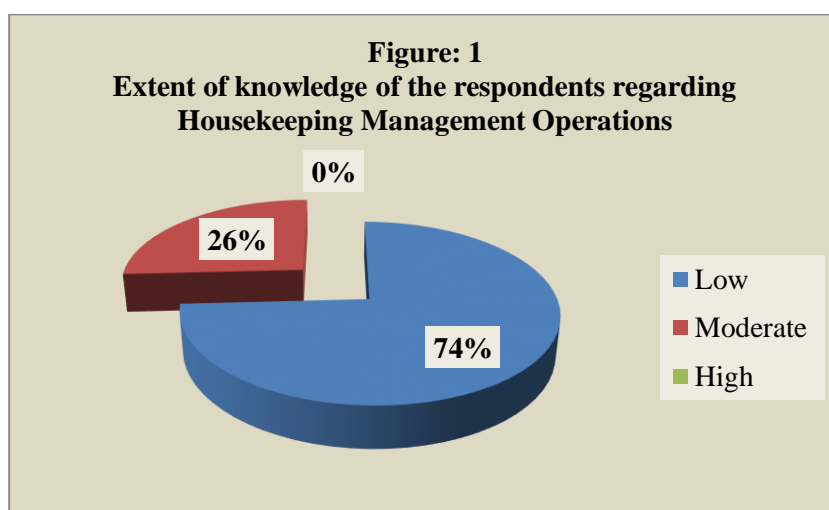
Distribution of the respondents according to their extent of knowledge regarding different areas of Housekeeping Management Operations

This section dealt with the extent of knowledge regarding different areas of Housekeeping management operations. The respondents were asked to respond to a 3 point continuum scale in terms of “agree”, “undecided” and, “disagree” and the scores from 3 through 1 were given to the respondents respectively. The minimum score was 21 and maximum was 63. To obtain the categories of extent of knowledge, the score range was divided on an equal interval basis.

The findings of the results showed that majority of the respondents had low extent of knowledge regarding different areas of Housekeeping management operations. Few respondents’ extent of knowledge was found to be moderate.

Table 2: Extent of Knowledge of the respondents regarding Housekeeping Management Operations

Sr. No.	Extent of Knowledge Housekeeping Management Operations	Range of Score	Distribution of the Respondents (n=120)	
			f	%
1	Low	21-34	89	74.17
2	Moderate	35-49	31	25.83
3	High	50-63	0	0



Development of Modules

The high level of knowledge category of respondents was found to be nil. Therefore educational modules were prepared by the researcher using mp4 video clips with voice over to train the senior secondary pass out girls regarding the different areas of the Housekeeping Management Operations. There were total eight modules and which were developed on the following topics:

Educational module on cleaning of rooms and bathrooms was prepared in which use of different types of cleaning agents such as R1, R2, R3, R4, R5, R6, R7 and R9 was shown. Various techniques for proper cleaning was also highlighted. Module on Flower arrangement and decoration was prepared by using fresh and dry flower arrangement. Module on Decorating rooms and different areas such as lobby area, staircase area, corridors, lift area etc. was also made. Bed making in rooms was done for single bedroom, double bedroom and Suite room. Managing registers like maintenance register, lost and found register, linen and laundry register etc. Module on linen and laundry management and housekeeping stores was prepared. Module on Housekeeping trolley in which the preparation and purpose of it, arranging items systematically etc. were included.



Plate 2: Modules prepared by the Researcher

A Training Program for the Respondents

A training program was conducted for the respondents, which was focused on enhancing the knowledge of the senior secondary pass out girls regarding the different areas of Housekeeping Management Operations. It was delivered in Hindi for better understanding of the respondents. The major focus in the training program was to acquaint learners with theoretical as well as practical knowledge of the duties, roles and responsibilities related to Housekeeping Department. Three months training was provided to the respondents in Surat city. Eight modules were there which were covered in 12 sessions and each session comprises of one hour time duration.



Plate 2: A Training Program conducted by Researcher

Sr. No.	Extent of Knowledge Housekeeping department	Range of Score	Distribution of the Respondents (n=120)	
			f	%
1	Low	21-34	00	00
2	Moderate	35-49	8	6.67
3	High	50-63	112	93.33

A post testing was done and the educational modules were found to be very effective in enhancing the employability skills of the respondents. The findings showed that Majority of the respondents gained high extent of knowledge after attending the training sessions.

CONCLUSION

The present study was carried out to enhance the employability skills of the senior secondary pass out girls in housekeeping department. The respondents' extent of knowledge regarding the different areas of Housekeeping management operations such as cleaning of different areas and cleaning agents, bed making, management, managing registers, housekeeping trolley etc. was found to be low. This motivated the researcher to develop the educational modules. With the help of the developed modules, three months training was provided to the group of respondents. Then a post testing was done and it was found very effective in enhancing their employability skills.

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DESIGNING OF WALL PANELS INSPIRED FROM CHERIAL SCROLL PAINTING

Dr. Sonia¹, Rubina²

¹Assistant Professor, Government Home Science College, Chandigarh, India

² Assistant Professor, Multani Mal Modi College, Patiala, Punjab, India

E-mail: saloniya20@gmail.com¹, rubina20081999@gmail.com²

¹13/CH/S-2/LF

ABSTRACT

The aim of the present study was to develop hand painted Wall panels by taking inspiration from Cherial scroll painting. From the selection of base fabric, base colour of fabric to the development of designs various sequential steps were followed to develop appropriate Wall panels. Construction of the Wall panels lead to collection of data from various shopkeepers and consumers to check market and consumer acceptability respectively. The result revealed that the market acceptability was encouraging as the majority of the shopkeepers found the quoted price reasonable and sellable. Consumers also accepted the Wall panels well, and found them to be creative and distinctive.

Keywords: Wall panels, Hand painting, Cherial scroll painting, Consumer acceptability, Market acceptability

INTRODUCTION

Cherial scroll painting is a traditional audio-visual aid which comprises of the beautiful combination of the story-telling scrolls with folklore. There are many forms of story-telling and are named differently after the various residing regions with distinct features. The scroll of Cherial painting adopted its name from the Cherial village of Warangal district in Telangana.

Storytelling was a way to depict the scene through voice and gestures, paintings to inform, entertain and promulgate the cultural values. Storytelling existed before writing. It reached its pinnacle during the Mughal period.

Cherial scroll painting depicts the tales of Indian mythology. These paintings are basically scrolls of mythology stories such as Mahabharata, Ramayana, ancient tales, local folk stories and daily activities of the life of the people (Pavani and Kumari, 2019). It was used to educate people about cultural values and morals. Unlike other court paintings, Cherial was characterized by its simplicity and appeal to a variety of castes, depicting rural life such as farmers working in paddy fields, women in the kitchen together and colourful festivals.

The artists who paint these caste scrolls belong to the social and cultural background of Telangana in heart of the Deccan plateau. The painted scrolls of Telangana described the legends of the origin of a particular caste. Nakashi's work is a very wide and impressive artistic medium. Traditionally, Cherial scroll painting was cooperation between some caste professionals. The communities involved in the production, presentation, and reception of these scrolls—that is, painters, performers, and patrons (Fonseca, 2019). The first panel of scroll starting was the picture either of Lord Ganesha or the other 3 supreme Lords- Brahma, Vishnu, and Shiva. Five members usually depicted the story. They sang and play musical instruments. The narration was

in the Telugu language with a poem. The panel was usually hung with a Wall or tree and was unscrolled slowly followed by the description of the story shown in a scroll. It was the responsibility of the patron to conduct the event in the village from time to time and to reward the story teller. Patron rewarded the story-teller as by Jajman system.

The scroll theme was decided by the history of parton caste. A new scroll is made when the old one dies or to make a similar scroll with some minute differences. A scroll took months to complete. First a rough layout was designed by Nakashis as told by the performer for a new scroll. Performer monitored and guided the Nakashis for the layout and needs. After finalizing the scroll, performer would return to their normal day to day life and would approach the Nakashis after five to six months to pick their new scroll. To make a scroll, a mixture of flour, white clay, edible gumand tamarind seeds, was treated on a khadi cloth that gave rigidity, smooth surface by filling up the pores and helping to retain colour. Marking was performed on the fabric over the entire length of the canvas, followed by red colour in the background and other textures required.

Addition of ornaments and other details were added at the end. Natural vegetable colours used on the canvas were yellow, royal blue, green, white and black. Black colour was mainly used for outlines. A sacred ceremony was performed after the completion of work and after rewarding the Nakashis for the work done. The scroll was kept in the temple for three nights. A goat sacrifice was done after that 3 nights and a feast was enjoyed.

With every decade or two, crowns and jewellery showed slight changes. Regional priorities were also observed in these matters. The remarkable feature was that these reflected the evolution of the tradition from a more sophisticated style to one another's folklore.

The narrator's scroll features were different from caste to caste. Some caste narrators described the scrolls as vertical, some were horizontal, some scrolls were starting from left to right, and some were from right to left. These features were strictly followed by different communities as per their traditions. Some scrolls were described from top to bottom as in EnotiGonds community and some were from bottom to top as in Gonda community. With different directions of the story on the scroll different communities follow different sacred stories with their hero. The heroes of different casts were inter-related at some point. On the other hand, Nakashis were free from the caste boundaries and responsibilities. They were not from any particular caste and were free to make any scroll.

If the scroll was severely damaged then all Hindu death ceremonies were performed and the scroll was fed into the water, followed by drinking wine and eating meat. Some scrolls had inscriptions in Telugu that gave dates for donors, artists, witnesses and ownership of the scroll to another family. The first scroll was dated 1625 because it had a date of transfer of ownership in November, 1664. It depicted the legend of Markandaya and Bhavana Rishi, the legendary ancestor of the Padmashalis. This early scroll and seven other paintings approximately 1775 and 1900 are in the Jagdish and Kamala Mittal Museum of Indian Art, Hyderabad.

AIM OF THE STUDY

Cherial scroll painting is one of the oldest art form which is struggling to remain relevant. Therefore, to generate awareness among them asses about this fading art, the construction of Wall panels have been undertaken in which the innovative designs of Cherial scroll painting has been presented to the customers, by carefully accessing market acceptability of the products.

OBJECTIVES

- The objective of the present study was to collect themes of Cherial scroll painting.
- Designing and creating Wall panels using hand painting technique.
- To check marketability and consumer acceptability of the Wall panels.

MATERIAL AND METHOD

Detailed information was collected from various researches and internet sources. The motifs were collected from various themes of Cherial scroll painting. From the scrolls, the themes were categorized into Religious and Rural life. The product range was evaluated by shopkeepers. Different type of suitable fabric was dyed and was evaluated by the judges. Further the selected fabric was dyed with various colours suitable for wall panels with reference to global colour forecast palette (2022). The colorfastness was checked of the selected base colour. Procreate software was used to create designs for wall panels i.e., Ten designs for Single wall panel and Ten designs for Multi- wall panels. After developing the wall panels, data was collected and was analysed for the market and consumer acceptability.

RESULTS AND DISCUSSION

- **Collection of motifs of Cherial scroll painting**

From the collected themes of Cherial scroll painting, the motifs were taken out suitable for the Wall panels.





- **Evaluation of different base fabric**

Table1: Evaluation of different base fabric suitable for Wall panels

FABRICNAME	MARKS	RANK
Cotton	98	1
Glazed Cotton	87	2
Taffeta	59	4
Silk	76	3
Canvas	40	5

The evaluation was done by total 30 judges out of which 12 judges were faculty of Govt. Home Science College, Chandigarh and other 18 were students of Clothing and textile department of Government Home Science College, Chandigarh. These judges were asked to rank the displayed fabric samples according to their preferences where the judging criteria were based on suitability of fabric for painting, price of the fabric. According to the ranks given by judges, marks were allotted to each sample e.g. rank 1 got 10 marks; rank 2 got 9 marks and so on. The sample with the highest score was selected.

Table 1.depicts that sample of Cotton fabric got maximum marks (98 out of 360 marks) and was ranked 1st. Glazed cotton sample was at 2nd rank (87 marks), Silk sample was at 3rd rank (76marks), Taffeta sample was at 4thrank (59marks), and Canvas got 5th rank (40marks). Therefore, Cotton fabric was selected as base fabric for creation of Wall panels where maximum marks were 360 and minimum were 40.

- **Evaluation of base colour of selected fabric**

For the present study, selected cotton fabric was dyed in different eight base colours by referring Global colour forecast palette. The motif was painted on the samples for the best outcome of the Wallpanels. The evaluation was done by total 30 judges out of which 12 judges were faculty of Govt. Home Science College, Chandigarh and other 18 were students of Clothing and textile department of Government Home Science College, Chandigarh. These judges were asked to rank the displayed fabric samples according to their preferences where the judging criteria were based

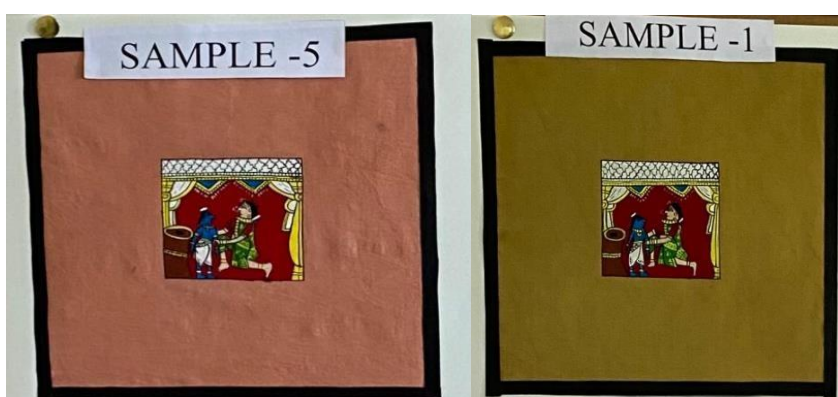
on colour contrast between fabric colour and motif colour. According to the ranks given by judges, marks were allotted to each sample e.g. rank 1 got 10 marks; rank 2 got 9 marks and so on. Two samples with the highest scores were selected.

Table2: Evaluation of base colour of selected fabric

SAMPLENO.	MARKS	RANK
Sampleno.1(Satib brass)	181	2
Sampleno.2(Butterscotch)	151	5
Sample no. 3(Honeycomb)	137	6
Sampleno.4(Oat milk)	172	4
Sampleno.5(Faded citrus)	188	1
Sample no. 6 (Orange oxide)	162	7
Sampleno.7(Sweet coral)	177	3
Sampleno.8(Dark cherry)	102	8

Table no. 2 shows that sample no. 5 got maximum marks i.e. 188 marks out of 1,270 marks and got first rank. Sample no. 1 got 2nd rank (181 marks), sample no. 7 got 3rd rank (177 marks), sample no.4 got 4th rank (172 marks), sample no. 2 got 5th rank (151 marks), sample no. 3 got 6th rank (137 marks), sample no. 6 got 7th rank (162 marks), and sample no. 8 got 8th rank (102marks) where maximum marks were 1,270 and minimum were 102.

Therefore, top two fabric colours were selected for the designing of Wall panels i.e. sample no. 5 (Faded citrus) and sample no. 1 (Satin brass).



Faded citrus

Satin brass

(Rank No.1)

(RankNo.2)

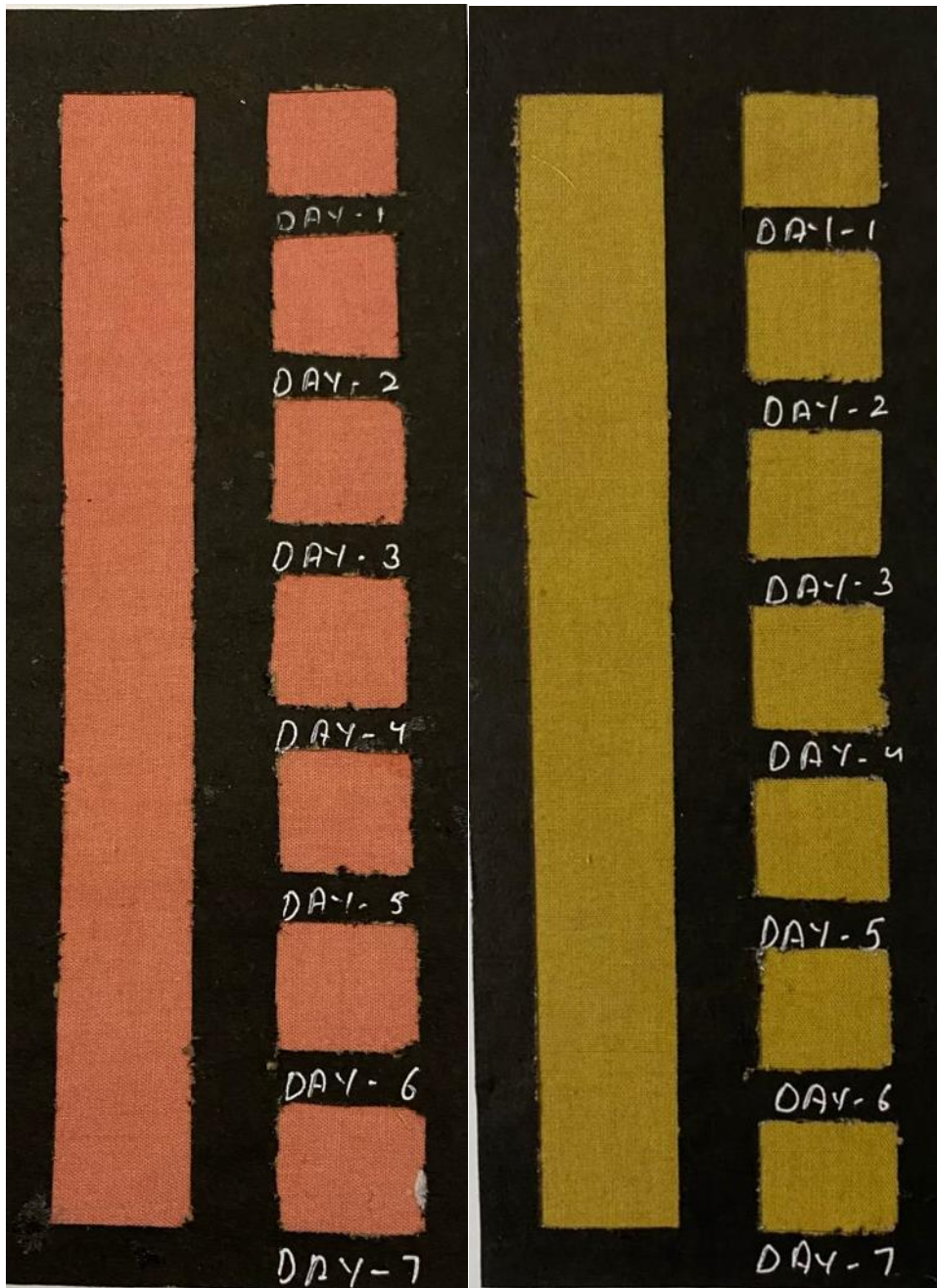
- **Testing the colour fastness of selected base colour fabric**

The colour fastness test for the dyed and painted samples was performed to test the fastness to the sunlight. The results of the test are as under-

TableNo.3 Color fastness results of dyed samples

Days	Changein color	
	Fadedcitrus(sample5)	Satinbrass(sample1)
1.	5	5
2.	5	5
3.	5	5
4.	5	5
5.	5	5
6.	5	5
7.	5	5

Table no.3 reveals that on exposure to sunlight for seven consecutive days, Faded citrus and Satin brass dyed fabric samples showed very good colour fastness.



Faded citrus
(Rank No. 1)

Satin brass
(Rank No. 2)

- Evaluation of designs

Table4: Evaluation of Single Wallpanel designs

DESIGN	MARKS	RANK
D.A.1	239	1
D.A.2	176	3
D.A.3	162	6
D.A.4	165	5
D.A.5	156	7
D.A.6	137	8
D.A.7	136	9
D.A.8	183	2
D.A.9	172	4
D.A.10	124	10

For Wall panels, 20 designs were developed for single panel and multi panel (10 designs for each style). The evaluation was done by total 30 judges out of which 12 judges were faculty of Govt. Home Science College, Chandigarh and other 18 were students of Clothing and textile department of Government Home Science College, Chandigarh. These judges were asked to rank the displayed designs according to their preferences where the judging criterion was based on design composition suitable for Wall panels. According to the ranks given by judges, marks were allotted to each design e.g. rank 1 got 10 marks, rank 2 got 9 marks and so on. Two designs with the highest scores were selected.

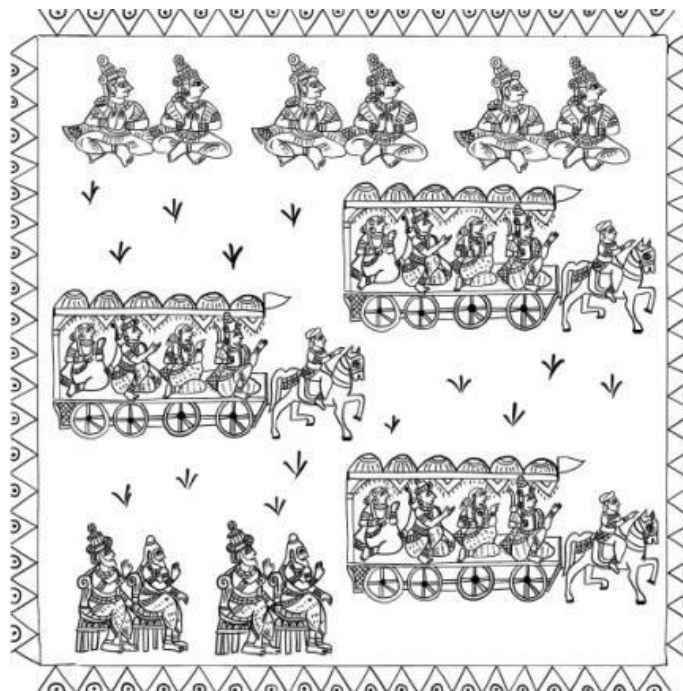
Table4 depicts that D.A.1 got maximum marks(239marks out of 1,650 marks)and was ranked first.D.A.8at 2nd position (183 marks), D.A.2 at 3rd position(176 marks), D.A.9 at 4th position (172marks), D.A. 4 at 5th position (165 marks), D.A.3 at 6th position (162 marks), D.A.5 at 7thposition (156 marks), D.A.6 at 8th position (137 marks), D.A.7 at 9th position (136 marks),and D.A.10 at 10th position (124 marks), where maximum marks were 1,650 and minimum were 124.

Therefore, top two designs i.e. D.A.1 and D.A.8 was selected for making Single Wallpanels.



D.A.1

Rank 1



D.A.8

Rank2

- Selected Single Wallpanel designs

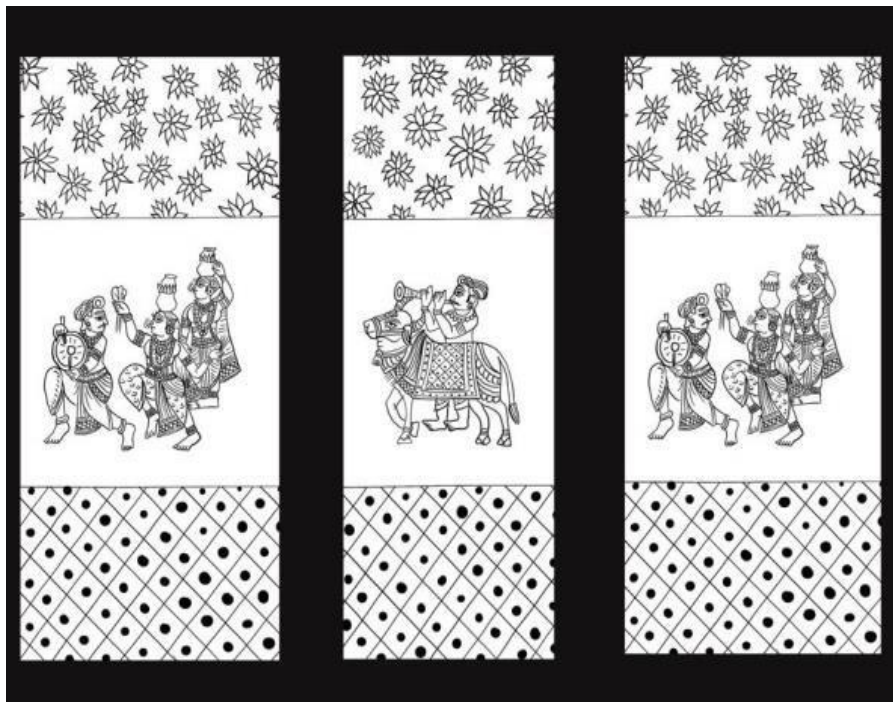
Table5: Evaluation of Multi-Wallpanel designs

DESIGNS	MARKS	RANKS
D.B.1	206	1
D.B.2	201	2
D.B.3	196	3
D.B.4	159	5
D.B.5	156	6
D.B.6	144	9
D.B.7	176	4
D.B.8	111	10
D.B.9	147	8
D.B.10	154	7

The evaluation was done by total 30 judges out of which 12 judges were faculty of Govt. Home Science College, Chandigarh and other 18 were students of Clothing and textile department of Government Home Science College, Chandigarh. These judges were asked to rank the displayed designs according to their preferences where the judging criterion was based on design composition suitable for Wall panels. According to the ranks given by judges, marks were allotted to each sample e.g. rank 1 got 10 marks; rank 2 got 9 marks and so on. Two designs with the highest scores were selected.

Table 5 depicts that D.B.1 got maximum marks (206 marks out of 1,650 marks) and was ranked first. D.B.2 was at 2nd position (201 marks), D.B.3 was at 3rd position (196 marks), D.B.7 was at 4th position (176marks), D.B.4 was at 5th position (159marks),D.B.5 was at 6th position (156marks),D.B.10 was at 7th position(154marks),D.B.9 was at 8th position(147marks),D.B.6 was at 9th position (144), and D.B.8 was at 10th position(111 marks), where maximum marks were 1,650 and minimum were 111.

Therefore, top two designs i.e. D.B.1 andD.B.2 were selected for making Multi-panel Wall panels.



D.B.1

Rank 1



D.A.2

Rank 2

- Selected Multi-Wallpanel designs



D.A.1

Rank 1



D.B.1

Rank 1



D.A.8

Rank 2



D.B.2

Rank 2

• Costing of constructed Wallpanels

Before checking the market acceptability and consumer acceptability of the Wallpanels, the cost of the same was calculated as per the given table:

TableNo. 6: Costing of Single Wallpanel of D.A.1

S.No.	Material used	Rate(Rs.)	Quantity	Cost(Rs.)
1.	Cotton Fabric	130/m	24''×24''	42
2.	Acrylic paints	25/bottle	-	45
3.	Dyeing charges	-	-	45
4.	Framing charges	-	1frame	500
5.	Labour charges	-	15hrs.	1500
6.	Total cost	-	-	2,132
7.	Profit (25%)	-	-	533
8.	Selling price	-	-	2,665

Table No. 7: Costing of Single Wallpanel of D.A.8

S.No.	Material used	Rate(Rs.)	Quantity	Cost(Rs.)
1.	Cotton Fabric	130/m	24''×24''	42
2.	Acrylic paints	25/bottle	-	45
3.	Dyeing charges	-	-	45
4.	Framing charges	-	1Frame	500
5.	Labour charges	-	18hrs.	1800
6.	Total cost	-	-	2,432
7.	Profit (25%)	-	-	608
8.	Selling price	-	-	3,040

Table No. 8: Costing of Multi -Wallpanel of D.B.1

S.No.	Material used	Rate(Rs.)	Quantity	Cost(Rs.)
1.	Cotton Fabric	130/m	-	70
2.	Acrylic paints	25/bottle	-	45
3.	Dyeing charges	-	-	750
4.	Framing charges	-	3frames	60
5.	Labour charges	-	16hrs	1600
6.	Total cost	-	-	2,525
7.	Profit (25%)	-	-	631
8.	Selling price	-	-	3,156

Table No. 9 Costing of Multi -Wallpanel of D.B.2

S.No.	Material used	Rate(Rs.)	Quantity	Cost(Rs.)
1.	Cotton Fabric	130/m	-	70
2.	Acrylic paints	25/bottle	-	45
3.	Dyeing charges	-	-	750
4.	Framing charges	-	3frames	60
5.	Labour charges	-	8hrs	800
6.	Total cost	-	-	1,725
7.	Profit (25%)	-	-	431
8.	Selling price	-	-	2,156

Table No. 6, 7, 8 and 9 depicts that the cost price of single Wall panels and multi Wallpanels varied between Rs. 1,725 to Rs. 2,525 depending upon the design. The cost price of single Wall panels was Rs. 2,132 (D.A.1) and Rs. 2,432 (D.A.8); whereas the cost price of multi Wall panels was Rs. 2,525 (D.B.1) and Rs. 1,725 (D.B.2).A profit of 25% was added to the total cost price and sale price of constructed Wall panels ranged between Rs.2,156 to Rs. 3,156.

•

- **Marketability of Wall panels**

A market survey was conducted to check the market acceptability of constructed Wallpanels with the quoted price. 15 reputed home décor shops were visited in Chandigarh and the shopkeepers were asked to answer the close ended questionnaire in respective of their opinion towards the wall panels. The results of market survey were as follows-

Figure 4.2: Distribution of the respondents on the basis of overall appearance of the Wall panels

N=15

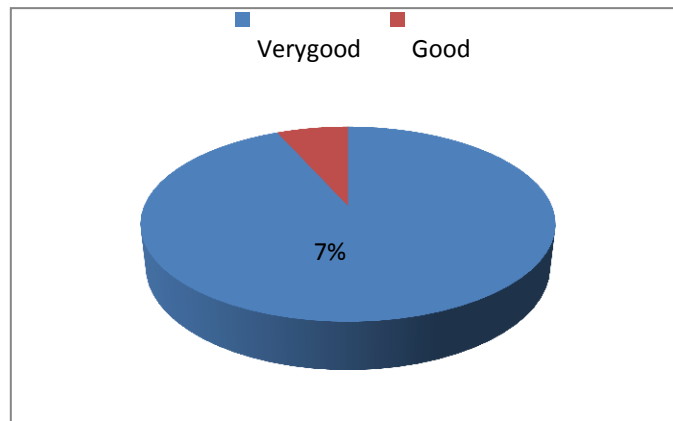


Figure 4.2 depicts that most of the shopkeepers (93%) liked the overall appearance of the Wall panels and found the designs very innovative while few shopkeepers (7%) found the appearance of Wall panels good. They also found the Single Wall panels more attractive than Multi-Wall panels.

Figure 4.3 Distribution of the respondents on the basis of their willingness to place an order

N=15

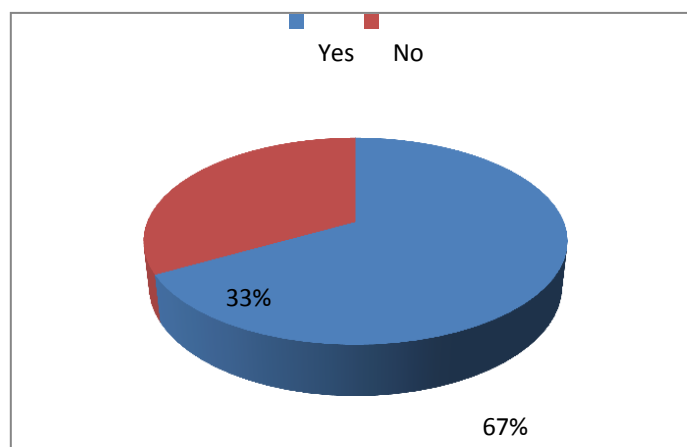


Figure 4.3 shows that 67% of the shopkeepers wanted to place an order. Wall panels were highly appreciated by the shopkeepers and found them very innovative while few shopkeepers (33%) did not want to place an order as they have their import terms and conditions.

Figure 4.4 Distribution of the respondents on the basis of the quoted price of Wallpanels

N=15

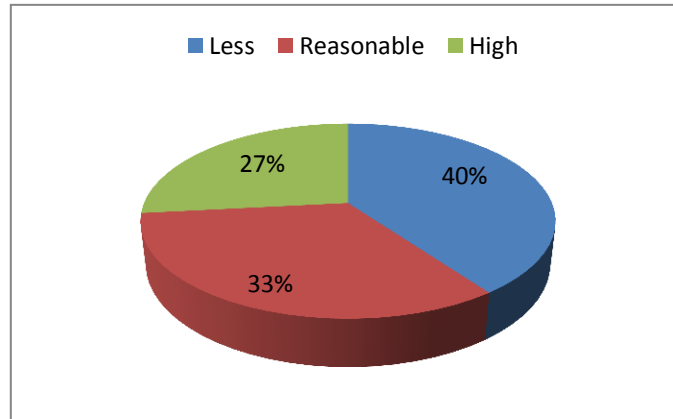


Figure 4.4 depicts that the most of the shopkeepers (40%) found the quoted price of Wallpanels less and 33% found the price of Wall panels to be reasonable, while 27% found it high.

- **Consumer acceptability of Wallpanels**

Consumers found in the local market of home décor were asked to answer the close ended questionnaire in respect of their opinion towards the wall panels. The results of consumer acceptability were as follows-

Figure 4.5 Distribution of respondents on the basis of their overall appearance of the Wall panels

N=15

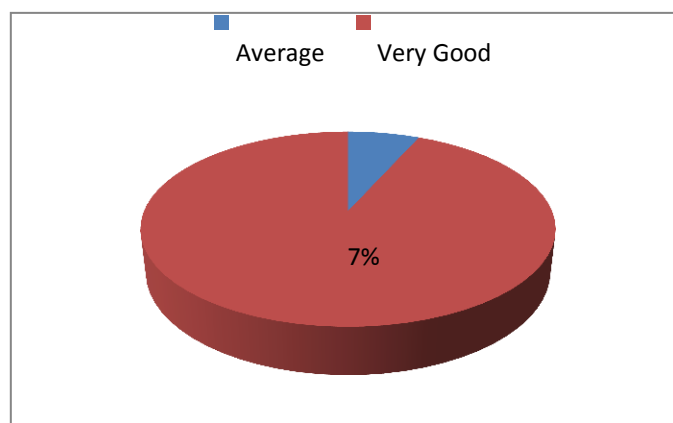


Figure 4.5 depicts that most of the consumer (63%) liked the overall appearance of the Wall panels and found it exclusive. Few customers (7%) found the overall appearance average. Most of the consumers also liked the Single Wall panels more than Multi-Wallpanels.

Figure 4.6 Distribution of respondent on the basis of quoted price

N=15

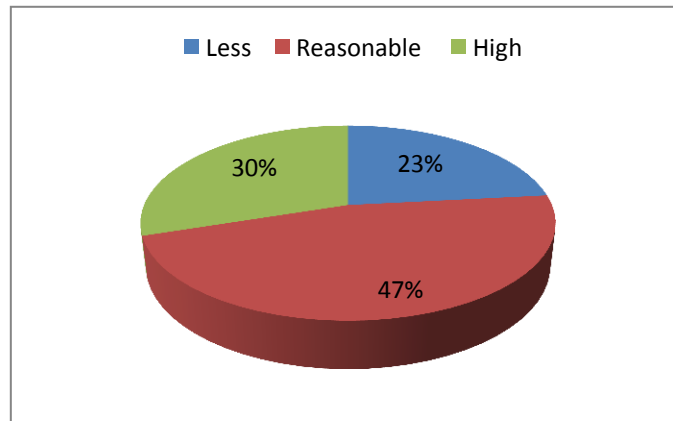


Figure 4.6 depicts that 47% of customers found it reasonable, 30% of the customers found it little high while 23% of customers found it less.

Figure 4.7 Distribution of respondents on the basis of their willingness to buy/place an order

N=15

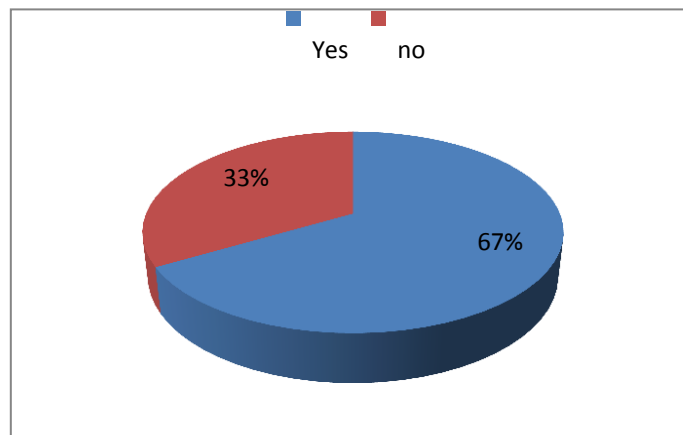


Figure 4.7 depicts that 67% of customers want to place an order and ready to buy the Wallpanels at quoted price whereas 33% of the customers were not interested to purchase it and want the designs in contemporary style.

CONCLUSION

Folk art of every region has its own uniqueness and they always been a significant source of inspiration for an artist and designers. Cherial scroll painting is a storytelling folk art that was used to educate people about their values.

An attempt was made in present study “Designing of Wall panels by taking inspiration from

Cherial scroll painting” to reintroduce the traditional storytelling scroll painting on fabric for decorating walls of homes.

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WALL MOUNTED INTERACTIVE TALKING BOARD FOR LANGUAGE DEVELOPMENT OF CHILDREN

Suhanya S¹, Dr. Jeyagowri R²

¹ Research Scholar, ² Professor,

Department of Resource Management, School of Home Science,
Avinashilingam Institute for Home Science and Higher Education for
Women, Coimbatore-43

¹suhanyakavi@gmail.com, ²jeyagowrirajagopal@gmail.com

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ABSTRACT

Language is an organised system of informative exchange that consists of both vocabulary and grammar. Language development is an important aspect of child development and it helps to enhance communicative skills, literacy, builds self-esteem, cognitive and social development. The main aim of this study is to develop the language skills for the children in an innovative way. Therefore, a wall mounted interactive talking board was designed and fabricated by the researcher. The talking book which is sold in the market for anywhere between Rs. 500 and Rs. 5000 served as an inspiration for the design. In order to identify the right concept for the talking board an interview was conducted with 15 experts (10 private school teachers (5 Tamil Nadu State Board and 5 CBSC syllabus) and 5 parents of 4-5 years of age) who are associated in the children education. Based on the survey's findings, an Interactive Talking Board was designed and fabricated for children between the ages of 4 and 5. The validity of the fabricated Wall Mounted Interactive Talking Board was evaluated using 16 parameters by the 14 experts in child development process. The developed design's primary attributes features include easy maintenance, easy installation, less space occupancy, water proof, multifunctional, user friendly and low cost.

Key Words: Communicative skills, Interactive, Language development, Self-esteem, Talking board

INTRODUCTION

Language development is a fundamental part of a child's overall development. All humans are born without the knowledge of language and it is only after they reach 10 months of age infants can distinguish speech sounds and engage in babbling. There are five stages in language development and it includes cooing stage (3-5 months), babbling (6-10 months), one-word stage (12- 18 months), two-word stage (18-20 months), later multi-word stage (30+ months) (Xu et al., 2023). Children can express their feelings only through language and it is closely related to their education (George et al., 2023). Many other aspects of development including cognitive, social, and literacy development be fostered by language development.

Language development sets the groundwork for children's reading and writing abilities and is also required for all elements of their education process (Bridges and Kelley, 2023). As a result, acquiring language abilities is critical for every child's future success as a social person and in pursuing an education. Some of the signs for lack of language development in children are blabbering even after the child reaches 15 months of age, not being able to talk or frame sentences by the age of 2 years, difficulty in communicating in short phases by the age of 3 years, trouble fitting words together in a phrase leaving words out of a sentence and bad pronunciation or

articulation (Hoskin, 2023). In general, children by 12 months: utter 2 words along with words like “mummy” and “daddy” (or equivalent in languages other than English), 18 months: 10-50 words, 2 years: 300 words, 2.5 years: 450 words, 3 years: 1000 words, 4 years: 2000 words, 5 years: 5000 plus words and 17 years: 36,000 to 1,36,000 words (Smith, 2023).

One of the best ways for language development is to do a lot of talking together among the family members and the peers. However, due to an increase in nuclear family living style, both parent work culture, single child homes and dysfunctional family conditions the children are forced to stay at home and return from school to an empty house or most of the time left in the house without any adult supervision. These children are termed as Latchkey children (Prema, 2019). Few working parents send their children to the creches where they are always made to sleep and allowed to play with toys on their own where healthy interaction is missing. In this case, the children stop communicating with the parents and also their socialization with their peer group is affected. Generally children below 5 years of age spend most of their time in their houses and lack of communication with them results in delay in language development (Karani et al., 2022).

Children, nowadays, are exposed to smart gadgets like mobile phones and television widely (Papadakis et al., 2022). Children enjoy watching cartoons using smart gadgets and this has its own advantages and disadvantages (Pogiatzi et al., 2022). While there are few shows that are child-friendly and helps in language development, few cartoons include violent aspects, expletive words being used, adult contents and non-verbal themes which may create negative impact on children (Dhiman, 2022). While the young children urge to explore new things using the smart gadgets, these gadgets are filled with contents related to all age groups. Therefore, parental supervision is required for the children while using smart gadgets. However, since this is becoming non-feasible nowadays, it is necessary to provide the children with valuable, interactive and fun-based concepts which are safe to be used even in the absence of the parents. This triggered an interest in the investigator to take up the study on “Wall Mounted Interactive Talking Board for Language Development of Children”.

OBJECTIVES OF THE STUDY

The study has been undertaken with the following objectives to -

- Analyse the concept of interactive talking board for children based on age group
- Develop an interactive talking board based on concepts and age of children
- Assess the developed interactive talking board with experts

METHODOLOGY

The methodology pertaining to the research study entitled” **Wall Mounted Interactive Talking Board for Language Development of Children**” comprised of three phases:

- A. Analysing the Concepts Suitable for Wall Mounted Interactive Talking Board for Children
- B. Developing a Wall Mounted Interactive Talking Board
- C. Assessing the Developed Wall Mounted Interactive Talking Board

A. Analysing the Concepts Suitable for Wall Mounted Interactive Talking Board for Children

The concepts to be considered for the interactive talking board for children were analysed by conducting direct personal interview with 15 experts in the field of teaching by purposive sampling method. Among these 15 experts, 10 were Kindergarten private school teachers (each five from State Board and CBSE board) from two schools and 5 parents of 4-5 year old children. An interview schedule was formulated to collect information on the right concept and word for each alphabet suitable for children of 4-5 year old children. The questions for the interview schedule were framed by referring to the CBSE syllabus 2020-2021. The Central Board of Secondary Education (CBSE) is a national-level board of education in India for public and private schools, controlled and managed by the Government of India. The details of the selected schools are provided in Table 1.

Table 1: Details of the Selected Schools

Name of the School and Location	Nature of School	Syllabus Followed	Year of Establishment	Number of Teachers Selected (N)
Madras Matriculation Higher Secondary School, Vellore Tamil Nadu	Private	State Board	1986	5
Global Public School, Vellore Tamil Nadu	Private	CBSE	2015	5

B. Developing a Wall Mounted Interactive Talking Board

After analysing the appropriate concepts for 4-5 year old children an interactive talking board was designed and developed. This design concept was drawn from talking book. The process involved in designing an interactive talking board is depicted in Figure 1.

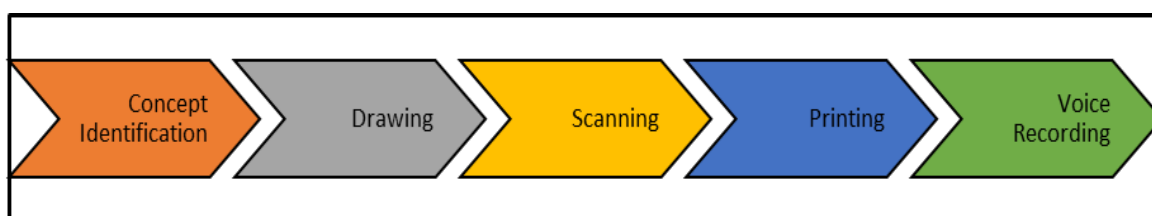


Figure 1: Process Involved in Designing an Interactive Talking Board

The details on the steps involved during the process of developing an interactive talking board are dealt under Findings and Discussion.

C. Assessing the Developed Wall Mounted Interactive Talking Board

The developed wall-mounted interactive talking board was evaluated by 14 experts consisting of four doctors (each two general practitioners and paediatricians), two preschool teachers, two child psychiatrists, two interior designers, two architects and two parents of children of 4-5 years of age. All the selected experts evaluated the finished product using the Likert scale developed by the investigator based on the guidelines of the American Academy of Pediatrics (2021). This scale includes 16 parameters such as age appropriate, child friendly colours, user friendly, game efficiency, educational value, promotes creativity, improves logical thinking, enhances fine and gross motor skills, promotes aesthetic sense, no sharp edges, no small parts, ease in installation, easy maintenance, child safety materials, cost effective and fixed at an appropriate height. The CVI (Content Validity Index) equation was used to assess the developed wall mounted interactive talking board.

FINDINGS AND DISCUSSION

The results of the study on “Wall Mounted Interactive Talking Board for Language Development of Children” is discussed under the following headings:

A. Content Validation for Wall Mounted Interactive Talking Board for Children

The concepts for the wall mounted interactive talking board was analysed and the details are discussed below.

1. Concepts Preferred by the Experts for Interactive Talking Board

The various concepts preferred by the selected 15 experts and the percentage of acceptance for each of the concepts are given in Figure 2.

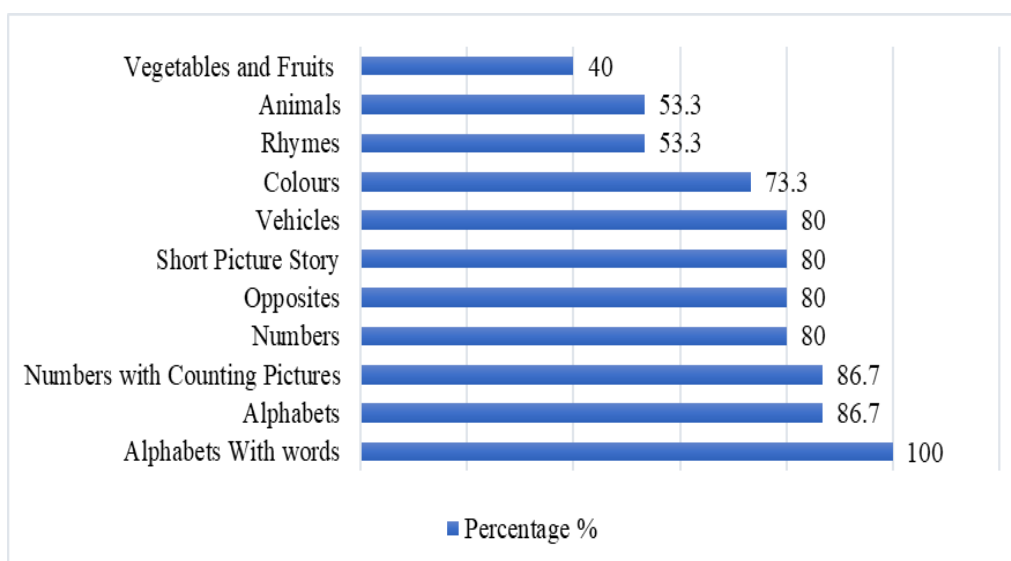


Figure 2: Concepts Preferred by the Experts for Interactive Talking Board

All the selected 15 experts preferred ‘Alphabets with a corresponding word for each of the alphabet’ for the children of 4-5 years of age. This was followed by the concept of ‘numbers and counting pictures’ (86.7 per cent), 80 per cent of the experts selected vehicles, short picture stories,

opposites and numbers as the appropriate concepts. The other concepts preferred by them were colours (73.3 per cent), animals (53.3 per cent), rhymes (53.3 per cent) and fruits and vegetables (40 per cent). All the experts suggested that the phonics way of learning English at an early age is the best method.

2. Words Chosen for Each Alphabet

Three word options were given for each alphabet and the experts were asked to choose one perfect word for each of them. The details on the options of the words provided by the investigator and the words highly preferred by the experts for each alphabet are given in Table 2.

Table 2: Highly Preferred Word for Each Alphabet by the Experts

Alphabets	Option 1		Option 2		Option 3		Highly Preferred Word
	Words	Acceptance	Words	Acceptance	Words	Acceptance	
A	Aeroplane	1	Alligator	13	Ant	1	Alligator
B	Butterfly	12	Balloon	1	Banana	2	Butterfly
C	Cat	9	Caterpillar	4	Cow	2	Cat
D	Duck	3	Dog	11	Dolphin	1	Dog
E	Egg	2	Engine	5	Elephant	8	Elephant
F	Frog	13	Fish	1	Flower	1	Frog
G	Guitar	4	Giraffe	1	Grape	11	Grape
H	Hen	1	Helicopter	12	Hat	2	Helicopter
I	Ice cream	1	Igloo	1	Ink pot	13	Ink pot
J	Jelly	12	Jam	2	Joker	1	Jelly
K	King	4	Kangaroo	7	Kite	4	Kangaroo
L	Ladder	0	Lime	0	Ladybug	15	Ladybug
M	Mat	4	Monkey	2	Mouse	9	Mouse
N	Nose	0	Needle	0	Net	15	Net
O	Octopus	13	Ox	2	Oil	0	Octopus
P	Peacock	11	Pencil	2	Potato	2	Peacock
Q	Queen	2	Quilt	0	Quail	13	Quail
R	Rabbit	6	Rose	4	Rainbow	5	Rabbit
S	Snail	0	Snake	3	Spider	12	Spider
T	Turtle	6	Tree	6	Tiger	2	Tree
U	Unicorn	1	Up	1	Umbrella	13	Umbrella
V	Vulture	8	Van	4	Vegetable	3	Vulture
W	Wind	0	Watch	0	Whale	15	Whale
X	Box	1	Fox	14	Six	0	Fox
Y	Yellow	4	Yogurt	4	Yak	7	Yak
Z	Zebra	13	Zig Zag	1	Zoo	1	Zebra

*N=15

The maximum chosen words by the experts for each of the alphabet was highlighted in Table 2.

B. Designing and Fabricating Wall Mounted Interactive Talking Board for Children

The steps involved during the process of designing and fabricating the wall mounted interactive talking board for children of 4-5 years of age are discussed under the following subheadings.

1. Concept Identification:

All the experts selected the concept of Alphabets with an appropriate word for each of the alphabet as the best concept for 4-5 year old children. Further, all the experts emphasized the importance of phonics at an early stage of education. Phonics is the method of teaching children to read with the help of alphabet sounds and help in learning correct spellings of the words they hear or read. Children can easily associate letter sounds with the word beginnings. Table 3 explains the final words chosen by the experts for each of the alphabet based on phonics.

Table 3: Words Chosen by Experts for Interactive Talking Board

A-Alligator	J-Jelly	S- Spider
B- Butterfly	K-Kangaroo	T- Tree
C- Cat	L- Lady Bug	U- Umbrella
D- Dog	M- Mouse	V- Vulture
E- Elephant	N- Net	W- Whale
F- Frog	O- Octopus	X- Fox
G- Grapes	P- Peacock	Y- Yak
H- Helicopter	Q- Quail	Z-Zebra
I-Ink pot	R- Rabbit	

2. Drawing

After identifying the right word for each alphabet for the talking board, appropriate illustrations were designed and drawn by the investigator. The investigator used a pencil to sketch the outline of the illustrations on chart paper. Once the illustration was chosen, a black sketch pen was used to draw the outlines which help in projecting the look of the illustration. Wax crayons were used to colour the illustrations as it was less messy, easy to use, available in wide range of colours, easily blending with other colours and less expensive. The stages involved in drawing are given in Figure 3.

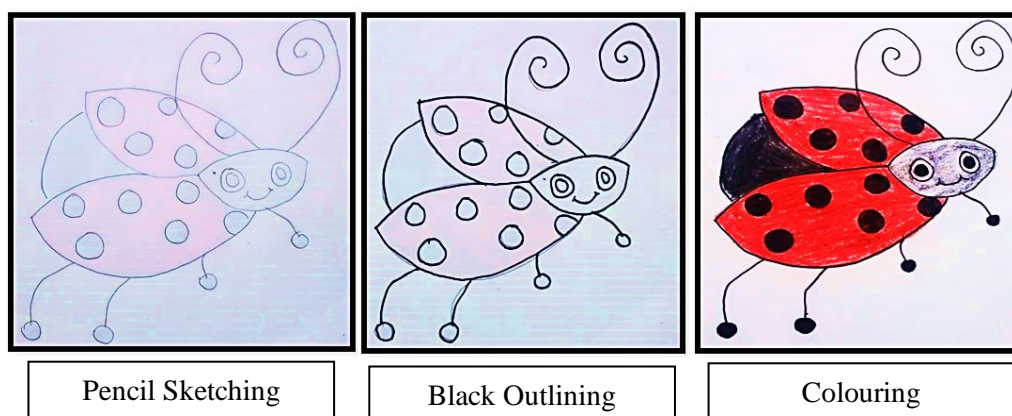


Figure 3: Stages of Drawing Pictures for Each Alphabet

3. Scanning

Once the illustrations were coloured, the hard copy of the illustrations were converted into a soft copy by scanning the images in a scanner. A scanner is a modern device that captures images in photographic form and makes it available in a format suitable for computer editing. A scanner is capable of scanning both black and white and coloured images.

4. Photo Editing

All the scanned illustrations were opened using the Photoshop software and the model design were developed. A 3'x 5' sheet was divided into 27 boxes (14 cm x 30 cm) with 3 columns and 9 rows to accommodate all the 26 alphabets of the English language. One last box was left empty. Each of the alphabets was represented in both upper and lower case formats in each of the box along with the scanned picture and its spelling corresponding to each of the alphabet. A sample box is provided in Figure 4 representing its dimensions.

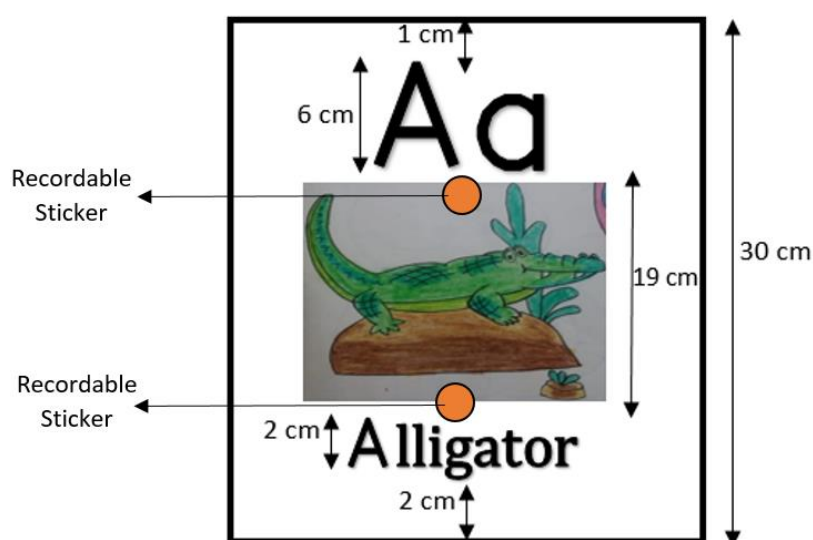


Figure 4: A Sample Box Representing the Dimensions

5. Printing

The designed image was then printed out on a flex sheet (3' x 5') using a digital graphic printer. The cost of printing was 50.Rs per sq. ft.

6. Recording

To make the printed flex sheet interactive, a smart talking pen was used. The investigator used a talking pen of the Dimdu Smart brand available in the market. The talking pen is a unique instrument used for modern teaching approaches for children. It helps in developing language skill, which comes with recordable stickers that can be stuck wherever needed and a voice can be recorded to any number of times and in any language. The process of recording is shown in Figure 5. The investigator used two stickers in each box. One sticker was stuck below the alphabet and the other was stuck below the picture. The details of sticker placement is shown in Figure 4. The right Phonic Sound for each alphabet and the words were recorded with the help of R. Latha Lakshmi (MA., M.Ed., M.Phil., Diploma in Montessori Education) who is working in

Madras Matriculation Higher Secondary School, Vellore. She has 15 years of experience in the field of children education and she is specialised in English (BA and MA).

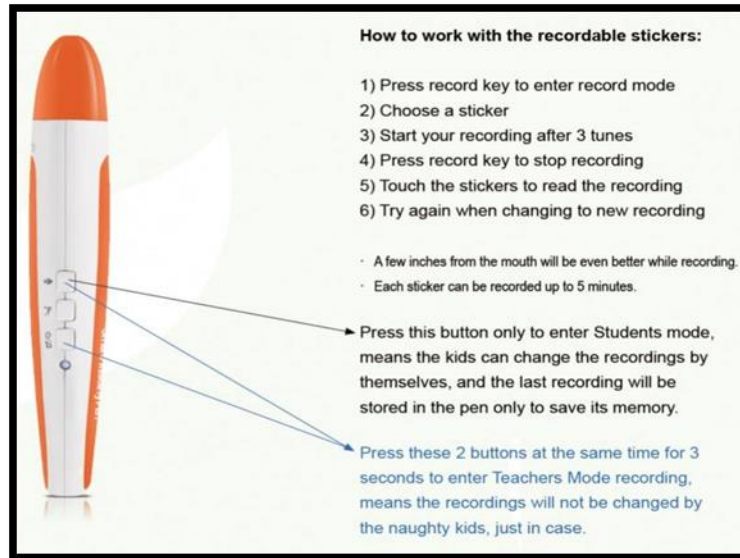


Figure 5: Working Process of Dimdu Smart Reading Pen

(Source: Dimdu Creative Smart Education Solutions Pamphlet)

7. Fabrication:

Once the flex sheets are recorded with the help of Dimdu smart reading pen the sheets are attached to the ply wood (3'x5') with the help of the carpenter. The fabricated interactive talking board can be fixed on the wall. The final output of the developed wall mounted talking board is shown in Figure 6.



Figure 6: Developed Wall Mounted Interactive Talking Board

8. Features and Working Process of the Developed Wall Mounted Talking Board:

The children need to switch on the Dimdu talking pen and place it on the sticker that was pasted on the flex sheet. Once placed, the pen replays the recorded voice corresponding to the sticker. For example, if the child places the pen on sticker under the letter ‘A’, then the recorded voice says ‘A says aa’. Similarly, if it is placed on the sticker stuck under the alligator picture, the recorded voice says ‘aa says alligator’. The salient features of the developed wall mounted talking board are:

- Easy maintenance
- Easy installation
- Occupy less space
- Water proof
- Multifunctional
- User friendly
- Work efficiency
- Low cost

9. Expenditure Incurred on Fabricating the Wall Mounted Interactive Talking Board

The amount spent on fabricating a single unit of the wall Mounted interactive talking board is given in Table 4.

Table 4: Expenditure Incurred on Fabricating the Wall Mounted Interactive Talking Board

Material	Quantity (Number)	Dimension (feet/inches /cm/mm)			Cost (Rs)
		Length	Width	Thickness	
Plywood	1	3'	5'	9mm	200
Flex Sheet Printing	1	3'	5'		750
Drawing Material	1				50
Dimdu Talking pen	1				4000
Material Charge					5000
Labor charge					100
Total					5100

The total cost incurred for fabricating a single unit of the wall mounted interactive talking board is Rs.5100.

C. Assessment of the Fabricated Wall Mounted Interactive Talking Board

The fabricated wall mounted interactive talking board was assessed using sixteen parameters by the 14 experts. The list of parameters chosen by the investigator and their level of acceptance by the experts are given in Table 5.

Table 5: Acceptance Validity of the Wall Mounted Interactive Talking Board by Experts

Parameters	Average Acceptance N=14	I-CVI	Acceptance/ Rejection
Age	14	1	Accepted
Child friendly colours	14	1	Accepted
User friendly	14	1	Accepted
Game efficiency	14	1	Accepted
Educational value	14	1	Accepted
Promotes creativity	14	1	Accepted
Improves logical thinking	14	1	Accepted
Enhances fine and gross motor skills	12	0.86	Accepted
Aesthetic	14	1	Accepted
No sharp edges	14	1	Accepted
No small parts	14	1	Accepted
Ease in installation	14	1	Accepted
Maintenance	14	1	Accepted
Child safety materials	13	0.93	Accepted
Cost effective	13	0.93	Accepted
Fixed at appropriate height	13	0.93	Accepted
S-CVI Average			0.98
Total Highly Accepted Parameters			12
S-CVI/UA			0.71

All the selected 16 parameters were accepted by the selected experts and among them 12 parameters were highly accepted. Though the S-CVI/UA average is 0.71, the S-CVI average value is 0.98 from which it is clear that the acceptance of the developed wall mounted interactive talking board was high.

SUMMARY AND CONCLUSION

An innovative interactive talking board was developed by the researcher for the children of 4-5 years of age to develop the language skill. The cost incurred in developing the talking board is Rs.5100 per unit. It has various advantages like easy maintenance, easy installation, less space occupancy, water resistant quality, multifunctional, user friendly and easy operation compared to other similar products in the market. The developed design was assessed by the 14 experts for 16 parameters. Out of the 16 parameters, 12 of them received high approval from the experts. Despite the S-CVI/UA average being 0.71, the S-CVI average value of 0.98 indicates that there was a high level of acceptance. This developed design can be used in residences and also in schools.

Suggestion for Future Research

Installation and evaluation of developed wall mounted interactive talking board for language development of children.

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HOME SECURITY SYSTEMS FOR ELDERLY: EXTENT OF UTILIZATION AND SATISFACTION

Dr. Urvashi Mishra¹, Ms. Poripurna Goswami²

¹Assistant Professor,²Temp. Teaching Assistant

Department of Family and Community Resource Management

Faculty of Family and Community Sciences

The Maharaja Sayajirao University of Baroda, Vadodara, Gujarat

E-mail: urvashi.mishra-fcrm@msubaroda.ac.in

poripurna.g-fcrm@msubaroda.ac.in

HSAI Membership No.09/U-3/LF

ABSTRACT

Home Security Systems for Elderly are the devices that work to secure an Elderly and the house from every possible threat. With the assistance that Home Security Systems provided to the Elderly, they'll likely be able to gain more independence and can live securely for a longer period of time. There are different Home Security Systems for Elderly available in the market and many people have also installed them at their residence. However, there was a need to know the extent of utilization and satisfaction experienced regarding Home Security Systems for Elderly by the residents. Therefore, a study was conducted on 120 respondents of Assam and online questionnaire was used for data collection. The major findings of the study revealed that, majority of the respondents belonging to the age group of 60 to 81 years were using Security Cameras at their residence and they were using it for more than 2 years. Whereas, respondents belonging to the age group of 82 to 92 years were highly utilizing Medical Security Devices along with the Security Cameras. Concerning the Family Monthly Income, respondents having less than ₹25,000 Family Monthly Income, had installed Medical Security Devices. While having Family Monthly Income between ₹25,000 to ₹50,000 and more than ₹50,000 had installed Security Camera. Again, it was found that, majority of the respondents were satisfied with the various aspects of the Automatic Pill Dispenser, Medical Security Device, Video Door Phone, Smart Door Lock, Security Camera, and Motion Sensor Lights.

Keywords: home security systems, elderly, extent of utilization, extent of satisfaction.

INTRODUCTION

India at present is considered as a leading nation in the world in terms of human power. The huge young population is considered as its strength and it enhances its potential for faster growth. Elderly people, due to their reduced mobility and debilitating disabilities, need other people to do things for them. ^[1] The major types of crimes faced by the Elderly are burglary and criminal acts like; a crime against the body (murder, attempt to murder, hurt and kidnapping etc.), a crime against the property (robbery, burglary and theft) and economic crime (cheating, criminal breach of trust etc.). (Mishra et al., 2013).

Although everyone is somewhat acquainted with the idea of Home Security Systems, there aren't many of them being used. The elderly members of the home as well as the rest of the household can feel safe and secure with the help of home security systems. Compared to other age groups, elders are far more vulnerable to risk because as they get older, their physical and mental capabilities decline. The elderly deal with a variety of problems on a daily basis. As a result, the requirement for ongoing assistance from another person to do their daily tasks is unavoidable. However, they can be helped and given safety and security inside the home with the aid of various Home Security System for Elderly.

During the literature review, it was found that, many researches have been conducted on fall detection and prevention for elderly, home mobile healthcare system for wheelchair users, smart home for elderly, effectiveness security devices, home automation, smart home security etc. But there are a few researches conducted specifically on Home Security Systems for Elderly specially in the state Assam. Therefore, it was thought that the present study will be distinctive and will contribute to the literature, live projects and researches on safety and security systems for Elderly.

Objectives of the study

1. To assess the extent of utilization of Home Security Systems for Elderly by the Elderly residents of households from the selected districts of Assam.
2. To assess the extent of satisfaction experienced regarding various aspects of Home Security Systems for Elderly by the Elderly residents of households from the selected districts of Assam.

Delimitation of the study

1. The present study was limited to the selected nine districts of Assam namely Jorhat, Dibrugarh, Golaghat, Lakhimpur, Sivasagar, Majuli, Dhemaji, Charaideo and Tinsukia.
2. The present study was limited to 120 households from the selected districts of Assam where at least one elderly family member resides in the house.
3. The present study was limited to those households where at least one Home Security System for Elderly was installed and was being used since minimum past one year from the time of data collection.

Hypothesis of the study

1. There exists a variation in the extent of utilization of Home Security Systems for Elderly with the selected personal variables (Age in years, Occupation and Family Monthly Income) and situational variable (Living Arrangement) of the respondents from the selected districts of Assam.

METHODOLOGY

For the present study, descriptive research design was adopted. The study was conducted in the randomly selected nine districts of Assam, amongst the selected nine districts, 120 households were selected with the help of Snowball Sampling Technique. For the study, only those households were selected where at least one elderly family member above 60 years of age residing, have installed at least one Home Security System for Elderly and being used since minimum past one year from the time of data collection. Market survey (to gather details of availability of Home Security Systems for Elderly) and online questionnaire (to assess the extent of utilization and satisfaction of the respondents regarding Home Security Systems for Elderly) was used for collecting the data. Data was analyzed using descriptive statistics (frequency, percentage, mean, and standard deviations) and relational statistics (Analysis of Variance). The extent of utilization and satisfaction with Home Security Systems for Elderly were measured on a 3-point continuum scale, i.e., "Always, Sometimes, and Never" and "Satisfied, Undecided, and Not satisfied," respectively, and 3,2, and 1 scores were assigned for those responses.

FINDINGS AND DISCUSSION

Section I: Market Survey: In order to know the extent of utilization and satisfaction of Home Security Systems, it was essential to know the availability of Home Security Systems for Elderly in the market of selected districts of Assam. For that purpose, a market survey was conducted and it was found that altogether seven Home Security Systems for Elderly were available in the market of selected districts of Assam(**Fig.-1**).

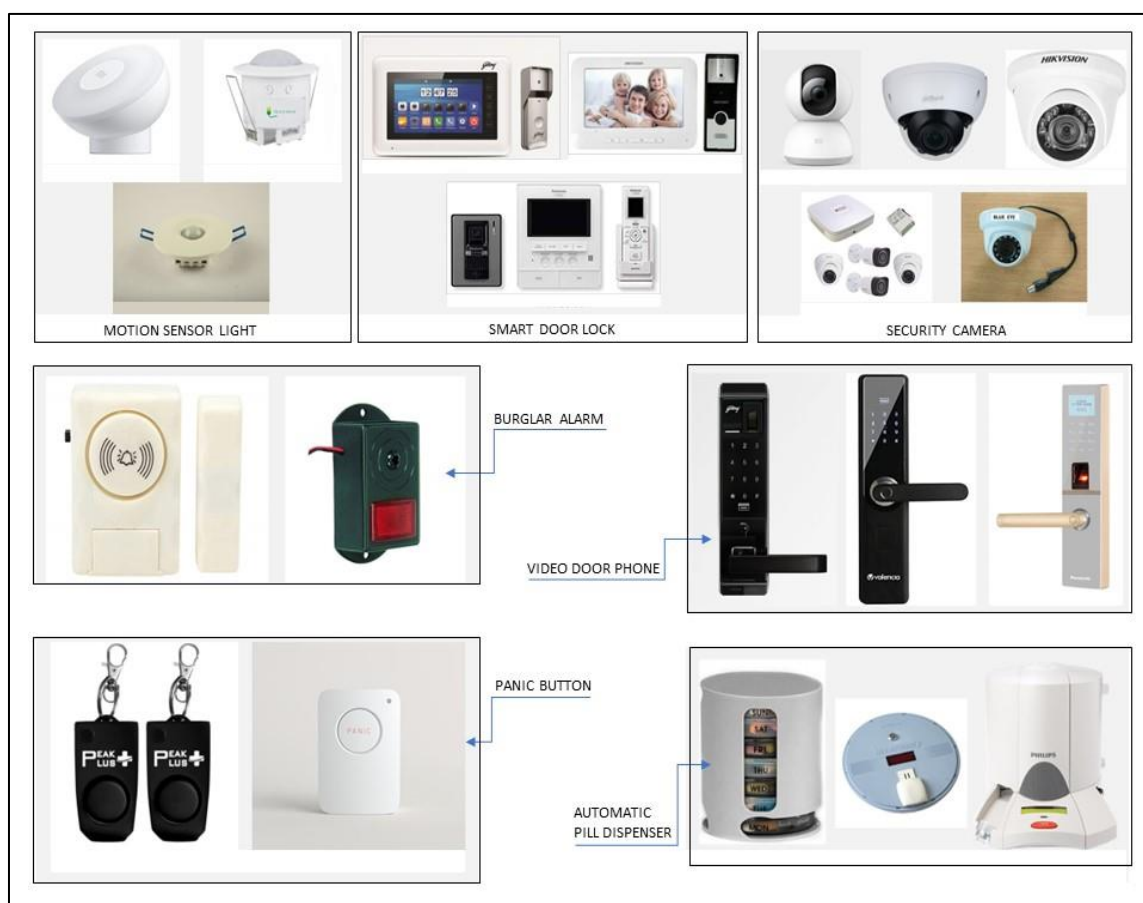


Fig.-1: Home Security System for Elderly available in the market

Table-1: Available brand and price of Home Security Systems for Elderly in Assam.

Sr. No.	Home Security Systems	Available Brand	Price Range (Rs.)
01	Motion Sensor Light	Halonix, Quick Sense, Mi	530 – 650
02	Burglar Alarm	Jenix, Quick Sense	1,300 –500
03	Security Camera	Mi, Dahua, Hikvision, CP plus, Blue eye	15,000 – 21,000
04	Video Door Phone	Godrej, Hikvision, Panasonic	17,000 – 20,000
05	Smart Door Lock	Godrej, Valencia, Panasonic	20,000 – 31,000
06	Medical Security System	Peak plus, SimpliSafe	1,100 – 1,700
07	Automatic Pill Dispenser	Mahi Enterprise, Medready, Philips	700 – 1,500

Section II: Background Information of the respondents

Based on the collected that, it was found that majority of the respondents (78.33%) belong to the age group of 60 to 70 years with the Mean age of the respondents 68.12 years, majority of the respondents (43.33%) were Not employed and hence they spent their maximum time at home, majority of the respondents (57.50%) had their Family Monthly Income more than ₹50,000 and majority of the respondents (62.50%) lived with their family members. the respondent reported that the Home Security Systems for Elderly was installed to monitor the house (56.67%) and to get protection from intruder (53.33%) respectively. Whereas, more than one-third of the respondent stated that the Home Security Systems were installed to get security (40.83%) and to get assistance (38.33%) respectively. The data exposed that more than one-half of the respondents (52.50%) were having no any health-related issues. (Fig.-2)

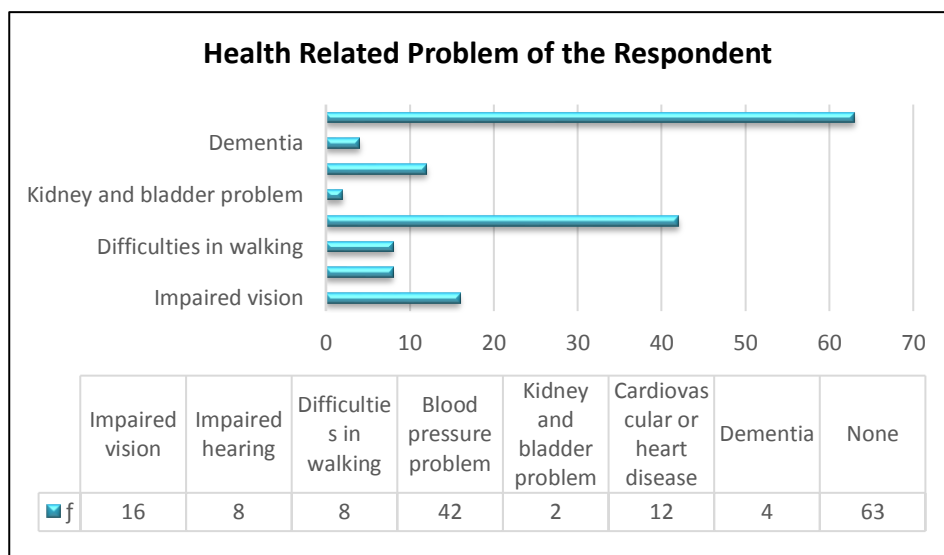


Fig.-2: Distribution of the respondents according to their Health-Related Problems

Section III: The extent of utilization of Home Security Systems by the respondents

From the data given in Fig.-3, it is observed that, 72.50% of the respondents have uses Security cameras at their residence.

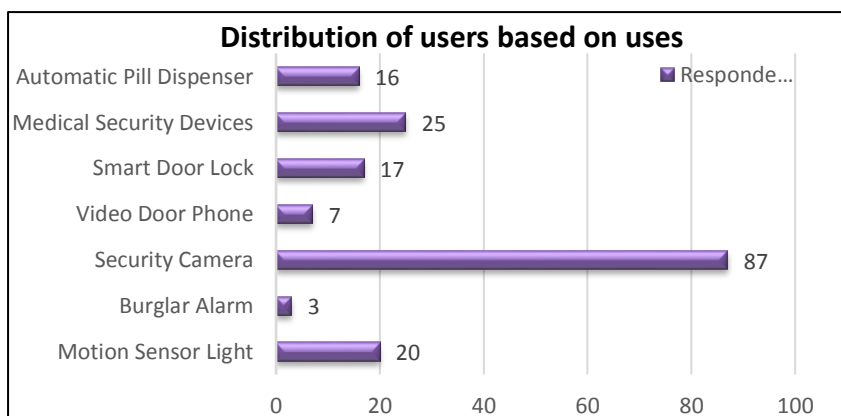


Fig.-3: Distribution of users based on uses of Home Security Systems for Elderly

The respondents belonging to the age group of 60-70 years and 71-81 years were utilizing Security Camera at their priority. Whereas, respondents belonging to the age group of 82 to 92 years highly utilized Security Camera as well as Medical Security Devices at their residence. Whereas, amongst the respondents having less than ₹25,000 Family Monthly Income had installed Medical Security Devices. It may be because these respondents belonged to the age group of 82 to 92 years. Whereas, the respondents belonging to the group of having Family Monthly Income between ₹25,000 to ₹50,000 and more than ₹50,000 had installed Security Camera at their residences.

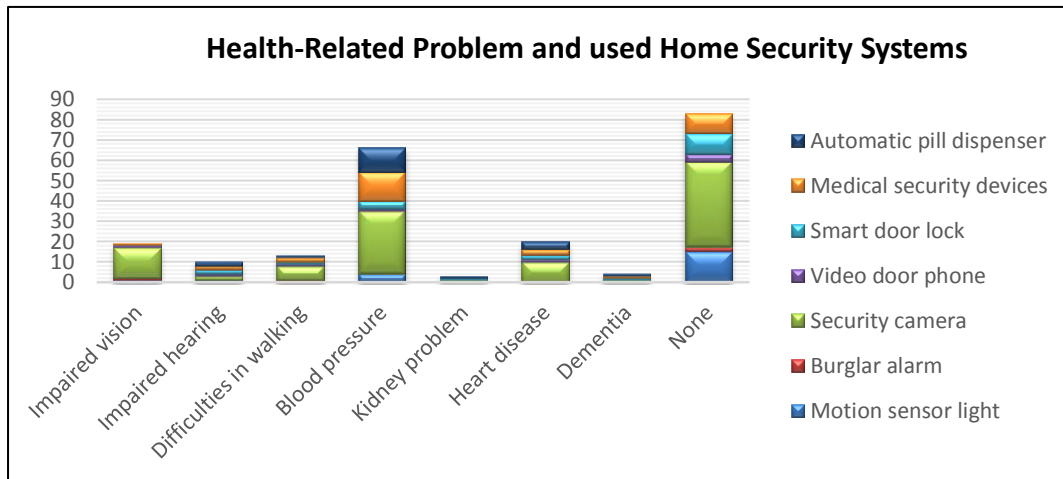


Fig.-4: Health-Related Problem and used Home Security Systems

From the Fig.-4, it was found that all the respondents were highly utilizing the Security camera at their residence. Those respondents, who had hearing related problem and dementia, they mostly utilized Smart Door Lock, Medical Security Camera and Automatic Pill Dispenser at their house.

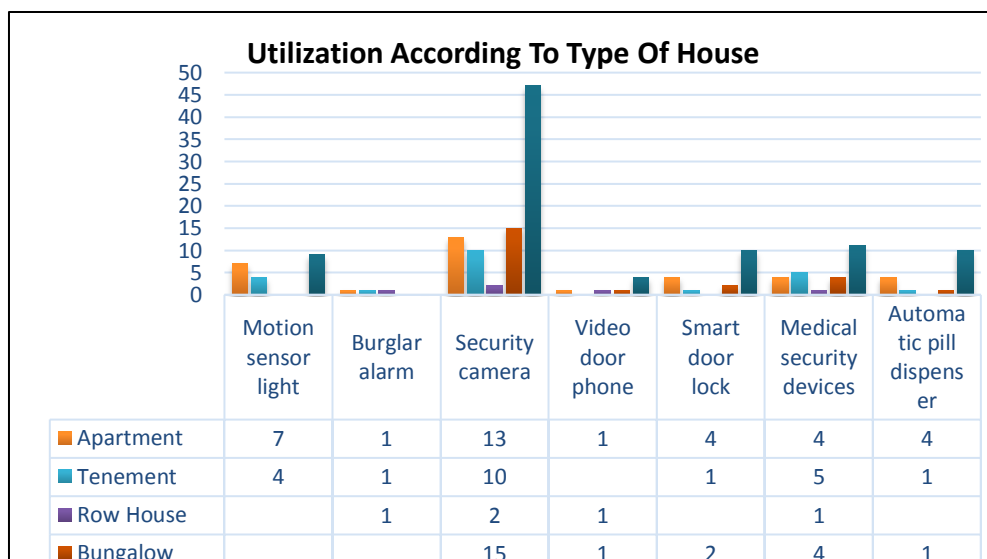


Fig.-5: Distribution of the respondents according to their Type of House where they reside and used Home Security Systems for Elderly

Fig.-5 described the frequency distribution of the respondents regarding their utilization of Home Security Systems for Elderly according to their Type of House. From Fig., it can be observed that, amongst the respondents who were lived in Apartments, more than one-half (61.90%) of the respondents were using Security Camera, respondents who were lived in Tenements, majority of the respondents (76.92%) were using Security Camera and Video Door Phone respectively. Again, the respondents who were lived in Row Houses, one-half of the respondents were using Security Camera (50%) and one-fourth (25%) of the respondents were using the Burglar Alarm whereas; the respondents who were lived in the Other Type of House i.e.; Assam-Type House, majority of the respondents were using Security Camera (75.81%), less than one-fifth of the respondents were using Medical Security Devices (17.74%), Smart Door Lock (16.13%), Automatic Pill Dispensers (16.13%) and Motion Sensor Lights (14.52%) respectively.

Respondents living in ready-made schemed house designed by builders, it was observed that, slightly less than four-fifth of the respondents were using Security Camera (78.46%), one-fifth of the respondents were using Medical Security Devices (20%), more than one-tenth of the respondents were using Motion Sensor Lights (12.31%) and Automatic Pill Dispensers (10.77%) respectively. Whereas, the respondents living in the house designed by themselves or by family member, more than one-half of the respondents were using Security Camera (64.45%), less than one-half of the respondents were using Motion Sensor Lights (40%), less than one-fifth of the respondents were using Smart Door Lock (18.18%) and Automatic Pill Dispensers (16.36%) respectively. Whereas, slightly less than one-tenth of the respondents were using Video Door Phone (7.27%) at their residence.

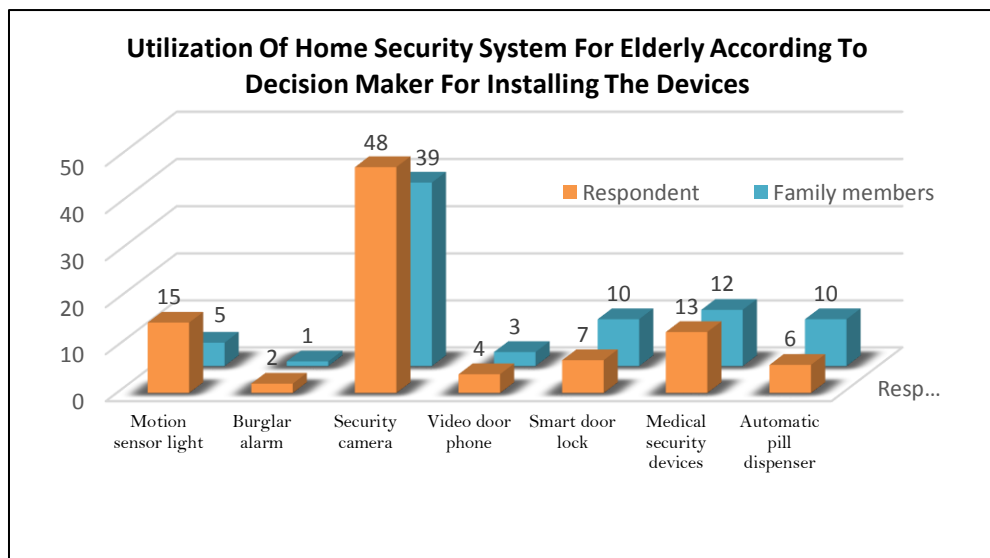


Fig.-6: Distribution of respondents according to the Decision Maker for installing the Home Security Systems for Elderly

It was also being observed that, amongst the respondents who had taken the decision of installing the Home Security Systems by themselves, more than one-half of the respondents had installed Security Camera (69.57%), although; the respondents whose family member had taken the decision for installing the Home Security Systems for Elderly in their house, more than two-third of the respondents had installed Security Camera (76.47%). (**Fig.-6**)

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During data collection for the present study, it was found that majority of the respondent had installed Security Camera at their residence for their safety and security. However, researcher come across a similar study during the review of literature which shows that, the Ambient Sensors are highly preferable by the users for elderly care and independent living which focuses on monitoring basic daily activities and falls of the elderly at their residence.

Section IV: The extent of satisfaction experienced regarding various aspects of Home Security Systems for Elderly by the respondents

The extent of satisfaction experienced regarding Home Security Systems for Elderly by the respondents was measured on 3-point continuum i.e.; “Satisfied, Undecided and Not Satisfied” and the ascribed score were 3, 2 and 1 respectively for the positive statements and vice-versa for negative statements. Further, a weighted mean score was calculated to find out the extent of satisfaction experience regarding various aspects of Home Security Systems for Elderly by the respondents.

- Motion Sensor Light: Majority of the respondents were satisfied with the functioning, comfortability of using, design, accuracy and material of the Motion Sensor Lights installed in their residence.
- Burglar Alarm: Majority of the respondents were satisfied with the material and design of the device followed with functioning of the device, frequency of responses received by the device during emergency, comfortability and emitted alarm sound of the Burglar Alarm.
- Security Camera: The respondents were satisfied with the functioning of the device, design and material of the device, comfortability, regularity and accuracy of the device, area coverage of the camera and its footage quality, response frequency of the Security Camera.
- Video Door Phone: The respondents who had installed Video Door Phone were satisfied with all the aspects of the device (i.e.; sound quality, design & material of the device, regularity of work, comfort during use and functioning of the devices) except its maintenance and purchasing cost.
- Smart Door Lock: The respondents were satisfied about the functioning, comfortability, accuracy and regularity of work, response frequency, design and material of the Smart Door Lock.
- Medical Security System: Cent percent of the respondents were satisfied with the functioning of the device, design and size of the device. Whereas, 96% of the respondent was satisfied with the accuracy and comfortability of using the device.
- Automatic Pill Dispenser: It can be seen that, all the respondents (100%) were satisfied with the functioning, comfortability of using, design and size, purchasing cost and accuracy of the Automatic Pill Dispenser with the weighted mean score 3.00. Therefore, it can be concluded that, respondents were highly satisfied with all the aspects of the Automatic Pill Dispenser system.

Section V: Testing of Hypothesis

For the present study, “Analysis of Variance” was used to test the hypothesis.

HO₁:There exists no variation between the extent of utilization of Home Security Systems for Elderly with the selected personal variables (Age, Occupation and Family Monthly Income) and situational variable (Living Arrangement) of the respondents selected from the districts of Assam.

Table-2: Analysis of Variance for selected personal and situational variable with extent of utilization of Home Security Systems for Elderly

Independent Variables	Sum of Square	df	Mean Square	F-ratio	Level of Significance
Age					
Between Groups	.467	2	0.233	0.072	N.S.*
Within Groups	381.500	117	3.261		
Total	381.967	119			
Occupation					
Between Groups	1.618	2	0.809	0.249	N.S.*
Within Groups	380.349	117	3.251		
Total	381.967	119			
Family Monthly Income					
Between Groups	41.649	2	20.824	7.159	0.01**
Within Groups	340.318	117	2.909		
Total	381.967	119			
Living Arrangement					
Between Groups	28.920	5	5.784	1.868	N.S.*
Within Groups	353.047	114	3.097		
Total	381.967	119			
* N.S.= Not Significant **Level of Significance = 0.01 level df: Degree of Freedom					

Table-2 clearly depict that, the computed F-ratio for selected personal variables “Age and Occupation” and situational variable “Living Arrangement” of the respondents were found not to be significant with the extent of utilization of Home Security Systems for Elderly by the respondents. However, the selected personal variable “Family Monthly Income” was found to be significant - at 0.01 level with the extent of utilization of Home Security Systems for Elderly by the respondents from the selected districts of Assam as the F calculated was higher than F tabulated ($F_c > F_t$ at 0.01 level). Thus, the null hypothesis HO₁ was partially accepted.

CONCLUSION

Home Security Systems can help the elderly age in place with dignity and safety by giving them more confidence in their ability to live alone and supporting families in avoiding making the difficult choice to place elderly parents in expensive assisted-living facilities. Elderly individuals need an abundance of care and attention. There are numerous elderly Home Security Systems available in the market that can help them feel safe and comfortable in their own residences. The collected data implied that, majority of the respondents were using Security cameras at their residence and they were using it from more than last three years. Along with that, majority of the

respondents were highly satisfied with the various aspects of Automatic Pill Dispenser, Medical Security Device, Video Door Phone, Smart Door Lock, Security Camera and Motion Sensor Lights. Whereas, respondents were moderately satisfied with the various aspects of the Burglar Alarm System. There existed a significant relationship between the extent of utilization of Home Security Systems for Elderly with the selected personal variable "Family Monthly Income" of the respondents as the F calculated value was found higher than the F tabulated ($F_c > F_t$ at 0.01 level). Therefore, it can be concluded that the extent of utilization of Home Security Systems for Elderly was higher for those respondents who have higher Family Monthly Income.

Implication of the study

- **For the Field of Family and Community Resource Management:** the types of Home Security Systems, its uses, benefits and available brand in the market in present time can incorporate in the curriculum.
- **For Architects, Interior Designers and Builders:** the market survey report and the design developed under the study will provide an idea related to Home Security Systems for Elderly which they can incorporate in upcoming projects where the need of providing security for elderly in a house will arise.
- **For the manufacturer, retailer and consumer of Home Security Systems:** extent of utilization and satisfaction of respondents will help them to make any necessary changes to improve the product. It is also beneficial to buyer who want to buy Home Security Systems for their house which is beneficial for the Elderly or Senior loved one, they can also estimate the approximate cost of that system from this study.

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PHYSICAL HEALTH AND ENDURANCE LIMITATIONS IN TYPE II DIABETES PATIENTS

Dr. Gayathry. C. P¹ Dr. Sheeja. P.R²

¹Assistant Professor, ²Associate Professor,

Department of Home Science

HHMSPB NSS College for Women, Neeramankara,

Thiruvananthapuram. University of Kerala

E mail: (1)drcpgayathry@gmail.com, (2)somsiv@gmail.com

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ABSTRACT

Diabetes mellitus, a common metabolic disease among the general population, is often looked upon with anxiety despite extensive medications. Diabetes and its management can have a considerable impact on people's lives, due to feelings of isolation, co-dependency, experience of loss, overuse of defence mechanisms, and loss of freedom, all of which takes a toll on the Quality of Life expressed as limitation in the physical health and endurance of diabetes patients. Based on the background described, the researcher was interested in examining the physical health and endurance limitations in type II diabetes patients. A total of 500 outpatient type II diabetics were non-randomly selected. Nutritional profile was assessed using standard tools adopting standardised methods through direct Interview. A Physical Quality of Life Score was developed for assessing the socioeconomic variables. Limitations in physical health and endurance of the patients were assessed by providing a self-administered Likert's 5 point rating scale to the patients. The data were analysed and interpreted statistically (SPSS 21.0). The results show that less than one fifth of the patients were found to have good socioeconomic status. The physical health and endurance of the patients were significantly limited in diabetic patients.

Keywords- Type II diabetes mellitus, Physical health, Physical endurance, Limitation

INTRODUCTION

Diabetes mellitus, a common metabolic disease among the general population, is often looked upon with anxiety despite extensive medications. Diabetes and its management can have a considerable impact on people's lives (SIGN, 2010 and Hanninen et al, 2001), due to feelings of isolation, co-dependency, experience of loss, overuse of defence mechanisms, and loss of freedom, all of which takes a toll on the Quality of Life (QoL) outcome of the diabetes patients. The highest loss in the potentially productive years of life worldwide (WHO, 2010), is attributed mainly due to the large proportion of people suffering from lifestyle diseases, especially diabetes mellitus.

Diabetes affects the physical well-being, the physical QoL of the patients too mainly through three major ways. The first and the most potent factor is the development of long-term complications. The patients' ability to function independently may be impaired as well. The second factor is short-term complications. Chronically elevated BG (BG) levels may lead to increased fatigue, sleep problems, more frequent infections, and other associated problems. The third major

factor concerns physical ill-being is resulting from the demands of the diabetes regimen. When the patients are forced to limit or restrict their activities in order to manage their diabetes effectively, their QoL is actually affected (Mathew et al, 2014). In addition, extremely elevated BG levels may lead to persistent fatigue, which can aggravate depressed mood. Similarly, frequent hypoglycemic episodes can be exhausting, debilitating, discouraging, and potentially quite frightening to the patients and also the family members.

Interventions including the introduction of BG-lowering medications or new insulin delivery systems, and educational and counselling interventions designed to facilitate the development of diabetes-specific coping skills, can improve both glycemic control and QoL in people with diabetes. According to Rubin (2000), active and effective disease-specific coping can trigger a positive cascade of enhanced well-being, more active diabetes self-management, better glycemic control, and fewer complications.

Demographic variables are associated with QoL in people with diabetes. Men generally report better QoL than women and younger people have better QoL than older people. Those with more education or income generally report better QoL than those with less of either. It was found that diabetic complications had more impact on the QoL in patients younger than 65 years old. Mathew et al (2014) has reported a positive association between high levels of perceived QoL and good glycemic control.

QoL is extremely important for diabetes patients and their healthcare providers for several reasons, as many people who suffer from diabetes with poor QoL, seldom pay attention to their self-care and disease management (www.icsi.org/guidelines). Thus it is important to examine one of the factors determining the QoL of diabetes patients that is their well-being in physical health and endurance.

Working definitions:

Physical health is defined as an organism's normal function at all levels, the standard path of biological processes required for individual survival and reproduction, the dynamic equilibrium of an organism and its processes with the external milieu, involvement in socially beneficial work, the performance of essential social functions, the absence of illnesses, painful situations, and the body's capacity to adapt to the constantly changing environment (Koipysheva, 2018).

Physical endurance is the ability to sustain an activity for extended periods of time and usually refers to aerobic ability (Avers, 2020).

Based on the background described, the researcher was interested in examining the limitations in physical health and endurance in type II diabetes patients.

OBJECTIVES

To study the limitations in physical health and endurance in type II diabetes patients

HYPOTHESIS

Where, the Null Hypothesis (H_0) being – There are no significant limitations in physical health and endurance in patients with type II diabetes.

MATERIALS AND METHODS

A) Area and sample- A considerably large sample of 500 type II diabetes patients who attended the outpatient department of Endocrinology wing of NIMS Medicity (NICER-Noorul Islam Centre for Endocrinology Research), Thiruvananthapuram, Kerala, India constituted the macro sample pool and the sampling method followed was purposive sampling method.

B) Tools used - In the present study details were collected from the patients using the developed tools such as questionnaires and schedules through direct interview method after obtaining consent from the patients to participate in the study. Details on various nutritional status indicators, namely socio economic profile, anthropometric, clinical status and dietary factors were collected from the patients during the course of the study.

C) Computed Scores- Physical Quality of Life Score (PQLS): PQLS was developed by modifying the Physical Quality of Life Index (PQLI) suggested by Dhanasekharan (1991). The variables considered in computing this score were marital status of the patients, educational and occupational status of the patients and their spouse, family strength, number of children, monthly income of the family and location of housing of the patients. Highest score of 3 was assigned to the positive response and lowest score of 1 was assigned to the worst response.

Limitations in physical health and endurance of the patients were assessed by providing self-administered rating scales to the patients. A Likert's 5 point rating scale was developed by modifying the QOLID formulated by Nagpal et al (2010). Two major domains namely a) Role Limitation Due to Physical Health (4 questions) and b) Physical Endurance (4 questions) were suitably selected for the study out of a total six domains.

The duration of the patients' participation in the study was approximately 50 minutes: 10 minutes for the consent process, 30 minutes for interview and 10 minutes for the self-administered rating scales. Once all study tools were completely filled, the investigator checked for any missing data before proceeding to other analysis.

D) Research Analysis

Statistical analysis was carried out using SPSS version 21.0. A p-value of ≤ 0.05 was considered as statistically significant.

- Categorical variables were presented as frequencies and percentages.
- Means of selected variables were compared using One-way ANOVA
- Tukey simultaneous comparison t-values for pairwise comparisons of variables.
- Descriptive statistics including mean (reported as mean \pm SD) was computed for continuous and categorical variables.

RESULTS AND DISCUSSION

1. Socio economic profile of the patients

The sample pool consisted of 283 male and 217 female patients, and more than half (52%) of the patients belonged to the age group of 45-60 years category. Among the patients 56.6 percent were males and 43.4 percent were females; belonging to urban (46.2%) and rural (48.4%) settings. Many patients were from nuclear families (63.6%), with moderate education (50.5-51%) and female patients mostly unemployed. Similar trend was observed in the case of spouses also. Physical Quality of Life Score (PQLS) as indicated by the basic details of the patients expressed that close to one fifth of the patients (19.20%) had good scores. The socio economic profile of the patients has been reported in Table 1.

Table 1.
Socio Economic Profile of the Patients

Particulars	Gender				Total		χ^2	
	Male patients (N=283)		Female patients (N=217)		N	%	Value	p-value
	N	%	N	%				
Age of the patients (in years)								
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		
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		
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		
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		
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		
a. 1 cell (12.5%) has an expected count of less than 5. The minimum expected count is 3.91.								

2. Physical Quality of Life Score (PQLS)

In order to ascertain the combined action of socio economic variables, an index named Physical Quality of Life Score (PQLS) was developed as depicted in Fig.1.

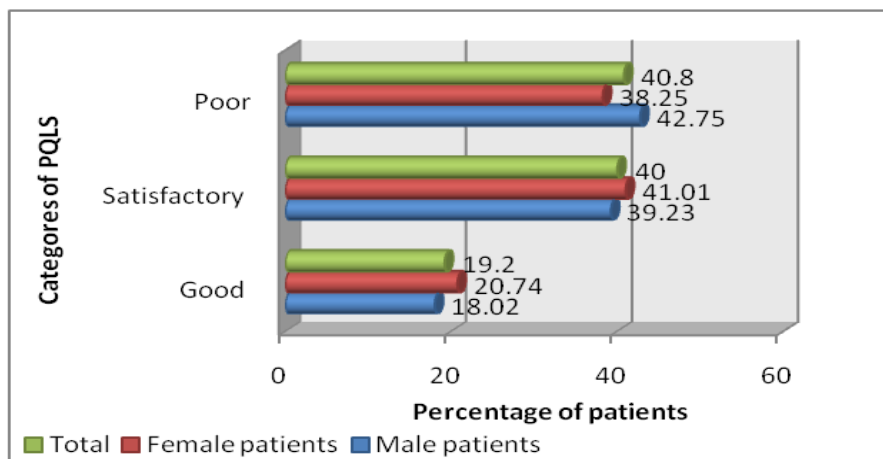


Fig.1. Distribution of the patients based on PQLS

According to the scores obtained, close to one fifth of the patients only (19.20%) were found graded as good, almost comparable in the case of both the genders. Whereas 40 per cent each of the patients belonged to satisfactory and poor grades, that too similar scenario observed among both the genders. However the distribution of the patients under the three categories of PQLS failed to establish statistical significance.

3. Physical health and endurance limitations in the patients

WHO has constantly contributed to increasing the understanding of the concept of Quality of Life. According to their studies, people with diabetes have a lower QoL than their healthy counterparts, which contributes to the presence of comorbidity, with higher HbA1c values, but not influenced by gender, age or the type of therapy used (Bosić-Zivanović et al, 2012). Taking this important matter into consideration an attempt was made to study the limitations of these patients in physical health and endurance.

The mean scores for the selected domains namely a) Limitations in physical health and b) Limitation in physical endurance were statistically treated to determine the low (<2.39), moderate (2.40-2.70) and high grades (>2.70) cut-off values for the patients.

The mean scores for the two domains were distributed in terms of gender and found that for male patients, it was in the moderately affected range (2.62) and for female patients it was found to be highly affected (2.90). The **Welch Robust Tests of Equality of Means** showed that the observation is statistically significant.

Gender wise comparison of mean score for the two selected domains is depicted in Fig.2 and 3.

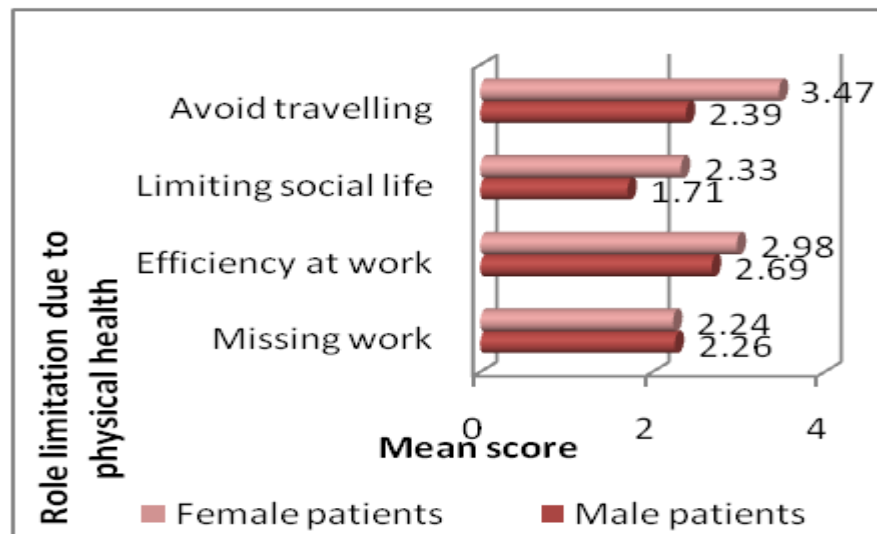


Fig.2. Role limitation due to physical health

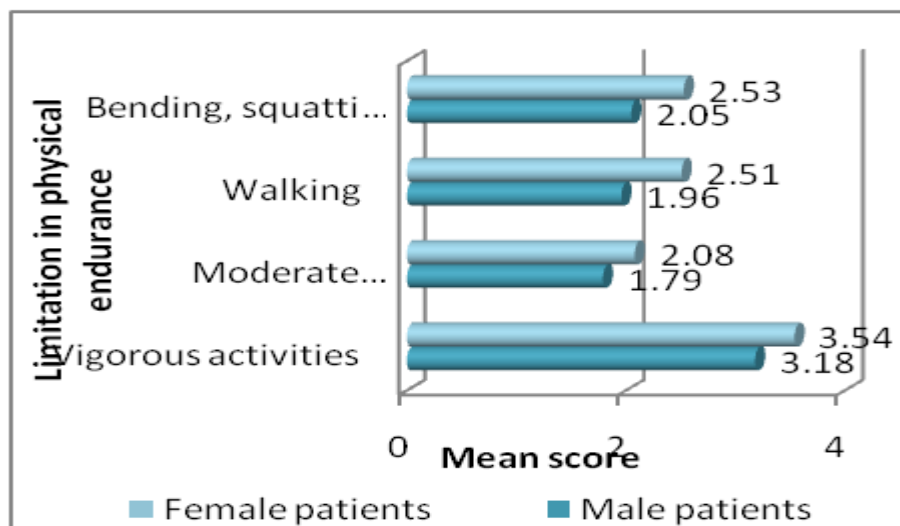


Fig.3. Limitation in physical endurance

As far as role limitation due to diabetes is concerned in the case of male patients, their work efficiency as well as travelling associated with work or family was moderate, whereas for female patients the same two roles were highly limited mainly due to diabetes (Fig.2). While looking into the mean values, it could be interpreted that role limitation due to diabetes considerably affected female patients. In this domain, except the variable missing work due to diabetes, all the other variables were statistically significant.

Fig.3 shows that in the case of limitation in physical endurance, when assessed it was observed that vigorous activities like lifting heavy bags/objects, running and skipping were highly affected for both male and female patients. Men were reported to have no difficulty undertaking physically demanding activities. At the same time the female members still felt moderate intricacies in walking 1-2 km at a stretch and also in bending, squatting and turning as part of their daily routine

activities. Here also the high mean values exemplified that diabetes affected female patients to a great extent when they engaged in physically demanding activities than their counterparts. All these observations had statistical significance too in this domain.

The significance of mean scores for each variable under the two selected domains was brought out using one-way Anova and the outcome of which is depicted in Table 2.

Table 2. Mean scores for variables under two selected domains

QOLID domains	Mean	S.D	Anova	
			F-value	p-value
ROLE LIMITATION DUE TO PHYSICAL HEALTH (R)				
Missing work (R1)	2.25	0.967	62.35	0.000 (S)
Efficiency at work (R2)	2.81	1.063		
Limiting social life (R3)	1.98	1.254		
Avoid travelling (R4)	2.86	1.524		
Total	2.48	1.276		
LIMITATION IN PHYSICAL ENDURANCE (PE)				
Vigorous activities (PE1)	3.3	1.00	168.42	0.000 (S)
Moderate activities (PE2)	1.9	0.98		
Walking (PE3)	2.2	1.19		
Bending, squatting, or turning (PE4)	2.3	1.09		
Total	2.4	1.20		

The overall data revealed that under role limitation due to physical health, except missing work and limitation in social life, efficiency at work (2.81) and travel for any purpose (2.86) were highly affected by the disease. Under the physical endurance domain, the overall mean score for vigorous activities like lifting heavy bags/objects, running, skipping, jumping rated high difficulty (3.30) by the patients. All the observations were statistically significant as shown by **One-way Anova** results.

As the result of One-way Anova was statistically significant for the two selected domains, the most distressed variable under each domain was worked out and the results are presented in Table 3.

Table 3. The most affected variables under two selected domains

Role limitation due to physical health	Mean	R3	R1	R2	R4	2.59*
		1.98	2.25	2.81	2.86	
R3	1.98					2.59*
R1	2.25	3.58				
R2	2.81	10.83	7.25			
R4	2.86	11.40	7.82	0.57		
Limitation in physical endurance	Mean	PE2	PE3	PE4	PE1	2.59*
		1.9	2.2	2.3	3.3	
PE2	1.9					2.59*
PE3	2.2	4.22				
PE4	2.3	5.10	0.88			
PE1	3.3	20.91	16.69	15.81		

* Critical values for experiment wise error rate at 0.05 (d.f. = 1996)

It could be interpreted from Table 3 that among various aspects examined under role limitation due to physical health, travelling was the most affected variable shown by the highest mean of 2.86 and it could be interpreted as a mutually exclusive among other variables. While sorting out the most affected physical endurance activity among the patients, the highest mean was observed for vigorous activities (3.3).

CONCLUSION

The present study indicated that less than one fifth of the patients were found to have good socioeconomic status. The physical health and endurance of the female patients were highly affected than male patients. The overall data revealed that under role limitation due to physical health, efficiency at work and travel were significantly affected by the disease, whereas under the physical endurance domain, vigorous activities like lifting heavy bags/objects, running, skipping, jumping were highly affected by the patients.

The limitations of the study

- The sample size was also limited, for more reliable models a considerably large sample size would be more appreciated.

- This research was conducted in the research centre of local state hospitals and hence the findings from these studies cannot be generalised for the Indian population due to regional differences in their physiological body types and body fat distribution.

Ethical approval: The approval was obtained from the Institutional Ethics Committee on 28/06/2014 and the Approval Number is 13/IEC/GTKA.

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WOMEN'S LIFESTYLE HABITS BOOST PSYCHOLOGICAL RESOURCES IN ACHIEVING EATING REGULATION

Kevin D'Souza¹, Purva Hegde Desai² and Nilesh Borde³

¹Assistant Professor, Hospitality, Travel and Tourism, Goa Business School, Goa University, Goa

²Professor, Management Studies, Goa Business School, Goa University, Goa

³Professor, Management Studies, Goa Business School, Goa University, Goa

Email Address: kevin@unigoa.ac.in

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ABSTRACT

The study addresses the prevention of obesity among women through eating regulation. The role of mindfulness and psychological hardiness in women's eating regulation has received scarce attention in research. The study further examines the critical role of lifestyle habits in helping achieve eating regulation. 416 women answered an online survey on mindfulness, psychological hardiness, lifestyle habits and eating regulation. Results indicate the role of psychological factors and recognize the mediating role played by daily routine, physical activity, and social and mental balance. The mediation was tested using regression in SPSS. The unique contribution of this study is that it has adopted an integrated approach of researching psychological resources with lifestyle management for control of eating habits, particularly among Indian women, who are a vulnerable social group with lower levels of healthcare status. The findings that lifestyle habits play a mediating role between psychological factors and eating regulation can bring about a much-needed awareness of eating habits. The study can help healthcare professionals design suitable interventions for women aiming to achieve weight loss through eating regulation.

Key Words: Eating regulation, habits, hardiness, lifestyle, mindfulness, women's health

INTRODUCTION

Women are adept at handling stressful situations and potentially have the ability to transform risky situations into less stressful ones. Their psychological hardiness can help them to manage their emotions and daily concerns, helping them adapt to and overcome health challenges. However, Indian women tend to accept a lack of help from others, a lack of personal time, and having to 'do it all' concerning the sacrifices they make for the family making them particularly vulnerable to health issues (Lansburgh et al., 2022).

In overweight and obese women, even modest weight loss can have profound benefits in reducing risks of Cardio Vascular Diseases and type 2 diabetes (Tonstad, 2007). Identification of risk factors and subsequent management of pre-existing diabetes mellitus, tobacco use, polycystic ovarian syndrome, high blood pressure, and micronutrient deficiencies can impact fertility, early pregnancy loss, pregnancy-specific conditions such as gestational diabetes, hypertension, and preterm birth (McAuliffe et al., 2020). This research thus endeavours to unearth the antecedents of eating regulation, particularly in the context of Indian women trying to balance multiple roles.

What are the health challenges that women face?

Women undergo significant physiological changes creating the potential for developing adverse health outcomes that can impact their health in the short term and are associated with worse health outcomes in the longer term (Sheiner et al., 2019). Overweight and obese women, on the other hand experience stigma. A study conducted in India found that women with low levels of physical activity perceived exercise as necessary only for those who are obese, demonstrating their perception of obesity management (Mathews et al., 2016). Women report having greater deal of stress, with married women reporting higher stress levels than single women (Upchurch & Johnson, 2019).

The regulation of eating habits is one of the important factors in the context of weight loss among women. Given the significant role that women play in the family and how it affects the people around them, the study examines how psychosocial factors and lifestyle-related practices can impact eating habits among women. While research has examined psychological hardiness in the context of depression, it has yet to be studied in relation to eating regulation.

OBJECTIVES OF THE RESEARCH

1. To explore whether an integrated approach of combining psychological resources like hardiness and mindfulness can lead to regulated eating habits.
2. To examine whether lifestyle practices mediate the relationship between psychological resources and the ability to regulate eating habits.

Self-regulation

Self-regulation mechanisms can potentially be relevant to a broad global audience rather than to a specific location of research (Paul & Cestero, 2021). The use of self-regulatory skills in improving body satisfaction and eating-related self-efficacy has been highlighted in a recent study (Annesi & Stewart, 2023). The importance of self-regulatory orientation and its long-term impact on consumer health and well-being is evidenced further from a broader perspective of life history strategies (Fennis, 2022). Hence, for attaining long-term sustainability in health care, self-regulation of eating is imperative. It is the core construct of this research, whose antecedents are proposed as the psychological prowess due to mindfulness and hardiness, accompanied by a conducive lifestyle.

Mindfulness

Mindfulness is defined as bringing one's complete attention to the experiences occurring in the present moment in a non-judgmental or accepting way. The literature on mindfulness suggests that it can foster well-being by preventing the onset of disease. Higher levels of mindfulness were positively associated with restrained eating behaviour and decreased emotional eating (Ouwens et al., 2015). Mindfulness could help women identify the triggers for eating and differentiate them from hunger. It could make them pay due attention and bring awareness to the quantity, content, timing and eating frequency. It is plausible that emotional women may turn to food in response to emotional stress. Mindfulness may help women become aware of situations which make them prone to overeating.

Hardiness

Hardiness is a psychological style associated with resilience, good health, and good performance under stressful conditions and is potentially a valuable personality style for highly demanding situations and occupations (Bartone et al., 2008). Hardiness is conceptualized as a combination of the three attitudes (3Cs) of commitment, control, and challenge (Maddi & Kobasa, 1984). Persons high in hardiness involve themselves in whatever they are doing (commitment), believe and act as if they can influence the events forming their lives (control), and consider a change to be not only normal but also a stimulus to development (challenge) (Kobasa & Puccetti, 1983). Among women who had breast cancer, psychological hardiness improved their coping ability and bear the pain from the disease (Mayouf & Yasir, 2022). Mothers with psychological hardiness were better in their coping ability during the COVID-19 pandemic (Pradhanani & Sharma, 2022). Female nurses showed a negative association between health hardiness and the fear of COVID-19 (Ramak et al., 2022).

In the context of eating regulation, the three attitudes comprising hardiness may provide the stimulus and determination required to turn around an unhealthy habit. These attitudes may promote progressive (health-enhancing) eating habits, and suppress regressive (health-detrimental) eating habits. The absence of noteworthy studies linking hardiness and eating regulation justifies the inclusion of hardiness in the study, given its potential as a preventive factor impacting eating regulation, particularly among Indian women, who are known for possessing the components of hardiness such as commitment and control.

Lifestyle habits

Health behaviours are not isolated phenomena but comprise routines and habits that make up a lifestyle (Bourdieu, 1987). Healthy lifestyles are broad orientations that organize patterns of behaviour derived from knowledge and norms about what constitutes healthy, stress-relieving, or pleasurable behaviours. The theory on lifestyle has highlighted the potential importance of healthy lifestyles in understanding how and why there are patterns of behaviour that promote or endanger health (Cockerham, 2000). There is an indication that low mental balance can adversely impact eating behaviour. Bidirectional effects between eating-related coping and adverse mental health in young people have been observed (Herman & Polivy, 2005). The importance of the timing of daily activities in weight regulation and the need to consider the timing of energy intake, physical activity and sleep were underscored in the design and evaluation of weight-loss interventions (Thomas et al., 2020). Associations were found between short sleep duration, high total energy intake, and low-quality diet. Short sleepers often display irregular eating behaviours and take their main meal late in the day (Vernia et al, 2021).

Women, though psychologically strong, may tend to compromise on lifestyle practices due to their propensity to prioritize family commitments over health. A study on self-regulation of eating habits can only be complete with acknowledging the role of lifestyle habits. Given the background of literature studying the impact of psychological factors and lifestyle habits, this research further focused on the mediating impact of lifestyle habits on women's eating regulation.

HYPOTHESES

H1: Mindfulness is positively related to eating regulation.

H2: Psychological hardiness is positively related to eating regulation.

H3: Lifestyle habits are positively related to eating regulation.

H4: Lifestyle habits mediate the relationship between mindfulness and eating regulation.

H5: Lifestyle habits mediate the relationship between hardiness and eating regulation.

METHODOLOGY

A cross-sectional study investigated responses from 416 women in the age group of 18 to 80. The study used a convenience sampling method. Women who participated in the study were further classified as 18 to 40 years (45%), 41 to 60 years (46%) and 61-80 years (9%). 86% of the respondents had a bachelor's degree or higher. According to the respondents' BMI data, 28% of the sample reported normal weight, 67% of the participants were overweight and obese, and 5% reported below normal weight. (Table 1). The survey was administered online, and only responses of those women who provided consent and completed the questionnaire in all respects were included in the study. The questionnaire consisted of items that assessed mindfulness, hardiness, lifestyle habits and eating regulation.

Table 1 Socio-demographic characteristics of the study sample (416 respondents)

Category of respondents		Percentage of the sample
Age(years)	18-40	45%
	41-59	46%
	60 and above	9%
Highest level of education	High school	14%
	Bachelor's degree	51%
	Postgraduate degree	35%
Occupation	Employed full time	38%
	Homemaker/ retired/student	27%
	Professional	23%
	Entrepreneur	12%
BMI status	Obese	47%
	Overweight	20%
	Normal weight	28%
	Underweight	5%

Measures

Mindfulness

The Mindfulness Attention and Awareness Scale (Brown & Ryan, 2003) was used for this study. It taps a unique quality of consciousness related to various self-regulation and well-being constructs. Participants indicated how often they have each experience (e.g., “I rush through activities without being really attentive to them”) on a five-point scale, ranging from never to always. Higher scores implied that the individual demonstrated lower levels of mindfulness. The MAAS showed high internal consistency (Cronbach's alpha = 0.86).

Hardiness

Hardiness, defined as a psychological factor comprising of 3 attitudes: commitment, control and challenge, was measured using a Hardiness scale (Moreno et al., 2014). The measure consisted of three subscales: Control (e.g. I do everything I can to control the results of what I do), Commitment (e.g. I involve myself seriously in what I do), and Challenge (e.g. I feel attracted to tasks and situations involving a personal challenge). Participants were asked to indicate the extent to which they agreed with statements regarding hardiness on a five-point Likert scale ranging from strongly agree to strongly disagree. The scale showed high internal consistency (Cronbach's alpha=0.887).

Lifestyle habits

Lifestyle habits are defined as a set of routine activities leading to the physical, mental, and social well-being of an individual. The questionnaire uses sub-scales from The Healthy Lifestyle and Personal Control Questionnaire (Darviri et al., 2014). Items in the questionnaire included organized physical exercise (representing the tendency to follow scheduled organized physical exercise), daily routine (representing the individual's control over daily activities and sleep) and social and mental balance (representing the individual's inclination to socialize, balance work, leisure, personal time and adopt positive thinking or cognitive control over stressors). Participants were asked to indicate how often they followed practices related to their lifestyle (e.g.: I follow a scheduled program for my daily activities, I feel that I have a good balance of time between work, personal life and leisure). Items were ranked on a five-point Likert scale ranging from never to always. The scale demonstrated good internal consistency (Cronbach's alpha= 0.89).

Eating regulation

Eating regulation is defined as a system of conscious personal management that involves the process of guiding one's thoughts, behaviour, and feelings toward healthy eating. It was assessed using the valid and reliable 5-item Self-Regulation of Eating Behaviour Questionnaire (SREBQ) (Kliemann et al.,2016). (e.g., I can remember what I have eaten throughout the day, if I am not eating in the way I intend to, I make changes). Response options ranged from 1 (never) to 5 (always) on a five-point scale. The SREBQ demonstrated good internal reliability at baseline (Cronbach's alpha = 0.75).

FINDINGS AND DISCUSSION

All the variables in the regression analysis were found to satisfy the assumptions of normality and linearity. A simple regression model was used to examine the main hypotheses, where mindfulness, hardiness, and lifestyle habits were the predictor variables and eating regulation was the outcome variable. The study first confirmed the relationship between mindfulness, hardiness and eating regulation. All three variables were significant predictors of eating regulation, as shown in Table-2. To confirm the mediation analysis, the direct and indirect effects of lifestyle habits was examined. Lifestyle habits partially mediated the relationship of mindfulness with eating regulation, as shown in Table-3. Mindfulness remained significant when lifestyle habits were entered into the regression equation. On the other hand, the relationship of hardiness with eating regulation was fully mediated by lifestyle habits as seen in Table -4. Hardiness was rendered insignificant when lifestyle habits were entered into the regression equation, confirming full mediation. The path estimates in Table-5 indicate that all relationships between the predictors of eating regulation are significant, and the mediator relationship with eating regulation is also significant.

Table 2: Models including single predictors of eating regulation

	B	S.E.	p-value	Adjusted R square
Mindfulness	0.229	1.188	.000	0.050
Hardiness	0.139	4.683	.000	0.017
Lifestyle habits	0.269	3.926	.000	0.309

S.E.= Standard Error

Table 3 Mediation effects of lifestyle habits for mindfulness

Effect	β	S.E.	p-value
Indirect	0.145	0.028	0.000
Direct	0.098	0.044	0.028
Total	0.242	0.051	0.000

S.E.= Standard Error

Table 4 Mediation effects of lifestyle habits for hardiness

Effect	β	S.E.	p-value
Indirect	0.049	0.018	0.000
Direct	0.034	.024	0.167
Total	.084	.029	0.004

S.E.=Standard Error

Table 5 Path estimates of hardiness and lifestyle habits with eating regulation

Path	B	S.E.	p-value
Mindfulness → Lifestyle habits	0.257	9.47	0.000
Hardiness → Lifestyle habits	0.149	9.69	0.002
Lifestyle habits → Eating regulation	0.557	3.92	0.000
Mindfulness → Eating regulation	0.229	0.051	0.000
Hardiness → Eating regulation	0.139	4.68	0.004

S.E.=Standard Error

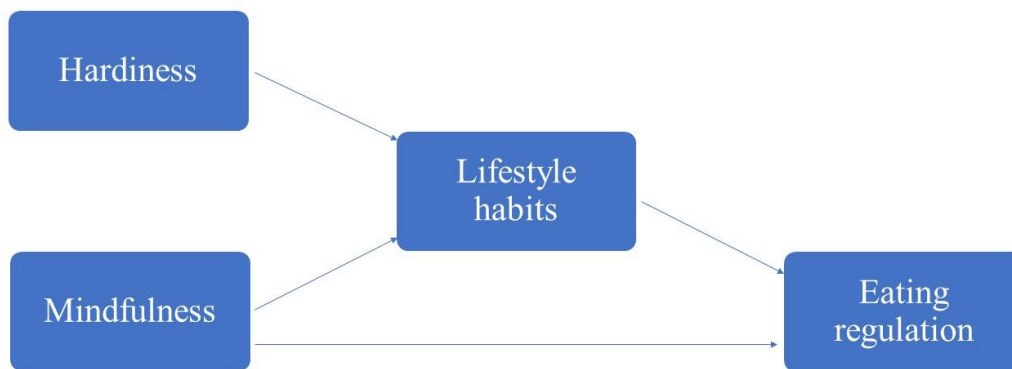


Figure 1 : Model depicting the mediating role of lifestyle habits between psychological resources and eating regulation.

The unique contribution of this research is that in the context of Indian women, lifestyle habits fully mediate the relationship between hardiness and eating regulation and partially mediate the relationship between mindfulness and eating regulation (Figure 1). This demonstrates that hardiness, with its components like commitment, control and challenge, should result first in lifestyle correction. Only then can it improve eating regulation and attain the consequent control over obesity. Without a conducive lifestyle, even women possessing characteristics like hardiness cannot achieve eating regulation. This contrasts findings that hardiness enabled mothers and nurses to cope better during the COVID-19 pandemic. The study found that despite having hardiness, lifestyle management should be primarily achieved which in turn would lead to eating regulation. The finding throws light on the central role played by lifestyle habits in the lives of Indian women, for their sustainable health goals. The finding about hardiness indicates that women who involve themselves seriously in what they do or can persist despite challenges can regulate their eating through the maintenance of healthy lifestyle habits.

Research has suggested a stage-wise approach to managing obesity (Wharton et al., 2020). It includes identifying the root causes of weight gain, targeting nutrition changes, and mental and social factors which the individual has to adapt to, and then devising a plan. A recent review has highlighted solutions such as nutrition, substance use, physical activity, stress, social connectedness and sleep with their potential in improving women’s health (Ba D & Ba S, 2021). These components reiterate the salience of lifestyle management to prevent weight gain. This

study can help to raise awareness about the salience of lifestyle in weight management, as prior research has revealed the negligent attitude of Indian women towards physical activity. In a study on women, the demotivating factors for attempting to reduce weight were a lack of self-acceptance and a bad mood (Krupa et al., 2023). The study elaborates on this observation by concluding that when women are mindful, they could be aware of their moods, and be careful of what they are eating in response to their moods, thereby accomplishing eating regulation.

SUMMARY, CONCLUSION AND IMPLICATIONS

In addition, the study shows how being mindful and resilient can help achieve goals related to eating habits. This study highlights the importance of psychological resources like mindfulness and hardiness, which can enable as well as motivate women to focus on their weight-related goals through necessary lifestyle corrections. Healthcare providers could use a combination of mindfulness training and resilience-building activities parallel to lifestyle changes in controlling eating habits. Combining these strategies could lead to more effective eating habits in weight loss programs. The self-regulation of eating habits through mindfulness control and lifestyle habits could effectively prevent addictive behaviour like binge eating among women. The conscious consumption of food could be included in policies directed at the prevention of obesity-related diseases.

Self-regulation is gaining importance as a strategic tool for long-term social stability (Billore, Anisimova & Vrontis, 2023). The study emphasizes the use of self-regulation in the health domain to improve eating habits among women. The research enhances the findings of previous studies, which focus on cultivating personal strengths to improve self-management of behaviours and improve health outcomes (Tai-Seale et al., 2019). This study on women has reiterated that some of the components of lifestyle, like adhering to regular sleep timings, keeping good relations with family and friends, and regular physical activity support women in improving their eating habits. The focus of interventions should shift from weight loss to a healthy lifestyle and improved quality of life and well-being (Tylka et al., 2014).

Women tend to be the gatekeepers of nutrition and health for other family members. In an Indian context, it is quite common for mothers to cook and pack meals for other family members. These meals would be influenced by their patterns of self-regulation which in turn could be impacted by personal psychological factors, as evidenced in this study. When women are mindful, resilient and practice good lifestyle habits, they can give a fillip to their eating regulation and influence the habits of people who they care for. The study supports strategies based on lifestyle habit interventions to address obesity which has reached pandemic proportions. Future research could use longitudinal methods to examine the efficacy of an integrated approach highlighted in this study to achieve dietary objectives.

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ASSOCIATION BETWEEN LIFESTYLE PRACTICES AND BLOOD GLUCOSE LEVEL AMONG DIABETIC RESPONDENTS

Leelavathi V^{*1}, PL.Sridevi Sivakami²

^{*1}PhD Scholar, ²Associate Professor,

Avinashilingam Institute for Home Science and Higher Education for Women,
Coimbatore, India

^{*1}Corresponding author: email: 18phfdf002@avinuty.ac.in

Emails of coauthor: ²sridevi_fsmd@avinuty.ac.in

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ABSTRACT

Diabetes incidence has been increasing alarmingly with some risk factors due to an inactive lifestyle, which increases obesity. This study helps notify people about how lifestyle practices hit the blood glucose levels of diabetic adults in different life stages (middle-aged and older adults). The research was conducted among people with diabetes in Coimbatore, where 100 respondents were selected (young, middle, and older adults). The respondents' information was gathered through an interview schedule, including anthropometry (height, weight, and BMI), biochemical parameters (fasting blood glucose, postprandial glucose, and HbA_{1C}), other clinical profiles, and lifestyle practices. This study revealed that older adults (BMI- 28.83± 5.65, TGL- 153.96± 30.55, HDL-41.54± 5.35, LDL -114.16± 26.24) had increased BMI and cholesterol levels than middle-aged adults (BMI- 27.53± 4.08, TGL- 146.23±39.14, HDL-40.01± 4.84, LDL -121.74± 27.57). Whereas, in the case of blood glucose parameters, middle-aged adults have uncontrolled blood glucose levels (FBS-161.81± 54.25, PBS -249.43±86.33, HbA_{1C}- 9.03± 2.47). On average, most diabetic respondents were on the borderline of obesity (BMI- 28.34± 5.13) and had uncontrollable blood glucose levels (FBS-153.70±52.04, PBS-237.73±81.79, HbA_{1C}- 8.3785±1.90). Lack of dietary restriction and exercise was negatively correlated with the respondents' blood glucose levels. Lifestyle practices had a 95 percent impact on the blood glucose of diabetic adult respondents. Older adults (48 respondents with one or more complications) were affected by multiple complications (eye problems, hyperlipidemia, thyroid, obesity, Etc.) when compared to middle-aged adults (17 respondents with one or two complications).

Keywords – Aging, Adults, Diabetes, Anthropometry, Biochemical, Lifestyle practices.

INTRODUCTION

Aging involves nutritional and physical changes in the body (Sánchez-García et al., 2007). Some studies have reported differences in the physical well-being of middle-aged and older adults. Lifestyle factors are associated with chronic non-communicable disorders (diabetes, cardiovascular diseases, Etc.) (Steyn & Damasceno, 2006). There is an increased risk of lifestyle disorders during the older adult stage (Wong et al., 2008) because of unhealthy lifestyle practices and body loss of control after middle age (Okabe et al., 2021).

Diabetes cases have been increasing with some risk factors due to an inactive lifestyle, which increases obesity (inactive lifestyle and obesity are the underlying causes of diabetes during a pandemic) (Talukder & Hossain, 2020). Most of the catastrophic damage caused to the heart, blood vessels, eyes, kidneys, and nerves is due to high blood glucose levels, a long-term metabolic condition called diabetes. It affects 537 million people worldwide, including 90 million in Southeast Asia, which will increase to 783 million by 2045. In 2017, India had a total of 72.946.400 diabetes cases (International Diabetes Federation, 2021) and adults aged above 20

years with diabetes rose to seven percent in 2016 from five percent in 1990 (Tandon et al., 2018). Type 2 diabetes has been prevalent among all income groups over the last three decades. Type 1 diabetes is a chronic disorder with little insulin or no secretion by the pancreas. By 2025, metabolic conditions, such as obesity and diabetes, will be controlled with the help of a global agreement formed by the World Health Organization (World Health Organisation (WHO), 2016).

Most studies have reported that older adults are at risk of diabetes in the world population (Kalyani et al., 2017; Kirkman et al., 2012) and develop serious diabetic complications (cardiovascular diseases, kidney problems, eye problems, Etc.) and age-related issues (dementia, Alzheimer's disease, physical disability, Etc.) (Longo et al., 2019). Diabetes in the older stage is associated with more insulin resistance than in the middle stage (Koo et al., 2016). So far, the researchers have not concentrated on comparing middle-aged and older diabetic adults, their lifestyle practices, and their association with blood glucose levels. Only a few studies have been carried out in the stages of diabetic adulthood. Carrying out research in adulthood stages helps identify the differences in body responses or lifestyle practices associated with diabetes at each stage of diabetic adulthood.

The self-management of diabetes has had a significant impact during the pandemic. Older adults are more stressed about diabetes self-management than other age groups (Wu et al., 2019). Diabetic individuals can manage and control their diabetes by changing lifestyle practices like diet and exercise and eliminating unhealthy practices such as smoking, alcohol, and limited sleep (Boles et al., 2017). Therefore, self-awareness is essential for self-management (Grabowski et al., 2021). Some technologies allow the management and prevention of diabetes. Blood glucose monitoring sensors or trackers help measure the blood glucose level throughout the day and provide a graph of the blood glucose level. Monitoring helps track glucose levels and helps control diet. Furthermore, other applications in exercise and caloric burn monitoring, diet monitoring, and routine lifestyle monitoring help manage glucose levels and maintain a healthy body.

This study explains the relationship between blood glucose levels of middle-aged and older-aged diabetic adult respondents and lifestyle practices (dietary and exercise patterns). It also helps in determining the incidence rate of diabetes at various stages (middle-aged and older adulthood), which have not been reported by most researchers (most of the research reports the general incidence of diabetic adults and old age, and not as middle-aged and older adults). Analyzing the association between lifestyle practices and blood glucose levels among diabetic respondents at different life stages paves the way for in-depth future research on the biochemical lifestyle practices of diabetic patients. It helps modify treatment/lifestyle changes of middle-aged and older adults.

OBJECTIVES

This study aimed to determine the lifestyle habits and relationships of diabetic adult respondents with their blood glucose levels.

HYPOTHESIS

As the study aimed to find the relationship between lifestyle practices (dietary and exercise patterns) on blood glucose levels, the hypothesis framed for the study was,

H1= There is a significant association between lifestyle practices (dietary and exercise pattern) and blood glucose levels of diabetic middle-aged and older adults

METHODOLOGY

Selection of the respondents

The study's ethical approval was obtained from the Institutional Human Ethics Committee of the Avinashilingam Institute for Home Science and Higher Education for Women in Coimbatore. The ethical approval ID for this study was AUW/IHEC/FSMD-19-20/XPD-25.

About 100 respondents in the age group category of young (18yrs-35yrs), middle-aged (36yrs-55yrs), and older adults (above 55 years) were selected purposively. The selected respondents had diabetes in adulthood. Of the 100 diabetic respondents, 38 were middle-aged adults and 62 were older adults. No respondent in the young adult stage was found to have diabetes during this study. The respondents' role in the study was explained before collecting data. Only respondents who volunteered to participate in the study were selected.

Collection of data

The tool used to collect data was an interview schedule that elicited information such as the respondent's age, anthropometric measurements, type of diabetes, fasting blood glucose level, dietary pattern, and exercise pattern of the diabetic respondents. Anthropometric measurements, namely the height and weight of the respondents, were measured using a stadiometer and weighing machine, respectively. Biochemical parameters were collected as secondary data from the respondents' medical reports. Dietary patterns were analysed using the three-day recall method (which was used to analyse food and beverage consumption for three consecutive days). The average daily nutritional intake of the respondents was calculated using the three-day recall method. Other questions such as snacking, diet restriction, and high glycaemic food intake frequency were listed in the interview schedule. Exercise patterns were collected through the interview schedule as questions such as duration and type of exercise were carried out regularly. The collected data were consolidated and statistically analysed.

RESULTS AND DISCUSSION

Mean of BMI, FBS, PBS, HbA1C, TGL, HDL, LDL in stages of adulthood

Table-1 Mean \pm SD of BMI, FBS, PBS, HbA₁C, TGL, HDL, LDL in stages of adulthood

The age group of the respondents (in years) N=100	Mean \pm Std. Deviation						
	BMI* (Kg/m ²)	FBS* (mg/dL)	PBS* (mg/dL)	HbA ₁ C* (mg/dL)	TGL* (mg/dL)	HDL* (mg/dL)	LDL* (mg/dL)
36yrs-55yrs (Middle-aged -aged Adults)	27.53 \pm 4.08	161.81 \pm 54.25	249.43 \pm 86.33	9.03 \pm 2.47	146.23 \pm 39.14	40.01 \pm 4.84	121.74 \pm 27.57

Above 55yrs (Older Adults)	28.83± 5.65	148.74± 50.43	230.56± 78.73	7.98± 1.32	153.96± 30.55	41.54± 5.35	114.16± 26.24
Total	28.34± 5.13	153.70± 2.04	237.73± 81.79	8.3785± 1.90	151.03± 34.09	40.96± 5.19	117.04± 26.87

**BMI- Body Mass Index, FBS -Fasting Blood Sugar, PBS-Post-Prandial Blood Sugar, TGL-Triglycerides, HDL-High Density Lipoprotein, LDL-Low Density Lipoprotein, TGL-Triglycerides, HbA_{1C}-Glycated Hemoglobin*

Table-1 shows that the mean±standard deviation of 27.53± 4.085 (BMI), 161.81± 54.25 (Fasting Blood Sugar (FBS)), 249.43±86.33 (Postprandial Blood Sugar (PBS)), 9.03± 2.47 (HbA_{1C}), 146.23±39.14, (Triglycerides (TGL)), 40.01± 4.84 (High-Density Lipoprotein (HDL)), 121.74± 27.57 (Low-Density Lipoprotein (LDL)) of the respondents in the middle-aged (36yrs-55yrs) adulthood. And also the mean±standard deviation of 28.83± 5.65 (BMI), 148.74± 50.43 (Fasting Blood Sugar (FBS)), 230.56± 78.73 (Postprandial Blood Sugar (PBS)), 7.98± 1.32 (HbA_{1C}), 153.96± 30.55 (Triglycerides (TGL)), 41.54±5.35 (High-Density Lipoprotein (HDL)), 114.16± 26.24 (Low-Density Lipoprotein (LDL)) among older(above 55yrs) adult respondents. Older adults have increased BMI and cholesterol levels than young adults. Whereas in the case of blood glucose parameters, middle-aged adults have uncontrolled blood glucose levels.

Snacking between meals

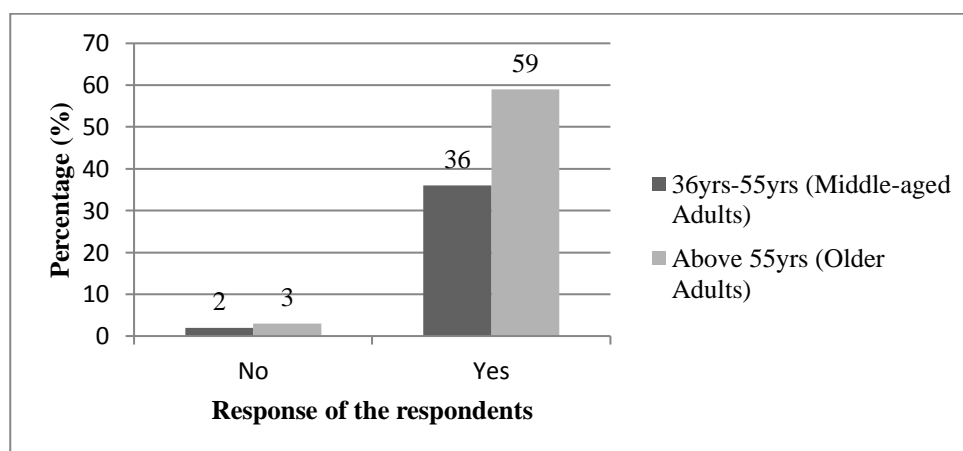


Figure-1 Snacking between meals

From Figure 1, it can be seen that 36 percent and 59 percent of middle-aged and old-aged diabetic adult respondents consumed snacks between meals, which may lead to complications in diabetes. Overall, 95 percent (80 percent consumed fried/baked snacks and 20 percent consumed any pulse sundial/fruits) of the respondents consumed snacks. This finding correlates with a study that concluded that frequent snacking increases the risk of diabetes (Kahleova et al., 2015).

Association between diet restriction and HbA₁C in stages of adulthood

Table-2 Association between diet restriction and HbA₁C in stages of adulthood

Diet restriction in stages of adulthood (N=100)		HbA ₁ C
Diet restriction (36yrs to 55yrs-Middle-aged Adults)	Pearson Correlation	-.400*
	Sig. (2-tailed)	.013
Diet restriction (Above 55yrs-Old Adults)	Pearson Correlation	-.322*
	Sig. (2-tailed)	.011
*. At the 0.05 level, the correlation is significant (2-tailed).		

From table-2, it can be seen that there is a 0.05 level of significance between HbA₁C and diet restriction among middle-aged and older diabetic adults. Furthermore, negative correlations exist between HbA₁C and diet restriction; a lack of diet restriction leads to increased blood glucose levels. This correlates with the results of a nutrition therapy study in the diabetic population. This study found that nutrition therapy affects glycemic control (Mottalib et al., 2018). This result also supports the acceptance of the alternate hypothesis framed for the study.

Consumption of high glyceimic foods by the respondents

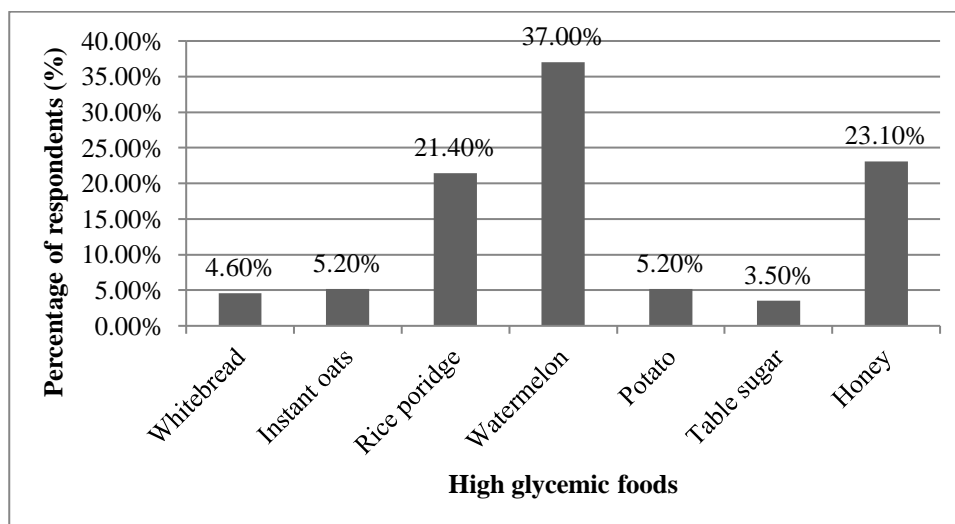


Figure-2 Consumption of high glyceimic foods by the respondents

Figure-2 shows the Consumption of high glyceimic foods by the respondents; the diabetic respondents from the middle-aged and older adult category took white bread (4.6%), instant oats (5.2%), rice porridge (21.4%), watermelon (37.0%), potato (5.2%) and table sugar (3.5%). Blood glucose levels would be affected if these high-glyceimic meals are often consumed.

Association between exercise and HbA₁C in stages of adulthood

Table-3 Association between exercise and HbA₁C in stages of adulthood

Exercise in stages of adulthood (N=100)		HbA ₁ C
Exercise (36yrs to 55yrs-Middle-aged Adults)	Pearson Correlation	-.398*
	Sig. (2-tailed)	.013
Exercise (Above 55yrs-Old Adults)	Pearson Correlation	-.259*
	Sig. (2-tailed)	.042
*. At the 0.05 level, the correlation is significant (2-tailed).		

From table-3, it was shown that there is a 0.05 level of significance between HbA₁C and exercise among middle-aged and older diabetic adults. Furthermore, negative correlations were observed between HbA₁C levels and exercise. This explains why when exercise increases, HbA₁C levels decrease. This correlates with a study in which type 2 diabetic patients were instructed to perform exercise. HbA₁C levels decrease with a persistent exercise routine (Najafipour et al., 2017). Overall, the results show the acceptance of the alternate hypothesis.

Daily Nutrient Intake of diabetic adults in different stages of life

Table-4 Mean ± SD of Daily Nutrient Intake of diabetic adults in different stages of life

Nutrient intake of diabetic adults in different stages of life (N=100)	Nutrient intake of Middle-aged Adults (36yrs to 55yrs)	Nutrient intake of Older Adults (Above 55yrs)
Energy (Kcal)	2121.69±211.29	2092.73±273.98
Carbohydrate (gm)	1129.47±919.28	940.75±865.65
Protein (gm)	982.75±1044.43	775.04±980.12
Fat (gm)	61.98±14.86	64.68±14.14
Calcium (mg)	420.65±350.65	467.78±338.18
Phosphorus(mg)	1316.40±169.09	1333.19±233.62
Total Fiber(gm)	40.69±7.30	43.31±10.45
Sodium (mg)	184.21±47.18	172.66±43.97
Potassium (mg)	3537.32±320.61	3532.48±410.77
* Values are Mean±Std. Deviation		

From the table-4, it can be seen that middle-aged diabetic adults (36–55 years) have higher nutrient intake than older diabetic adults (> 55 years) in stages of life. It also correlates with an American study among middle-aged and older adults, that is, energy, fiber, protein, and other

nutritional intakes were higher in middle-aged diabetic adults than in older adults with diabetes (Krok-Schoen et al., 2019).

CONCLUSION

The study aimed to examine the lifestyle practices that impact the blood glucose of diabetic adult respondents. The sample included 100 diabetic respondents, 38 were in middle-aged adulthood, and 62 diabetic respondents were in older adulthood. The findings revealed that most diabetic respondents were on the borderline for obesity and had poorly managed blood glucose levels. Older adults have increased BMI and cholesterol levels than young adults. Whereas in the case of blood glucose parameters, middle-aged adults have uncontrolled blood glucose levels. This study showed a substantial negative correlation between the lack of diet restriction and exercise and the blood glucose levels of the respondents. Specific lifestyle practices such as snacking, consumption of glycaemic foods like (white bread (4.6%), instant oats (5.2%), rice porridge (21.4%), watermelon (37.0%), potato (5.2%), and table sugar (3.5%)), lack of diet restriction, and exercise have an impact on the elevation of the blood glucose of the respondents. The alternate hypothesis framed [H1= There is a significant association between lifestyle practices (dietary and exercise pattern) and blood glucose levels of diabetic middle-aged and older adults] was accepted. The unhealthy lifestyle of the respondents led to an uncontrollable increase in blood glucose levels. Older adults were the ones who had more complications than middle-aged adults because of their unhealthy lifestyle practices. This study examined lifestyle practices and their impact on blood glucose levels among middle-aged and older adults with diabetes. Many other studies need to concentrate on the association between lifestyle practices and blood glucose levels in the two stages of adulthood. Therefore, this study helps researchers and people to identify the relationship between lifestyle practices and blood glucose levels among middle-aged and older adults with diabetes.

SUGGESTIONS FOR FUTURE RESEARCH

Further, in the future, comparative studies can be carried out to find the relationship between lifestyle practices and blood glucose levels among diabetic subjects in other age groups. Intervention studies can also be carried out to enhance healthy lifestyle practices and control blood glucose levels.

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PHYSICAL ACTIVITY AS A BENEFICIAL SOLUTION FOR OBESITY IN COLLEGE-GOING WOMEN

Nita Ann Johnson¹ and Dr. S. Kowsalya²

PhD Scholar¹ and Registrar and Professor²

Department of Food Science and Nutrition, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, Tamil Nadu, India

Corresponding author postal address: Nita Ann Johnson, PhD Scholar, Department of Food Science and Nutrition, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, Tamil Nadu, India – 641043

Corresponding author email: nita.ann.johnson@gmail.com

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ABSTRACT

Obesity is a public health issue that is linked to a variety of non-communicable diseases, which in turn affects the quality of living in present times. Though there are multiple causes of obesity, the most commonly attributed are unhealthy dietary practices and a lack of physical activity. Being physically active is beneficial across all ages of the human lifespan including a lowered risk of depression, improved cognitive functioning and a reduced risk of contracting a covid-19 infection. With the global and national prevalence of obese individuals increasing considerably in the last decade, World Health Organisation and Indian Council of Medical Research recommend at least 150 minutes of weekly aerobic physical activity of moderate-to-vigorous intensity for adults. This study was undertaken to understand the extent of physical activity's contributions towards reducing obesity in college-going women. Collegiate women between 18-25 years were purposively sampled for this study. Their initial anthropometric measurements of height, body weight, and body mass indices were recorded after which the final 100 study participants were randomly assigned an aerobic exercise intervention that had to be followed for five days a week for 26 weeks after which their anthropometric measurements were re-measured. Results showed statistically significant decreases in the post-intervention body weights ($p=0.001$) and the body mass indices ($p=0.001$) as well as significant, inversely proportional relationships between the minutes of exercises, body weights ($\beta = -0.66$) and body mass indices ($\beta = -0.80$) of the women. This study proves that future treatments of this global epidemic should prioritise lifestyle modifications, especially through improving physical activity.

Keywords: obesity, physical activity, body mass indices, aerobic intervention, collegiate women

INTRODUCTION

Obesity is a public health issue that is linked to a variety of non-communicable diseases including but not limited to diabetes, cardiovascular diseases, hypertension and cancers, which in turn affects the quality of living in present times (Loos & Yeo, 2022). Though there are multiple causes of obesity from genetic and environmental perspectives, the most commonly attributed are unhealthy dietary practices and a lack of physical activity (Lahiri *et al.*, 2019). Recent literature suggests that being physically active is beneficial across all ages of the human lifespan towards various domains of health including ensuring healthy habits, minimising weight gain (Ray *et al.*, 2022), a lowered risk of depression (Pearce *et al.*, 2022), improved cognitive functioning (K. I. Erickson *et al.*, 2022) and even a reduced risk of contracting a covid-19 infection (Lee *et al.*, 2022). However, even with such evidence, the global and national prevalence of obese individuals have

increased exponentially in the last decade, thus prompting global and national organisations such as the World Health Organisation (WHO) and the Indian Council of Medical Research (ICMR) to recommend at least 150 minutes of weekly aerobic physical activity of moderate-to-vigorous intensity for adults (NIN-ICMR, 2011 and WHO, 2022). Studies have elaborated on the importance of exclusive dietary modifications in combating obesity among women (Chudzicka-Strugała *et al.*, 2022; Cincione *et al.*, 2021; Silveira *et al.*, 2021; Vidya, 2022), however, the association between aerobic physical activity and obesity remains relatively under-researched even though a great deal of systematic reviews proving their beneficial association exist (Celik&Yildiz, 2020; Doeweset *et al.*, 2022; Lopez *et al.*, 2022). Adding to this are the popular reasons such as unavailability of time, or the notion that weight loss can only happen in gyms, and too much of self-motivating consistent approach required, may be the hindrances as to why collegiate women are not keen on solving obesity through physical activity. Thus, this study was undertaken to understand whether physical activity could effectively contribute towards reducing obesity in college-going women.

OBJECTIVES

This study aimed to:

1. Assess overweight and obesity in collegiate women of Coimbatore
2. Promote physical activity among the young women to combat overweight and obesity
3. Understand the extent of the physical activity intervention towards overweight and obesity in the young women

HYPOTHESIS

The hypothesis to be tested in this study was whether the exercise interventions would reduce overweight and obesity in college-going women of Coimbatore.

METHODOLOGY

After obtaining ethical clearance from the Institutional Human Ethical Committee (acceptance number: IHEC/19-20/FSN-38) the first phase of the present study employed an initial purposive sample of 150 young women aged 18-25 years from colleges in the Coimbatore district of Tamil Nadu. These women were then screened for their initial anthropometric measurements of height, body weight and body mass index (BMI) levels using InBody BMI Machine (Model: BSM 170, South Korea). Following this was the application of the inclusion criteria stating the study participants were to be collegiate women having a BMI status of overweight or obese as well as the exclusion criteria indicating that chronically-ill women or women who were non-willing to participate post the initial screening were to be removed from participating. This reduced the number of study participants to 120.

In the second phase, these participants were then randomly assigned through a computerized technique into intervention Group1, Group2, Group3 and Group4. Group1 and Group2 had overweight participants while Group3 and Group4 had obese participants. Both overweight and obese groups carried out the aerobic physical activity of 30 and 45 minutes each for five days a week for 26 continuous weeks in the comfort of the participants' homes via virtual platforms due to the lockdown norms existing in the country at the time. To remove chances of non-compliance,

the investigators supervised and conducted daily Google Meet video meetings which participants joined for their activity. The aerobic physical activity routines were formulated with the help of a medically licenced physiotherapist and trained physical instructors with doctoral degrees in physical education to ensure the women participants' safety and to avoid possible health risks and complaints that accompany long-term exercise interventions, such as joint pain or back pain.

The final phase included re-measuring the anthropometric measurements of the final 100 participant women, followed by data analysis using statistical package for the social sciences (SPSS Version: Windows 64-bit, USA).

FINDINGS AND DISCUSSION

Twenty women dropped out of the study citing reasons of difficulty in following through with the intervention along with the demands of their individual lives. After excluding the data of the dropped-out participants (N=20) and finding the data having normal distributions as per the Kolmogorov-Smirnov test, there were a total of 100 college-going women who complied with the entire 26 weeks of the study period after which their resultant anthropometric recordings were analysed for this study which reports the following results.

Age and socio-economic distribution

Out of all the study participants, 26% of the college-going women were graduates while 37% were pursuing under-graduate courses or were post-graduates. The most commonly observed religions among the participants were Hindus (35%), Christians (27%), Muslims (21%) with 17% belonging to 'Others'. Participants were classified into the two income categories as per the annual family incomes as reported by Rathore (2022). Both rural (50%) and urban (50%) income categories consisted of participants who were overweight (N=50) or obese (N=50).

Anthropometric parameters

Table-1: Average Weight and BMI of All Participants Pre and Post Intervention

Anthropometric Parameter	Pre-Intervention (Mean±SD) (N=100)	Post-Intervention (Mean±SD) (N=100)
Weight (kg)	60.75±3.50	54.44±3.15
BMI (kg/m ²)	24.55±0.86	22.00±0.87

The average height (mean ± standard deviation) of all the participants was 1.57±0.38m and did not change post-intervention. Observing Table-1, an average of 6.3kg of weight loss and a 2.5kg/m² of BMI reduction can be seen among all the participants after the intervention irrespective of the intervention group they were assigned to.

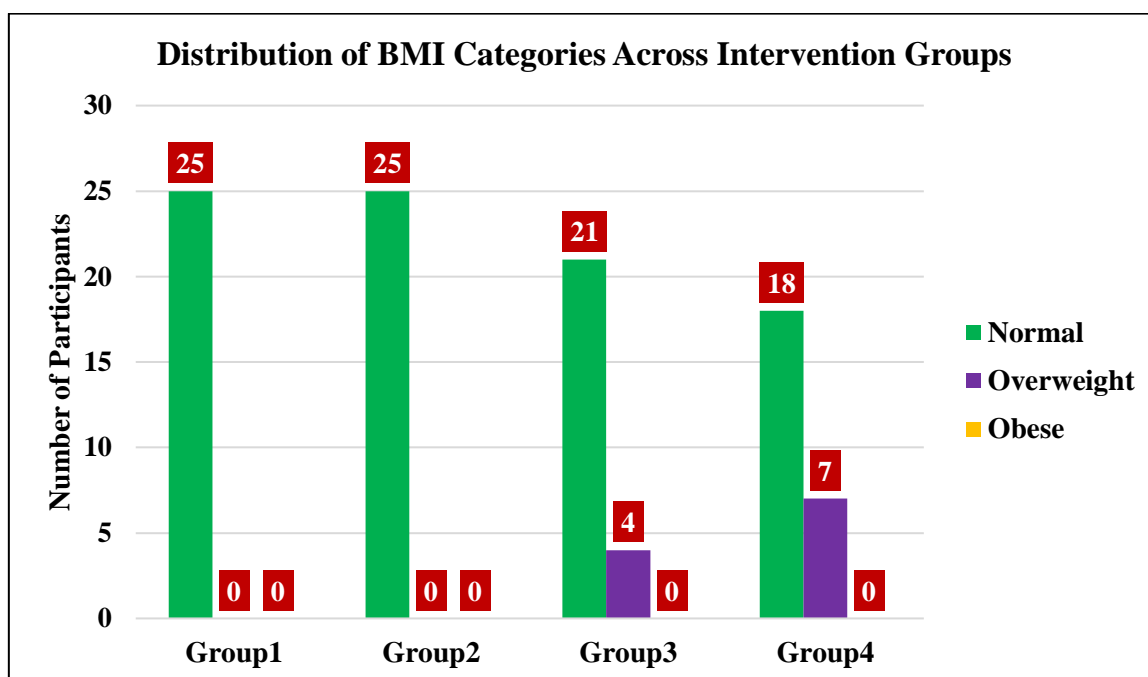


Figure-1: Distribution of All Participants as per Average BMI Categories Post Intervention

Utilising the BMI classification for Asian adults (WHO, 2000), zero percent were of normal category, 50% were each of overweight and obese categories at week zero, while after the 26-week intervention period, it was seen that the extent of obesity among all the participants reduced to zero percent with the majority (88%) reportedly belonging to the normal BMI category across all intervention groups (see Fig.-1). Previously, lifestyle interventions in the form of physical activity that aimed to reduce body weight in apparently healthy women have yielded similar results (M. L. Erickson *et al.*, 2019; Taheri *et al.*, 2020) which support this study’s findings.

Anthropometric parameter differences within intervention groups

The two intervention groups had an equal number of participants due to the computerized random sampling technique applied and for easier comprehension, analyses were conducted on the resultant four groups and the results are displayed in Table-2.

Table-2: Difference in Average Anthropometric Parameters of Participants Due to Intervention

Intervention Group	Variable	Mean ± SD	t _{value}	Two-tailed Significance
Group1 (Overweight, 30 minutes) (N = 25)	Weight (kg)	-6.05 ± 1.62	-18.58	< 0.001*
	BMI (kg/m ²)	-2.44 ± 0.72	-16.80	< 0.001*
Group2 (Overweight, 45 minutes) (N = 25)	Weight (kg)	-6.26 ± 1.64	-19.00	< 0.001*
	BMI (kg/m ²)	-2.52 ± 0.61	-20.38	< 0.001*
Group3 (Obese, 30 minutes) (N = 25)	Weight (kg)	-6.05 ± 1.98	-15.27	< 0.001*
	BMI (kg/m ²)	-2.47 ± 0.15	-15.89	< 0.001*
Group4	Weight (kg)	-6.88 ± 2.38	-14.46	< 0.001*

(Obese, 45 minutes) (N = 25)	BMI (kg/m ²)	-2.74 ± 0.88	-15.53	< 0.001*
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A uniform negative association (at $p = <0.005$) was found across all four intervention groups denoting the significance of the exercises carried out by the participants. Thus, it appears that the most effective intervention for both overweight and obese participants is 45 minutes. It can also be deduced that participants who were overweight lost more weight and BMI as compared to those with obesity. This highlights the novelty of this study, that women with overweight and obese BMI levels can have different outcomes even if they perform equivalent aerobic physical activities. Unlike this study, since previous studies did not report the post-intervention differences between the overweight and obese BMI, it can only be said that the implemented physical activity interventions, report results that reinforce the findings that increasing physical activity leads to a decrease in BMI levels, irrespective of age or gender (Colom *et al.*, 2021; Kotarsky *et al.*, 2021; Zeng *et al.*, 2021).

Independent influence of exercise intervention

Once the negative association between exercise, weight and BMI was established, the extent of this relationship, i.e., exactly how much of the weight loss and BMI reduction was solely due to the exercise intervention was to be determined. Carrying out a regression analysis (Table-3), it was found that, exercise significantly explains weight to the extent of 43% ($F = 152.68$) and BMI to the extent of 64% ($F = 352.38$) at 95% of confidence. As per the standardised coefficient value, per every additional minute of exercise, there is a significant decrease of 0.66kg ($t = -12.36$) and 0.80kg/m² ($t = -18.77$) in weight and BMI levels respectively.

Table-3: Extent of Influence of Intervention on Body Weight and BMI of Participants

Variables	R ²	Standardised Coefficient of Beta	F _{value}	Significance at 95% Confidence Interval
Exercise on weight	0.435	-0.660	152.68	< 0.001*
Exercise on BMI	0.640	-0.800	352.38	< 0.001*

Studies that have assessed weight and BMI reduction among experimental groups having either a physical activity intervention or a dietary modification, report non-significant differences among the said groups. This cements the authors' previous assumption that standalone physical activity interventions can cause similarly effective and beneficial outcomes of weight and BMI reduction when compared with dietary modification interventions (Kite *et al.*, 2019; Kotarsky *et al.*, 2021; Zeng *et al.*, 2021).

SUMMARY & CONCLUSION

The results obtained suggest that women with overweight and obese BMI levels can have different outcomes even if they perform equivalent aerobic physical activities and the most effective intervention is to perform 45 minutes of physical activity per day for at least five days a

week. Thus, the investigators accept the initial hypothesis of the study and establish that consistent physical exercise for at least 30-45 minutes per day is negatively associated with body weight and BMI levels and that it significantly contributes towards healthy weight loss and decreases the degree of overweight and obesity irrespective of a woman's body weight or BMI level. Therefore, future treatments of this global epidemic should prioritise lifestyle modifications, especially through improving physical activity. It is to be remembered that even the slightest of sustainable lifestyle changes that are initiated at the personal level can go a long way towards conquering this public health concern to ensure healthier future generations for a healthier planet.

LIMITATIONS & SUGGESTIONS FOR FUTURE RESEARCH

The drawbacks to this study are that it included only women participants, had a comparatively small sample from a specific locale, had physical distancing barriers during Covid-19 and also saw drop-outs from non-compliance and inconsistencies in lifestyle behaviours due to the long-term duration (more than six months) of the study. In spite of these limitations, there is a wide scope for further research including studying the influence of recently reported factors such as vegan dietary modifications, sleep apnoea or stress on the prevalence of overweight and obesity in humans with or without co-morbidities and other chronic illnesses.

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IMPACT OF BEHAVIOURAL CHANGE COMMUNICATION ON NUTRITION AND HEALTH STATUS OF PREGNANT WOMEN IN BIHAR

Dr. Priyanka Kumari

Assistant Professor and Head, Department of Home Science, Gautam Buddha Mahila College, Gaya, Magadh University, Bodh Gaya, Bihar.

Email.id: drpriyankak.14@gmail.com, kumari.priyanka.2004@gmail.com

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ABSTRACT

In Bihar 63.1 per cent (NFHS-V) of pregnant women were anaemic and 30.4 per cent of women have BMI less than 25.6 (BMI>18.5) and the mother mortality rate is 208. The aim of the study is to improve the nutrition status of women through behavioural change communication (BCC) towards dietary diversity. A cross-sectional study was conducted on 200 pregnant women in the age group of 15-49 years from Jalalgarh and Kasba block of Purnia district of Bihar. Pregnant women were selected by incidental-cum purposive sampling. Weekly BCC and nutritional education are done in Self Help Group meetings by using various informative educational materials (IEC) materials. Their nutritional status was measured by anthropometric measurements (Body Mass Index (BMI) was calculated using the formula: $\text{Weight (kg)}/\text{Height}^2(\text{m})$), Food frequency questionnaire, 24 hr diet recall and biochemical measurements were conducted by using standardized methodology as recommended by World Health Organization at baseline and end line. Data were analysed using computer software Microsoft Excel for Windows and all results were evaluated statistically by applying the SPSSPC package (version 9.0, SPSS, Chicago, Illinois, USA.). There was a significant increase in Body Mass Index (BMI) from 18.05 ± 0.215 to 19.88 ± 0.494 after 1 year of treatment ($p \geq 0.001$). The majority of women (70%) had Mid Upper Arm Circumference (MUAC) less than 21 cm ie 19.92 ± 1.394 and after treatment 21.6 ± 1.174 . There was a significant improvement in the level of haemoglobin from 8.77 ± 0.824 to 10.53 ± 0.8354 ($p \geq 0.001$). There was a great improvement in nutrition status of women. This study reflects there is great impact of BCC and nutrition education on consumption of locally and seasonal available food material focussed on diet diversity. Food production primarily for household consumption by various methods with minimum input and maximum output eg: Kitchen gardening, sack farming, change in life style, focused on hygiene and sanitation

Key words: Behavioural change communication, nutrition status, pregnant women, diet diversity, food.

INTRODUCTION

Pregnant women are most vulnerable segment of our country. Maternal nutrition is an important determinant of the course and outcome of pregnancy and 75 per cent of foetal growth is related to maternal nutritional status (Worthington et al. 1993). The WHO defines good nutrition as “intake of food necessary for optimal growth, function, and health. Good nutrition is a well-balanced diet that provides all essential nutrients in optimal amounts and proportions, whereas poor nutrition is defined as a diet that lacks nutrients. Maternal nutrition not only determines the state of offspring of birth but also the future course of its development and health on adult years. Nutritional requirement is based on the recommended daily number of serving of foods from the basic group

meat, milk, fruits and vegetable, pulses, bread and cereals. Item to avoid during pregnancy include high calorie, foods that provide few nutrients, drugs, cigarettes, alcoholic beverages and caffeine. Due to inadequate intake of nutrient is diet like energy protein, iron and calcium etc. Various deficiency disorders occur. Iron deficiency state associated with reduced work productivity and economic output as increased morbidity and mortality of both mother and babies. Anaemia in pregnant women has serious health implications. Severe anaemia during pregnancy significantly contributes to maternal mortality and morbidity (Agrawal et al, 2006, Dorierjan et al,2014)]. Anaemia is not only cause of mother morbidity and mortality but also leads to preterm birth, still birth and foetal growth retardation. In India more than half of women population are suffering from anaemia, in Bihar also nearly sixty per cent of pregnant women were anaemic and most of them from low socio-economic status families with large family size, illiteracy and unawareness etc. Table:1, itself presenting the present poor nutritional status of pregnant women in study area Purnia along with state and country.

Table: 1. Nutrition status of pregnant women (NFHS-5)

S.No.	Indicator	India	Bihar	Purina (Rural)
1.	Women 20-24 year married before 18year 15-19 year adolescent already mother	26.8	42.5	39(39.4)
2.	/pregnant	7.9	12.2	12.3(12.7)
3.	Anaemia	50.3	58.3	72.2(72.9)
4.	ANC in 1st trimester	58.6	34.6	34.5(34.2)
5.	Mothers with 4ANC	51.2	14.4	12.2(7.7)
6.	Full ANC Care	21	3.3	4.6(1.6)

Justification of the study: Keeping all these points in view present study was planned and conducted in the Jalalgarh and Kasba blocks of Purnia to improve the nutritional status through Behavioural change communication and nutrition education. Maternal knowledge of the risk factors associated with pregnancy along with the adequate nutritional requirements for healthy and safe delivery of the neonate. Adequate awareness and knowledge are directly and indirectly related to birth outcomes.

The objective of the study

1. To know the socio-economic condition of pregnant women.
2. To assess the nutritional status of women at the baseline survey and at the end line survey after behavioural change communication and nutrition education.

Hypothesis

Ho-There was no significant improvement in nutrition and health status of pregnant women after BCC.

METHODOLOGY

Survey design, population and sampling

The paper is based on data that were collected as part of an intervention to evaluate the effectiveness of behavioural change communication (BCC) and nutrition education to improve the uptake of essential maternal and newborn care (MNC) services in the Purnia district of Bihar. Two cross-sectional household surveys at baseline and after six months end line survey was carried out in both the intervention areas of the district to measure the change in key indicators. 200 pregnant women were selected in the age group of 15-49 years preferably in their first trimester from many villages in Jalalgarh and Kasba block of Purnia district of Bihar. Pregnant women were selected by incidental-cum purposive sampling.

Research Design:

The descriptive and analytical research design is used for the cross-sectional study of pregnant women of selected block of Purnia district.

Development of the research tool

An initial Interview schedule was developed with various sections that contained demographic details of the pregnant women, health and nutrition status assessment and various government scheme benefits, dietary diversity questions and change in behavioural pattern. Dietary diversity questionnaire is a standardized questionnaire developed by the Food and Agriculture Organization of the United Nations and circulated among experts to obtain their opinion. The Interview schedule had both structured and semi-structured questions and pretested in the community of Purnia district.

Behavioural Change Communication and nutritional education

Weekly BCC and nutritional education were done in Self Help Group meetings for change in lifestyle and behaviour. BCC started after a baseline survey to improve the seasonal availability and ensure the consumption of seasonal food such as protein-rich food (Pulses, milk, egg and animal foods), green leafy vegetables and fruits.

- Food production primarily for household consumption by various methods with minimum input and maximum output
eg: Kitchen gardening, sack farming, roof farming etc
- Consumption of locally and seasonally available food materials
- Change in lifestyle, focused on hygiene, sanitation and disposal of waste.

Assessment of Nutrition status

- Anthropometric assessment: BMI was calculated using the formula: $\text{Weight (kg)}/\text{Height}^2(\text{m})$ by following standard parameters given by WHO, depicted in table-2.

Table:2. Body Mass Index(BMI) by WHO

Status	BMI(Non-Asian)	BMI(Asian)
Underweight	<18.5	<18.5
Normal	18.5-24.9	18.5-22.9
Overweight	25-29.9	23-24.9

Pre-obese		25-29.9
Obese	≥30	≥30
Obese Type I	30-40	30-40
Obese Type II(Morbid Obese)	40.1-50	40.1-50
Obese Type II(Super Obese)	>50	>50

- Mid Upper Arm Circumference (MUAC) of women were measured by using standard measuring tape by UNICEF on left upper arm and nutrition status will be calculated as per below standard that is exhibited in below table-3.

Table: 3. Mid Upper Arm Circumference (MUAC) for adults by UNICEF

Status	MUAC
Underweight	<21
Normal	21-22.9
Overweight	>23

- Food frequency questionnaire, 24-hour diet recall and
- Biochemical assessment: Haemoglobin testing by using standardized methodology as recommended by World Health Organization and other ANC check-ups with the liaison at Village health, Sanitation and Nutrition Day (VHSND).

FINDINGS AND DISCUSSION

In socio-economic information (Table 4) it was found that the majority of pregnant women were from low-income groups and from joint type of family (56%) of they were pregnant from age group between 19-22 years. Even in the age group of 15-18 years, the fifteen per cent of adolescent girls (15%) were pregnant. More than half (50%) of the respondent were illiterate or signature literate.

Table: 4. Socio economic profile of women(N=200)

S .No.	Indicator	Per cent (%)	
1	Monthly Income level (INR)	<5000	87.9
		5000-10000	12.1
		>10000	0
2	Type of family	Joint	56

		Nuclear	44
3	Educational status	Illiterate	22
		Signature literate	29
		Up to primary	23
		Up to middle	21
		Up to Higher secondary	5
		12 th or above	0
4	Status of Sanitation	Good	12
		Average	49
		Poor	39
5	Disposal of Garbage	Into open pit	55
		Into open near house	21.66
		In the corner of courtyard of house	23.33
6	Condition of Kitchen	Hygienic	35
		Unhygienic	20
		Satisfactory	45

Their household, kitchen and surrounding environmental sanitation conditions were average and the majority of them disposed of their garbage in an open pit.

Table 5: Quality improvement in health and nutrition of women at the end line

S.No.	Characteristics	Details	Baseline (%)	End line (%)
1	Immunization status	Early immunization (In 1 st trimester)	3	54
		Late immunization	43	46
		No	54	0
2	ANC Check-ups	All 4	3.3	43.8
		<4	44.5	56.2
		0	34.2	0
3	Consumption of IFA and Calcium	Yes	27.2	100
		No	72.8	0
4	House hold having	Kitchen garden /roof garden/sack farming	7	44.8
		Backyard poultry	2	25

Any kind of bird/fish (Edible)	12	54.2
No animal protein source	79	10

At baseline, when survey done only three per cent of pregnant women were early registered (In 1st trimester) while going through various meeting for BCC and nutrition education scenario has changed to 54 per cent. The number of prenatal care visits should be higher than or equal to the World Health Organization recommended level– 4 visits—and visit in the first trimester; but in Purnia case was reversed even 34.5 per cent women were not went for any check-ups. At end line significant improvement noticed. After regular counselling the consumption of IFA enhanced , studies also indicate that women were likely to take iron and folic acid regularly if they received additional nutritional counselling during pregnancy (Lassi and Bhutta, 2015, Stockley et al., 2008; Webb and Olude, 2012) .

During pregnancy and lactation, women’s nutritional needs for energy, protein and micronutrients significantly increases (WHO/UNHCR/UNICEF/WFP 2000)(WHO 2013a). Figure:1. shows that at baseline the dietary diversity was very poor but at end line there was significant improvement in consumption of food from various food groups. Majority of pregnant women started consuming foods from more than five food groups.

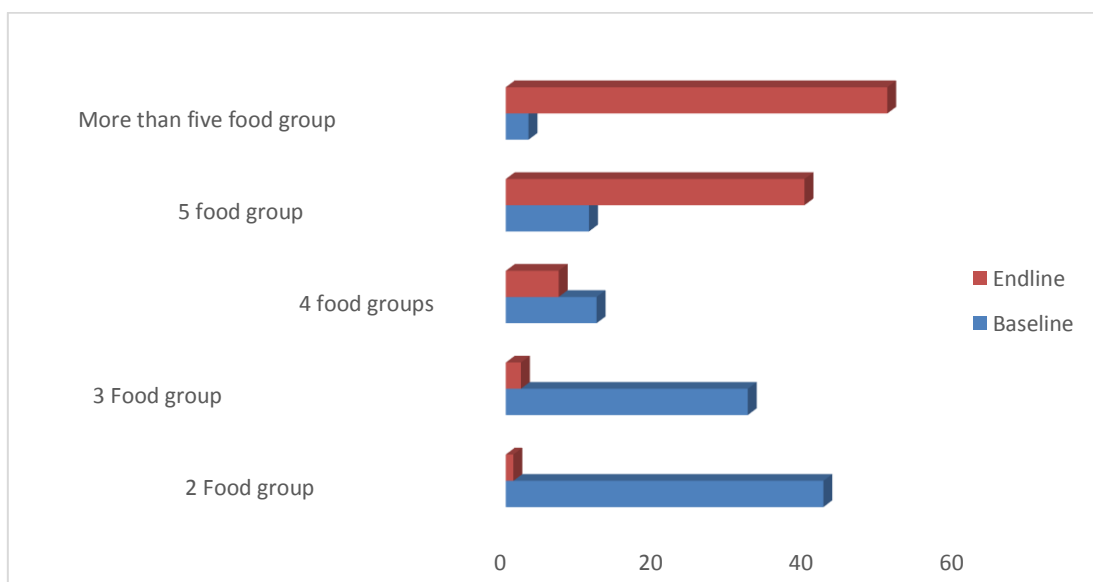


Figure: 1. Consumption pattern of food from different food groups at baseline and endline

An increase in dietary diversity is associated with socioeconomic status and household food security measured in terms of household energy availability. Similar studies also reflect the impact of dietary diversity (Jones et al., 2014, Lo, et al., 2012; Thorne-Lyman et al., 2009 and Faber et al. 2009) on nutritional status of pregnant women.

Three fourth of respondents were having faulty habits and culture restrictions and only 33.33 per cent have no faulty habits and cultural taboos but after BCC and nutrition education the case was reversed. Figure:2 exhibiting the clear scenario of women

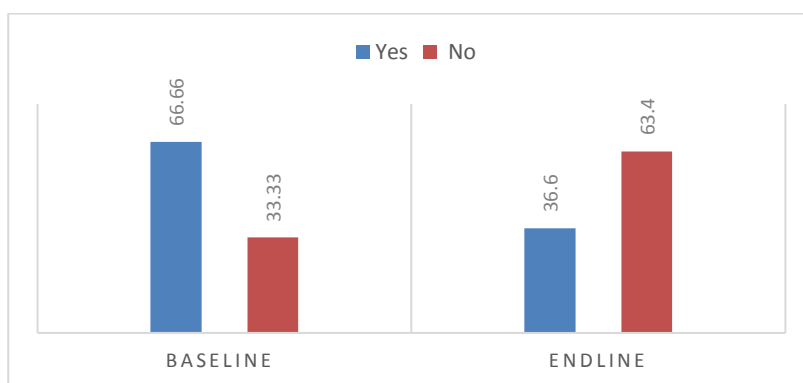
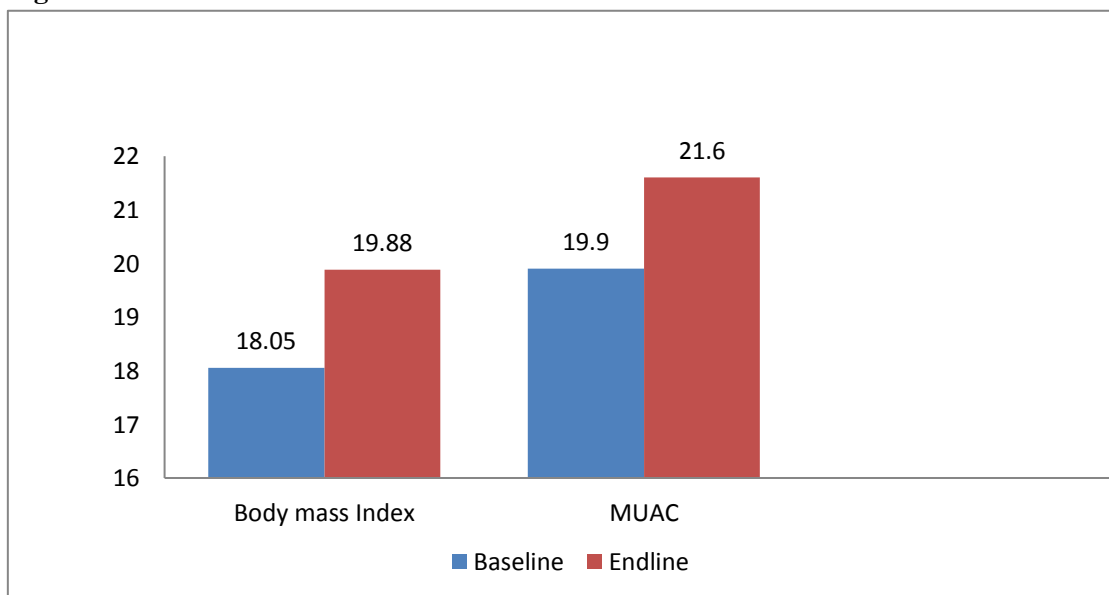


Figure: 2. Faulty habits and cultural taboos among pregnant women

During pregnancy increase in BMI and MUAC is natural process but here it was mentioned because there BMI and MUAC was alarming and was very low as per WHO standard but after change in behaviour concern to their dietary pattern, life style, dietary diversity (Increase in consumption of protein and iron rich food as per seasonal availability), there were remarkable improvement in BMI and MUAC

Figure: 3. Status of BMI and MUAC at baseline and end line



There was significant improvement in Dietary diversity score (more than 6 of 10) and in level of haemoglobin from severe anaemic to mild.(Table-3) at end line in compare to baseline.

Table: 6. Mean dietary diversity score and level of haemoglobin of women

S.No.	Indicators	Baseline	Endline
1	Mean dietary diversity score	3.9±1.4	6.8±1.7
2	Level of haemoglobin	8.77±0.82	10.53±1.52

Maternal acute under nutrition (low BMI) puts infants at higher risk of foetal growth, by regular behavioural change communication and Nutrition education session there was great improvement in dietary consumption pattern of various foods and ultimately improvement in Nutrition status of pregnant women. Due to regular timely consumption of seasonal local food both in quality and quantity improved the mean weight of pregnant women and also healthy birth outcome.

Table: 7. Mean weight gain of mother and birth weight of Infant at end line

S.No.	Indicators	End line result
1	Mean Weight gain	9.213±0.376*
2	Birth weight of Infant	2.718±0.267**

**p value<0.001, * p value<0.01

Table-7 shows that there was significant improvement in mean weight gain to pregnant women during antenatal period and there was also birth of normal body weight of infant which was extremely significant (p value<0.001).

Similar result seen in study by Permatasari et. al(2021) that pregnant women in the intervention group indicated a significant increase in knowledge, attitudes, and practices regarding nutrition and reproductive health after receiving education and intervention has the potential to be replicated and developed for large-scale implementation by optimising collaboration between government, nongovernmental organizations, and maternal and child health service providers.

SUMMARY AND CONCLUSION

There was a significant contribution of behavioural change communication and Nutrition education intervention to maternal knowledge towards enhancement in consumption of diverse food with maintenance of hygiene and sanitation not only for their health but also for foetus in her womb. There was improvement in ANC visits, enhancement in consumption of IFA tablets, improvement in breaking social taboos, enhancement in plantation of seasonal vegetables and ensuring consumption. It improved dietary diversity and enhanced nutrition status and birth outcome. Therefore, provision of information, education and communication to targeting women on need of pregnancy and childbirth and associated factors would be an important step towards attaining universal health coverage. Health of pregnant women and foetus not only depends on availability of food but on ensuring consumption with optimum quantity with quality to cope up with food insecurity and various kinds of undernourishment, morbidity and mortality.

It is suggested that further studies on the quality of counselling on nutrition status and utilization of health services be carried out in order to design appropriate training modalities for health workers for Community mobilization through participatory women's approach, group meetings for strengthening the future pillars of country.

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EFFECTS OF COVID 19 ON MICRO, SMALL AND MEDIUM ENTREPRENEURS OF VADODARA DISTRICT

Dr. Varsha Parikh¹, Dr. Dhara Bhatt² and Ms. Urmi Patel³

¹Associate Professor ² Assistant Professor ³ Research Scholar

Department of Extension and Communication,
Faculty Family and Community Sciences,
The Maharaja Sayajirao University of Baroda,
Vadodara, Gujarat, India

Email: (1)varshaparikh-extcomm@msubaroda.ac.in

(2) bhatt.dhara-extcomm@msubaroda.ac.in

HSAI Life Member No.: (1) GJ 03/P-I/LF

(2) GJ1122-LF

ABSTRACT

The COVID-19 pandemic outbreak has transformed the way business is done and placed people in circumstances that we may never experience again. In order to maintain their businesses, business owners, retailers, and entrepreneurs must overcome obstacles. Thus, researchers conducted a study on how COVID-19 affected Micro, Small, and Medium (MSM) entrepreneurs in the Vadodara district. Purposive and snowball sampling methods were used to select the 110 MSM entrepreneurs for the sample. According to study results, men predominate among entrepreneurs in terms of percentage distribution between genders and MSM entrepreneurs' lives, were clearly affected by COVID-19. The overall effect of COVID-19 was noticeable in people's lives, especially in the lives of MSM Entrepreneurs. COVID-19 had moderately affected their personal lives. They agreed that they valued time spent with their family, which was a sign that it had a beneficial effect on their daily personal lives. Both positive and negative effects on personal life were determined to be moderate. The COVID-19's effects on entrepreneurs' families were found to have a positive and a negative impact. By spending time together, the entrepreneurs said that it strengthened family ties. They also concurred that to meet necessities, their family has begun to compromise. However, they also concurred that the load placed on them by children's online education had increased. Further, COVID-19 had high to moderate effect on the company. These outcomes revealed their business's preparedness plans for a pandemic. The study came to the conclusion that while entrepreneurs faced a variety of problems on a higher level, they also did not perceive government restrictions, changes in the workplace that are seen as the new normal, disturbed supply chain management, and a lack of manpower due to worker migration as serious issues for their companies.

Key words: COVID-19 effect, MSM Entrepreneurs, Vadodara, Personal, Family, Business

INTRODUCTION

Defining Micro, Small and Medium Enterprise (MSME)

Micro, small, and medium-sized businesses operate with lower capital expenditures and turnover. The Indian government introduced the micro, small, and medium enterprises development act in 2006. That established the maximum investment and revenue threshold for MSMEs. After fourteen years, it was changed in July 2020. Micro, Small, and Medium-Sized Enterprises (MSME) are currently defined as Manufacturing Enterprises and Enterprises providing Services. The restrictions

for manufacturing and service-providing businesses were distinct and outlined. The MSME definition was altered to provide the SME, which had previously had a low upper limit, one. The MSME entrepreneurs also received other perks in addition to this. They were-

- Collateral free automatic loans for up to Rs. 3 lakh crores
- Subordinate debts for MSMEs worth Rs. 20,000 crore
- Equity infusion through MSME Fund of Funds worth Rs. 50,000crore
- Global tenders capped - to be disallowed up to Rs. 200 crores.

Effects of COVID 19 on Business

Outbreaks of the virus, COVID-19, led to several companies closing and thus causing unprecedented economic disruption in most industry sectors. In short, retailers and brands were faced with a wide range of short-term challenges in the areas of health and safety, supply chain, workforce, cash flow, consumer demand, sales and marketing. There is no longer a large number of markets, especially in the tourism and hospitality sectors. Priority and cost optimization, or postponement of tasks that do not add value in the current environment, shall be the aim of all organizational functions. An unlimited hiring freeze has been imposed by companies, notably small and medium sized enterprises. And, in parallel, there's massive growth of communication via the Internet, digital entertainment and shopping on the internet.

Effects of COVID 19 on Personal Life

COVID-19 (Corona virus) has affected day to day life and is slowing down the global economy. In less than a century, COVID-19 has changed our daily lives, businesses, world trade and movement with unprecedented speed. The causes of this disease affect the different industries and sectors. It is essential that the disease be identified at an early stage to control transmission of the virus, because it has very rapid spread among humans. As well as affecting the world's economic situation, this virus is having a significant impact on people's daily lives. COVID-19 has a wide range of impacts, which have major consequences for daily life.

Effects of COVID 19 on Family Life

The novel corona virus pandemic had a profound impact on everyone, some more drastically than others. This could result in significant changes to the daily routine for several families, because of financial difficulties. In other families, this could mean increased distress for children, tension between parents or general fear. From March 2020 to May 2020, a nationwide quarantine was imposed due to an outbreak of COVID-19. This will have a profound impact on the lives of Indian families.

Challenges Faced by Entrepreneurs during Pandemic

The pandemic caused by the novel coronavirus affected almost all the sections of the community. This pandemic is forcing the world to face up to a new normal way of life. This has had influence in people's personal and professionals' lives. COVID 19 has changed a lot of things, i.e., from the use of sanitizers and masks at household level to virtual conferencing and maintaining social distancing in professional settings. There are a lot of things happening in the market sectors, too, with this new normal. Therefore, businesspeople, retailers, entrepreneurs are facing challenges to sustain their business.

Chaudhary and Sodani et. al 2020 mentioned that India cannot have a real and sustainable growth without having a thriving MSME sector. The COVID-19 crisis had impacted the businesses nationwide and almost all the business houses had undertaken the preventive measures like reduction, reducing the staff and so on to lessen these effects. Therefore, government should make funds available to the business sector and should take the action to empower MSME. This also became the concern for the Government of India.

JUSTIFICATION: The number of MSME in Vadodara as per the 2011 census data was 15,534, employed over 1,23,055 workers. It is understood that there are many MSMEs in the Vadodara district working under various trades. Therefore, it become important to study the effects of COVID-19 pandemic on these MSM entrepreneurs, in order to understand their present situation in the market and also to find out their combating strategies for the COVID-19 effects on their enterprises. Hence, an investigation was undertaken to study not only the effects on their business but also focused on their personal as well as family life.

OBJECTIVES OF THESTUDY

- 1) To study the profile of selected MSM entrepreneurs of Vadodara district.
- 2) To study the effects of COVID-19 on MSM entrepreneurs residing in Vadodara district in relation with aspects viz.; (i) Personal life, (ii) Family life and (iii) Business in relation to the selected variables viz., (a) Gender (b) Age (c) Type of Enterprise (d) Span of Business (e) Usage of Media during COVID-19
- 3) To study the differences in the overall effect of COVID-19 on selected MSM entrepreneurs of Vadodara district in relation with above selected variables.
- 4) To study the challenges faced by selected MSM entrepreneurs of Vadodara district during COVID-19 pandemic.

NULL HYPOTHESIS OF THE STUDY

There will be no significant difference in the overall effect of COVID-19 on selected MSM entrepreneurs in relation with selected variables viz., (a) Gender (b) Age (c) Type of Enterprise (d) Span of Business (e) Usage of Media during COVID-19

METHODOLOGY

The sample was drawn using purposive and snowball sampling technique. For the study, **one hundred and ten** MSM Entrepreneurs were selected as the sample from Vadodara district basically from service, manufacture and production enterprise. The tool used for data collection was a **structured questionnaire**. For data collection **google forms** were sent through email or WhatsApp and filled. A **survey** was conducted using questionnaire and MSM entrepreneurs were contacted through incubation centre.

FINDINGS AND DISCUSSION OF THE STUDY

Table – 1: Percentage distribution of the respondents as per background information of the selected MSM Entrepreneurs of Vadodara district.(n=110)

Variable	Category	%
Age	Young Entrepreneur (19-40)	56.36
Gender	Male	76.36
Education Qualification	Moderate Level	61.81
Marital Status	Married	83.64

Little more than half of the respondents were young entrepreneurs (56.36%) and little more than forty percent of them were senior entrepreneurs (between 41-61 years). Majority of the respondents were male (76.36%). Majority (61.81%) was having either graduate or had diploma in varied fields moderate level of education.

Table – 2: Percentage distribution of the selected MSM Entrepreneurs of Vadodara district as per their business profile. (n=110)

Variables	Category	%
Type of Enterprise	Service	32.73
	Manufacture	51.82
Year of Establishment	Old (1960-1988)	32.73
	Recent (1989-2017)	58.18
Entrepreneurial Experience	Less Experience (1-10 Years)	27.27
	Moderate Experience (11-20 years)	44.55
	More Experience (21-30 Years)	28.18
Daily Working Hours	Moderate Working Hours (8-14 hrs.)	70.00
Establishment of Enterprise	Established by Family	41.82
	Established by Self	38.18
Business Expansion	Within the City	21.82
	Within the District	30.91
	Within the State	31
Benefits availed from Govt.	Did not Availed	85.45

The above table-2 reveals the business profile of the selected MSM entrepreneurs of the study. Little more than half of them were having Manufacturing units (51.82%) and nearly one third of them were providing diverse services through their enterprise (32.73%). More than half of the enterprises were established in recent years (58.18%) followed by one third of them as 'Old' enterprise (32.73%) (established between years 1960-1988). Majority of them had moderate working hours (70%) i.e., 8 hours to 14 hours per day. More than forty percent of the respondents shared that their enterprise was established by their family (41.82%), whereas a little less than forty percent of them established their enterprise themselves (38.18%). Higher percentage of the respondents had their business expansion within the state (31%) and within the district (30.91%). One fifth of them were doing business within the city (21.82%). Very high majority (85.45%) of the respondents did not avail the benefits from the government schemes and programmes for MSMEs.

Usage of Media for Business by MSM Entrepreneurs

Table – 3: Percentage distribution of the respondents according to their overall media usage (n=110)

Overall Usage of Media	%
Low Usage	46.36
Moderate Usage	5.45
High Usage	48.18

Figure-1: Percentage Distribution of the selected MSM Entrepreneurs of Vadodara district according to their overall media usage for their business. (n=110)

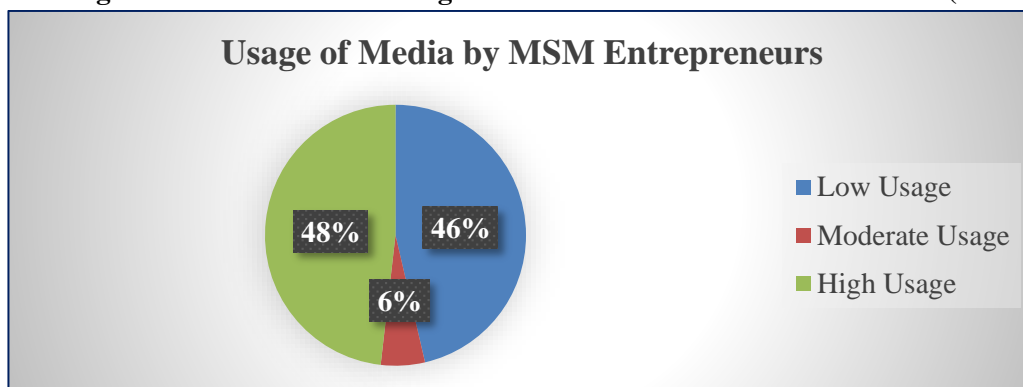


Fig.1 Overall media usage for business by selected MSM entrepreneurs

Above table 3 and fig-1 reveals data regarding overall media usage for business purpose by selected MSM entrepreneurs of Vadodara district. The data revealed that a little less than half of the entrepreneurs had high media usage (48.18%). However, more than forty percent of them showed low media usage (46.36%). Moderate usage of media was noted among very few of the entrepreneurs (5.45%). Overall, high usage of media was observed among the MSM entrepreneurs.

Effects Of Covid-19 On Msm Entrepreneurs:

Table – 4: Overall and Aspect-wise Percentage Distribution Of the Respondents According To the Effect of COVID-19 On Them. (n=110)

Effect of COVID-19 on MSM Entrepreneurs	Effects	%
Overall Effect of COVID-19	High Effects	74.55
Effect of COVID-19 on Personal Life	High Effects	41.81
	Low Effects	47.27
Effect of COVID-19 on Family Life	High Effect	50
	Low Effect	42.73
Effect of COVID-19 on Business	High Effects	46.36
	Low Effect	50.91

Figure-2: Percentage Distribution of the Selected MSM Entrepreneurs According To Their According To the Effect of COVID-19 On Them. (n=110)

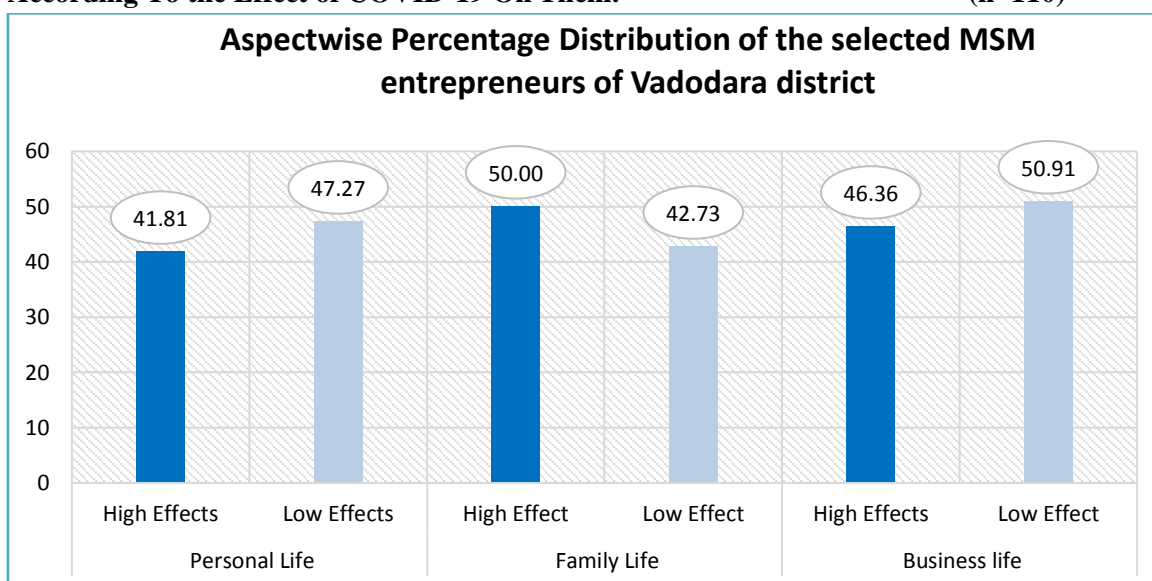


Fig.2: Effect of COVID-19 on MSM Entrepreneurs

Table -4 revealed the data regarding the **overall effect** of Covid-19 on MSM entrepreneurs showed that high majority of them had high effects (74.55%) of it.

Table-4 and fig-2 revealed that, higher percentage of the respondents had low effects (47.27%) of Covid-19 on their **personal life**, followed by high effects (41.81%) of the same. Half of the MSM entrepreneurs were highly affected (50%) by Covid-19 with respect to their **family life** followed by low effects (42.73%) on them. More than forty percent of the MSM entrepreneurs' **business** were highly affected (46.36%) followed by half of them with low effect on their business (50.91%).

Effects of Covid-19 on selected Aspects

I) **Personal Life:** Intensity indices show the high effects on the respondents' **personal life** that ranged between (2.71-2.00). On the positive side it highly affected their routine personal life as they agreed to great extent that they cherished moments spent with their family (2.71), and they took interest in socialization (2.13). The occurrence of pandemic also showed positive high effects on the entrepreneurs' personal life as they became more aware about importance of health (2.31), as well as considered themselves as the more responsible citizen (2.25). On the negative side it showed high effects on their mental health. The respondents agreed that they started feeling lonely, fear of uncertainty, and increased stress level after the emergence of Covid-19.

Intensity indices highlights, that the respondents' positive moderate effects as they have become more patient (1.72), started doing meditation (1.75), improved appetite (1.84). Moreover, its moderate effects on negative side showed that the entrepreneurs were indulged in negative thoughts often and developed fear of going out (1.84), problem in maintaining work-life- balance (1.78).

The low effects on the negative side were noted for the items viz Developed problem of insomnia, increased screen time and increased expenses for internet, However, it made them conscious for the saving money and spending it thoughtfully (1.23)

II)**Family Life:**The highest intensity index was for strengthening the **family** bond by

spending time together (2.85). They also agree to the great extent that their family member had started saving money (2.45), understood each other well (2.42). The entrepreneurs consider them as bigger emotion support. However, they got help from their spouse in managing their business (2.10). Furthermore, on the negative side they face frequent quarrels (2.26), unable to concentrate (2.23), disagreements among family members (2.20), disappointment due to postponement of family event (2.04).

It showed low effect as they agreed that their family have started compromising to fulfilling basic need. However, they also agreed that the Online education of children has increased burden on them (1.32).

III)Business Life:The intensity indices ranged between 2.55 to 1.67. This showed high to moderate effect on their **business**. The overall mean score (2.08) also indicates the high effect of Covid-19. The following are the positive effects of it that showed higher intensity index for items viz.,learnt new skills for my business. (2.55), understood the relationships with my vender’s & clients. (2.53), changed marketing platform for business; and changed marketing platform for my business. (2.44), increased faith in government initiatives (2.16)

They agreed to great extent that they used technology-based solution to deal with crisis (2.35), changed their business model (2.25), concern for employees increased their commitment at work (2.22), learn to optimize the resources (2.05). However, on the negative side it affected the business highly as employees became apprehensive to work due to salary issues (2.06), reduction in salary led to dissatisfaction among staff (2.01), frequent manpower crisis (2.00). These effects, at one side helped in keep the business on track; it also affected the production and finances.

Furthermore, it showed moderate effects for remaining listed items. The item that showed highest score in this section was lost of routine client (1.99), staff members were stressed to deal with pressure in the market and problem of clearing the backlogs of material and delivery (1.92), reduced manpower and disrupted supply chain, delayed loan repayment (1.88), delayed delivery of products/ services (1.79), spent more money to follow the government guidelines to run the workplace (1.76).

Differences in Effects of COVID-19 on MSM Entrepreneurs:

Table -5: T-Ratio Showing Difference On Overall Effect of COVID-19 on Selected MSM Entrepreneurs According To Their Age (n=110)

Age	N	Mean	SD	T	Df	Sig. (2-tailed)
Young Entrepreneurs	62	8.13	0.06	3.28101	108	0.00139**
Senior Entrepreneurs	48	7.82	0.4			

P <0.01**

Table-5 indicates the differences in the overall effect of COVID-19 on selected entrepreneurs according to their age. A significant difference was found in overall effect of COVID-19 on selected entrepreneurs according to their age.

Table-6: T-Ratio Showing Difference On Overall Effect of COVID-19 on Selected MSM Entrepreneurs According To Their Social Media Usage. (n=110)

Source	SS	Df	MS	F Ratio Value	p value
Between-treatments	1.6577	2	0.8288	3.29263	.040955*
Within-treatments	26.9345	107	0.2517		
Total	28.5922	109			

*p<0.05

Table-6 showed that there were significant differences in overall effects of COVID-19 existed among entrepreneurs in relation with their social media usage. It indicates that the varied use of social media may have affected the type of effects that the entrepreneurs faced during pandemic. Therefore, the null hypothesis stating that there will be no significant difference in the overall effect of COVID 19 on selected MSM Entrepreneurs in relation with their social media usage was not accepted. It is understood that those who had high social media usage showed higher mean scores for the overall effect of COVID-19. This could be due to the technological change that they might have adapted to cope up with the situation. There was **no significant** difference found in the overall effect of Covid-19 on selected entrepreneurs according to their **gender, Span of business and type of enterprises.**

Challenges Faced by the MSM Entrepreneur:

The entrepreneurs had faces varied challenges in their business due to Covid-19. The intensity indices for the challenges ranged between 4.13-2.29, that showed more to less challenges that the entrepreneurs had to face. The highest intensity index was found for the challenges occurred due to financial stagnation in the market (4.13). The least challenging task as indicated by the entrepreneurs was nationwide lockdown (2.29). This indicates that the spirit of the entrepreneurs to take part in controlling the global crisis by risking their business and finances. The other items that showed more challenging covid-19 times were as follows-no market mobility (3.99), did not get time to plan for crisis (3.90), financial crisis in business. (3.83), restricted working hours after the unlock (3.80), difficulty in dealing with the uncertainty of the market (3.74), maintain health and safety standard according to government norms were difficult. (3.74), interrupted cross border communication and maintaining work life balance (3.65).

SUMMARY, CONCLUSION, IMPLICATIONS

The study data illustrates the overall effect of Covid-19 on MSM entrepreneurs of Vadodara district, which revealed that the vast majority of them (74.55%) had high effects, followed by moderate effects (25.45%). Aspect-wise data also revealed that a nearly equal amount of respondents (41.81%) expressed positive and negative effects of Covid-19 on their personal lives. Covid-19 had a significant impact on half of the MSM entrepreneurs' family lives (50%) and on more than forty percent of the MSM entrepreneurs' enterprises (46.36%). COVID-19 had a moderate impact on both positive and negative aspects of the selected entrepreneurs' aspects viz, personal as well as family lives. Spending time together, according to the entrepreneurs, helped to enhance the family tie. They also agreed that their family had begun to make adjustments in order to meet fundamental needs. They did, however, agree that online education for youngsters had increased their workload. The results showed that Covid-19 has a significant and moderate impact on entrepreneur's businesses too. The fact that they used technology-based solutions to deal with

the situation was intriguing. These consequences, while helpful in keeping their enterprise/ firm on track, also had an impact on productivity. The majority of entrepreneurs faced challenges as a result of market financial decline and reduced personnel as a result of worker migration was a major concern for their firms.

So, it can be concluded that, during COVID-19, the majority of MSMs of Vadodara district were struggling with access to capital, marketing of their products, lack of manpower which were basic which must be addressed on a long-term basis by the government. Due to extensive COVID-19 turmoil, the government must develop an ongoing supportive and monitoring mechanism by providing emergency relief measures to restore confidence in the MSMs sector. MSMs should be encouraged to connect to the internet, and tax rebates should be increased for this sector. The never say die attitude of entrepreneurs of Vadodara district have encouraged them to deal with the situation and helped them face with great courage however, the state as well as government of India should take a variety of steps to improve Indian MSMEs.

RECOMMENDATION FOR FURTHER STUDIES

- A similar study can be taken up women entrepreneurs, working women, Street vendors and people working in unorganized setup residing in Vadodara District.
- This study can lead to further studying the new business models post lockdown and emerging market trends.
- A training program can be designed to help entrepreneurs cope with the new normal markets and new age business skills.

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RAGI BROWNIE-A MILLET BASED APPROACH TOWARDS TRIPLE BURDEN OF MALNUTRITION

Sai Gayathri H⁽¹⁾ Dr.A.Thirumani Devi⁽²⁾

¹Research Scholar, ²Professor, Food science and Nutrition,
Department of Food Sciences and Nutrition
Avinashilingam Institute for Home Science and Higher Education for Women,
Coimbatore.

Email ID: saigayathrihnair@gmail.com

HSSAI Membership ID: HSAI-2023-TN-1275-LF

ABSTRACT

The Triple Burden of malnutrition comprising under-nutrition, over-nutrition and micronutrient deficiencies (hidden hunger) makes up an alarming condition of today's world. The present study aims to develop a product suitable to address the micronutrient deficiencies that are generally neglected by main stream nutritional studies focusing on the calorie count of the diet. This paper deals with the development, sensory evaluation, nutrient analysis and shelf-life study of Ragi Brownie as a supplement for calcium deficiency, a micro-nutrient deficiency. The product development was carried out with three variations of Ragi brownie, and the variation which was approved by the sensory panel was further analysed for nutrient analysis and shelf-life. The Finger Millet (Ragi) was picked to develop calcium rich product as they are nutritionally rich in calcium and ecologically sustainable while being abundantly climate resilient. The process used for development of Ragi Brownie is made simple and cost effective to make the adoption smooth and achieve desired results.

Keywords: Triple Burden of Malnutrition, Ragi Brownie, Hidden Hunger, Sensory Analysis, Nutrient Analysis.

INTRODUCTION

The Green Revolution in India led to improved food security in India, but also forced the population of this country to consume increased amounts of cereal grains. This increased consumption of cereal grains while addressing the calorie requirement failed to address the micronutrient requirement of the population (MI Gomez et.al 2013). This led to increased malnutrition in the population on the micronutrient front. Malnutrition has been observed to be in three dimensions in the population. The subjects were found to be suffering from either over-nutrition, under-nutrition and micronutrient deficiencies or a combination of the above. To address malnutrition, it is required that products addressing the specific case of nutrition deficiency are developed. Millets are a viable solution to address the micronutrient deficiencies found in the population of this country.

Millets were traditionally consumed in the 1960s. The green revolution led to a decline in the production of millet. Recently the nutritional benefits of millet are attracting a change in

government policies. The policy changes with an increase in the production of the millets has resulted in acknowledging the nutritional benefits and the climatic resilience of millets. The millets being climatic resilient are also ecologically sustainable owing to the storage feasibility of millets. The millet can be stored longer without losing it to pests. India's proposal to the UNGA to declare 2023 as the International Year of Millets was passed by a resolution and adopted (J Mathew & M. K Joseph 2022). This achievement comes at a point when the calorie requirement mode of addressing malnutrition was found to be flawed as it needs to focus on the micronutrient consumption of the population leading to malnutrition. The present product aims to address the issue of malnutrition while focusing on the micronutrient requirement.

OBJECTIVES

- Develop a Calcium Rich Food Product to supplement the required intake of Calcium to prevent the occurrence of micronutrient deficiency
- Assess the nutrient analysis of the developed product
- Assess the Shelf life of the developed product
- Cost calculation of the developed product

HYPOTHESIS

The present study is an attempt to develop a Calcium rich food product and analyse for its nutritional content and shelf- life.

METHODOLOGY

The study focuses on analysing a certain number of subjects for their nutritional status and categorise them based on demographic parameters to understand the root cause of malnutrition. The study was carried out in Mercy College, Palakkad, over 500 subjects. The subjects were analysed for their nutritional status by screening the subjects over a questionnaire. The biochemical tests were performed on the subjects suspected of developing malnutrition after obtaining the consent of the subjects. The subjects were checked for the amount of haemoglobin, calcium, iron and folic acid and grouped as per the dimension of malnutrition observed. It was alarming to find that the subjects were ill informed of the dimension of micronutrient deficiency. The subjects were imparted with the knowledge of their condition while providing them with guidance to improve their nutritional condition.

Personalised nutrition to the subjects could hardly yields more measurable results. This required the development of new products that can address the case of malnutrition and provide a quantile means of measurement. The product needs to be suitable to address the dimension of malnutrition being addressed while being economically viable and standardised to meet the Estimated Average Requirement (EAR) of the selected subjects. The product was developed to be suitable to cater one-third of the requirement of the selected subjects. The product development was made keeping in mind the likes and dislikes of the selected subjects and as a healthier alternative to the junk food consumed by the selected subjects as snacks. The current product was developed to address the dimension of calcium deficiency in selected subjects.

Food code	Food Name	No. of Regions	Aluminium (Al)	Arsenic (As)	Cadmium (Cd)	Calcium (Ca)	Chromium (Cr)	Cobalt (Co)	Copper (Cu)	Iron (Fe)	Lead (Pb)	Lithium (Li)
			mg	µg	mg	mg	mg	mg	mg	mg	mg	mg
			AL	AS	CD	CA	CR	CO	CU	FE	PB	LI
A CEREALS AND MILLETS												
A001	Amaranth seed, black (<i>Amaranthus cruentus</i>)	1	3.32			181	1.227	0.059	0.81	9.33	0.013	0.028
A002	Amaranth seed, pale brown (<i>Amaranthus cruentus</i>)	6	2.73±0.47		0.001±0.000	162±15.7	0.092±0.045	0.021±0.005	0.56±0.09	8.02±0.93	0.018±0.012	0.008±0.008
A003	Bajra (<i>Pennisetum typhoides</i>)	6	2.21±0.78	0.97±0.24	0.003±0.001	27.35±2.16	0.025±0.006	0.030±0.015	0.54±0.11	6.42±1.04	0.008±0.002	0.003±0.001
A004	Barley (<i>Hordeum vulgare</i>)	6				28.64±3.49	0.029±0.009	0.027±0.010	0.43±0.17	1.56±0.15		
A005	Jowar (<i>Sorghum vulgare</i>)	6	2.56±0.59	1.53±0.04	0.002±0.002	27.60±3.71	0.010±0.003	0.012±0.007	0.45±0.11	3.95±0.94	0.008±0.003	0.001±0.001
A006	Maize, dry (<i>Zea mays</i>)	6	2.82±0.16			8.91±0.61	0.010±0.006	0.010±0.003	0.45±0.23	2.49±0.32		0.002±0.001
A007	Maize, tender, local (<i>Zea mays</i>)	6	0.12±0.05			6.35±0.89	0.004±0.003		0.18±0.06	0.71±0.06	0.001±0.000	
A008	Maize, tender, sweet (<i>Zea mays</i>)	4	0.11±0.02			6.37±1.07	0.002±0.001	0.001±0.000	0.11±0.02	0.54±0.07		
A009	Quinoa(<i>Chenopodium quinoa</i>)	1		0.03	0.002	198	0.004		0.48	7.51		
A010	Ragi (<i>Eleusine coracana</i>)	5	3.64±0.69		0.004±0.004	364±58.0	0.032±0.019	0.022±0.009	0.67±0.22	4.62±0.36	0.005±0.002	0.003±0.003
A011	Rice flakes (<i>Oryza sativa</i>)	6	2.44±0.60		0.002±0.001	9.19±1.33	0.050±0.027	0.007±0.003	0.26±0.05	4.46±0.81	0.005±0.003	0.002±0.002
A012	Rice puffed (<i>Oryza sativa</i>)	6	2.41±0.61		0.004±0.003	15.09±2.92	0.028±0.007	0.007±0.002	0.25±0.05	4.55±1.03	0.013±0.006	0.004±0.002
A013	Rice, raw, brown (<i>Oryza sativa</i>)	6	0.60±0.18		0.002±0.001	10.93±1.79	0.005±0.002	0.011±0.003	0.37±0.14	1.02±0.35	0.002±0.001	
A014	Rice, parboiled, milled (<i>Oryza sativa</i>)	6	0.20±0.06		0.002±0.003	8.11±1.01	0.005±0.002	0.003±0.001	0.27±0.12	0.72±0.20	0.006±0.002	0.005±0.002
A015	Rice, raw, milled (<i>Oryza sativa</i>)	6	0.44±0.30		0.002±0.002	7.49±1.26	0.005±0.003	0.003±0.002	0.23±0.06	0.65±0.11	0.005±0.004	0.002±0.002
A016	Samai (<i>Panicum miliare</i>)	6		0.49±0.15	0.001±0.000	16.06±1.54	0.016±0.006	0.001±0.000	0.34±0.08	1.26±0.44		
A017	Varagu (<i>Setaria italica</i>)	5	1.07±0.83			15.27±1.28	0.021±0.027	0.005±0.003	0.26±0.05	2.34±0.46		0.027±0.003
A018	Wheat flour, refined (<i>Triticum aestivum</i>)	6	0.94±0.33		0.001±0.000	20.40±2.46	0.005±0.002	0.001±0.001	0.17±0.02	1.77±0.38	0.004±0.002	0.003±0.003

Figure1: Calcium rich raw ingredients-Table IFCT (Indian Food Composition Table-NIN 2019)

Ragi was chosen as the main ingredient for the product development as it is rich in Calcium and has a low Glycaemic Index (Figure 1). The ragi flour was used as a replacement for all- purpose flour in different proportions, and the sensory evaluation was conducted for each product variation. The quantitative analysis of the product was made to analyse the fortification provided is able to address the EAR of the selected subjects. Other ingredients used in the development of the product are curd, Jaggery, Oil and sesame seeds. Curd was chosen as it was also high in calcium content while adding essential minerals like Sodium. Oil was used as a binding agent, and sesame seeds provided the nutty flavour essential for texture of product. The flow chart of the development of Ragi Brownie is illustrated in Figure 3.

The product was designed as a dessert to ensure that the consumption of the product over an extended duration is not dull for the selected subjects. Millet flour was blended with ragi flour in different proportions for multiple formulations to ensure the texture and taste of the product were within palatable parameters during sensory analysis (Table 1).The different variations of Ragi Brownie are shown in Figure 2.The product was further analysed for its nutritional status and will be supplemented to the subjects with calcium deficiency.

Formulations of product



Figure 2: Image showing different formulations of Ragi Brownie

Table 1: Variations of Ragi Brownie

Proportion of Ragi Flour	Variation 1(RB1)	Variation 2(RB2)	Variation 3(RB3)
Ragi Flour(g)	50	30	20
Refined Wheat flour	-	20	30
Jaggery(g)	40	40	40
Sesame seeds(g)	20	20	20
Curd(ml)	50	50	50
Oil(ml)	5	5	5
Cocoa powder(g)	1	1	1
Baking powder(g)	1	1	1

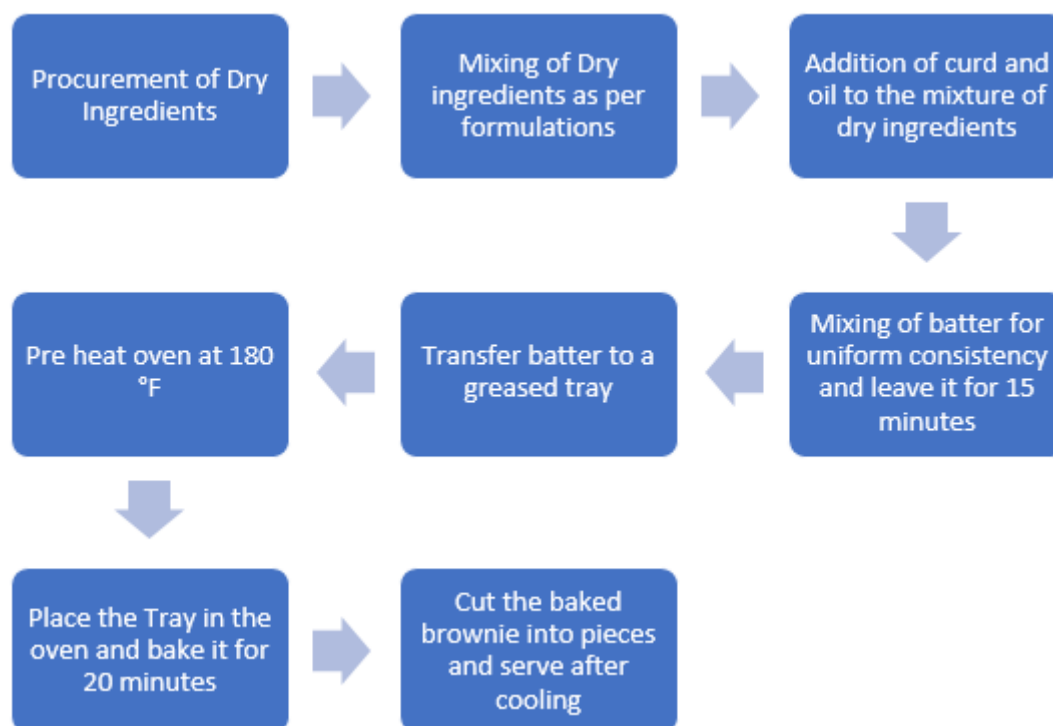


Figure 3: Flow chart of development of Ragi Brownie

Costing

The development of the product to cater to the needs of the subjects has to be made economically viable so that it can be consumed by all economic sections as it is observed that the economically weaker sections are more prone to micronutrient-deficient malnutrition rather than economically strong sections owing to food insecurity and low diversification in consumed food. The selected ingredients are such that they are regularly available household items. The cost of final product has been arrived at to check economic viability and availability of product for the malnourished subjects (C.Burns et.al 2010).

Sensory Evaluation

A sensory assessment of the Ragi brownie was carried out. The nine-point Hedonic scale was used to conduct it. A total of 30 semi-trained panels from our own university performed the sensory evaluation. Three different iterations of the developed product were evaluated for their overall acceptability, colour, flavour, and texture. The total score of the sensory evaluation was calculated, and the product with the highest sensory score and acceptability was selected for nutrient and shelf-life study (MA Amerine et.al 2013). The Figure 4 shows a panel member during the sensory evaluation and Figure 5 shows a sensory evaluation score card.



Figure 4: Sensory Evaluation

Name:

Class:

Date:

Product	Flavour	Texture	Taste	Colour	Overall Acceptability

9 Point Hedonic Scale

- Like Extremely-9
- Like Very Much-8
- Like Moderately-7
- Like Slightly-6
- Neither like Nor Dislike-5
- Dislike Slightly-4
- Dislike Moderately-3
- Dislike Very Much-2
- Dislike Extremely-1

Figure 5: Sensory Evaluation Score Card

The nutrient analysis for the most palatable variation was performed to check if desired nutritional values were observed in the processed product. The main parameters analysed in the nutrient analysis were total carbohydrates, energy, protein, fibre, fat, calcium, Iron and folic Acid.

The analysis of the processed product's nutrients was analysed based on standard testing methods mentioned in Table 2.

Table 2: Methods of Nutrient Analysis

<u>Nutrients</u>	<u>Method</u>
Total Carbohydrate	FSSAI Manual 2016- Anthrone Reagent Method
Energy	FAO manual ,2003-Bomb Calorimeter
Protein	AOAC-Kjeldal Method
Fat	AOAC- Soxhlet Extraction method
Calcium	AOAC Calcium method
Iron	AOAC-Atomic Absorption Spectrometry
Folic Acid	UV-Visible Spectrometry
Fibre	AOAC- Fibroton method

Shelf life analysis was carried out for the product and pH, total bacterial count, total fungal count were among the parameters analysed for 7th and 10th day respectively. The methods adopted for shelf life analysis are as shown in Table 3.

Table 3: Methods for Shelf life Analysis

<u>Analysis</u>	<u>Procedure</u>
Appearance	Sensory Evaluation
Colour	Sensory Evaluation
Odour	Sensory Evaluation
pH	FSSAI- electrometric method
Total bacterial count	Colony Count Technique
Total Fungal count	Colony Count Technique

Nutrient Analysis

- Determination of Total carbohydrate by Anthrone Reagent
 - Weigh 100 mg of the sample in to a boiling tube Hydrolyze by keeping it in a boiling water bath for 3 hours with 5 ml of 2.5 N HCl and cool to room temperature.
 - Until the effervescence stops, neutralise with solid sodium carbonate.
 - Make up the volume to 100 ml and centrifuge.
 - Take 0.5- and 1-ml aliquots of the supernatant for analysis.
 - Take 0, 0.2, 0.4, 0.6, 0.8, and 1 ml of the working standard to prepare the standards; "0" serves as a blank.
 - Add distilled water to all the tubes, including the sample tubes, to bring the volume to 1 ml.
 - Then add 4 ml of Anthrone reagent. Heat for 8 minutes in a boiling water bath.

- Cool rapidly and read the green to dark green colour at 630 nm. (FSSAI Manual)
- 2. Determination of Energy by Bomb Calorimeter
 - Using a device known as a bomb calorimeter, it is simple to determine the fuel value of food. A weighed sample of food is put in a "bomb," a large steel container.
 - The sample is lit after the bomb has been loaded with oxygen, and the heat is then transferred into a known amount of water surrounding the bomb.
 - One can determine the energy content of food by applying the definition of a calorie while recording the change in water temperature.

$$\text{Calories} = (\text{Mass of water in kg}) \times [(1 \text{ Calorie}) / (1 \text{ kg } (1^\circ\text{C}))] \times (\text{temp change in } ^\circ\text{C})$$

3. Determination of Fat Content.

- To extract with petroleum ether in a Soxlet or other suitable extractor, weigh precisely 2.5 g of the dried material into a thimble.
- From 4 hours at a condensation rate of 5 to 6 droplets per second to 16 hours at a rate of 2 to 3 drops per second, the extraction time can vary. 30 minutes of steam bath drying the extract followed by cooling in a desiccator and weighing. Continue this alternate drying and weighing procedure at 30-minute intervals until the difference between two successive weighing is less than one milligram.
- Note the lowest mass. (AOAC 18th Edition / FSSAI)

Calculation

$$\begin{array}{l} \text{Crude fat (on moisture-free basis),} \\ \text{Percent by mass} \end{array} = \frac{100 (M_1 - M_2)}{m}$$

Where

M_1 = mass in 'g' of the extraction flask with dried extract,

M_2 = mass in 'g' of the extraction flask, and

m = mass in 'g' of the dried sample taken for the test

4. Estimation of fibre

- To remove fat, extract 1-2g of powdered material with ether or petroleum ether (boiling temperatures: initial boiling: 35–38°C, final boiling: 52°C). (Note: Extraction may be skipped if fat content is less than 1%)
- After ether extraction, boil 2g of dried material in 200mL of sulfuric acid for 30 minutes while stirring with bumping chips.
- Filter through muslin and wash with boiling water until washing are no longer acidic.
- Boil with 200mL of sodium hydroxide solution for 30min.
- Filter through muslin cloth again and wash with 25mL of boiling 1.25% H₂SO₄, three 50mL portions of water and 25mL alcohol.
- Transfer the residue to an ash dish after removing it (pre-weighed dish W₁).
- Dry the residue for 2hours at 130 ±2°C. Cool the dish in a desiccator and weigh (W₂).
- Ignite for 30minutes at 600 ±15°C. 9. Cool in a desiccator and reweigh (W₃). (AOAC method)

Calculation:

$$\% \text{ Fibre in ground sample} = \frac{(W_2 - W_1) - (W_3 - W_1)}{\text{Weight of the sample}} \times 100$$

5. Estimation of Protein

- Quickly weigh 1-2 g of the sample, then transfer it to a 500 or 800 ml Kjeldahl flask, being careful to ensure that no sample clings to the flask's neck.
- Add 0.7 gm. of Mercuric oxide, 15 gm. of Potassium Sulphate and 40 ml of concentrated sulphuric acid.
- Include 2–3 glass beads.
- Put the flask on the stand in the digestion chamber at an angle,
- The flask should be carefully heated over a low flame until the liquid starts to boil steadily at a reasonable rate and the initial froth formation ends.
- Rotate the flask many times while it is cooking. Heat the digest for another hour or more until it turns a light blue colour. After 30 minutes of digestion, if black specs are still visible, wrap the vessel with aluminum foil and keep for another two to three minutes. By doing this, the digesting mixture's black specs would descend from the walls. If the specs are still present, turn off the heat and let the vessel cool for 10 minutes.
- Do not modify the heat intensity in the whole process. Alternatively, few drops of water may also be poured down across the side of the flask.
- After the digest has cooled, slowly pour in 200 cc of water. Before combining the acid and alkaline layers, let the mixture to cool, add a piece of granulated zinc or anti-bump granules, and carefully pour down the side of the flask enough NaOH solution (450 gm/liter) to make the contents highly alkaline (approximately 110 ml).

- Attach the flask to a distillation setup with a powerful flash head and condenser. A delivery tube that dips just below the surface of the pipette volume of standard acid housed in a conical flask recipient is attached to the condenser. (Precaution: The receiving solution must be below 45°C to prevent loss of ammonia). Mix the contents of the digestion flask and boil until 150 ml have distilled into the receiver. Add 5 drops of methyl red indicator and titrate with 0.1 N NaOH solutions. Carry out a blank titration simultaneously. 1 ml of 0.1 N (H₂ SO₄) = 0.0014gm N.

Calculation

$$\text{Nitrogen content (N) in \%} = \frac{(\text{Blank} - \text{Titre value}) \times \text{Normality} \times 1.4}{\text{Sample weight}}$$

Calculate protein % : N x Conversion factor

Ideally the protein content of food stuff is calculated by multiplying its total nitrogen content by 6.25, this factor is used whenever the nature of the protein is unknown or when the product to be analyzed is a mixture of different proteins with different factors. However, use of different Nitrogen conversion factors for different matrices may lead to better accuracy of results. (FSSAI Manual of methods)

6. Determination of Iron in sample

- Take 100 ml standard flask
- Prepare Iron standards (*Nist traceable*) to 0.05, 0.1, 0.125, 0.15, 0.20 & 0.25 mg/l in nitric acid (1:499) from 1000 ppm solution.
- Prepare a blank solution in 100ml distilled water.
- Take 1gm of dried sample in a beaker and digest with 0.5 ml. of conc. Nitric acid and add 25 ml CaCl₂ till the volume reduced to three fourth.
- Make up to 100 ml. with distilled water.
- Process the blank in the same way as you did above.
- Set the Atomic Absorption Spectroscopy (AAS) in accordance with the detailed work instruction.
- Aspirate the digested food sample solutions, standards, and blanks.
- At 248.3 nm, gauge the iron's absorption.

Calculation:

- Draw the standard calibration graph by plotting the absorbance Vs. standard conc. for each standard
- Calculate the concentration of Iron content from the sample through calibration graph. (AOAC method)

7. Determination of folic acid/vitamin b9 by UV-Visible spectrophotometry:

Reagents

1. Folic acid Standard Stock Solution:

Accurately weighed Folic acid (10mg) was transferred in 100 ml volumetric flask. The drug was dissolved in methanol with sonication and final volume was adjusted with methanol up to mark to prepare a 100µg/ml stock solution.

2. Folic acid Working Standard Solution:

From the above stock solution (100µg/ml), an accurately measured 0.2, 0.4, 0.6, 0.8, 1.0 and 1.2 ml was transfer into separate 10 ml volumetric flask and final volume was adjusted with methanol up to mark to prepare 2-12µg/ml solutions.

Procedure

- Transfer powder sample, exactly equivalent to laboratory mixture containing 25 mg of Meclizine Hydrochloride and 2.5mg of Folic acid to a 100 ml volumetric flask. Add about 60 ml of methanol and sonicate for 15 minutes solution was filtered through Whatmann No.1 filter paper. The residue was washed with 10ml methanol three times and make up volume with methanol. From this solution take 1ml and dilute up to 50ml with methanol. Again, take 1ml and dilute up to 10ml with methanol.
- The absorbance of sample solution and standard solutions were recorded at 540.0nm against blank. (R Matias et.al 2014).

Calculation

Calculate the Vitamin B9 from the calibration curve of Folic acid

8. Procedure for testing of calcium in sample

- The 1-2gm sample was taken in conical flask and add 50ml of water.
- Add 2-3 drops of sodium hydroxide 1N solution and to raise the pH 12 -13.
- Add a pinch of Patton & Reeder indicator and stir well titrated against the solution with 0.01M EDTA.
- The end point is appearance of blue colour. (AOAC Calcium method)

Calculation

$$\text{Calcium (Ca), mg/l} = \frac{A \times B \times 1000}{C}$$

Where,

A = Volume in ml of EDTA solution used for titration,

B =Mass in mg of calcium equivalent to 1ml of EDTA solution, and

C =Volume in ml of the sample taken for the test.

Shelf life study

1. Determination of the pH

Instrument Calibration:

- Calibrate the pH meter with the buffer solutions of the required pH
- If the pH meter value and the pH of the buffer solution did not match each other, adjust the pH meter to show the value matching with that of the buffer.

pH Measurements:

- Remove, clean and dry the electrode after calibration.

- Take sample, 1% solution in a beaker and measure the pH directly with the pH meter.
- After measurement remove, clean and dry the electrode, and deep it in storage solution. (FSSAI/BIS)

2. Total Fungal count

The total fungal count of the developed product was analysed by Standard operating procedure for Total fungal count (yeast and Mould count) by Colony Count Technique at 25°C. The shelf-life was assessed for 7th and 10th day to check for the growth of any fungus on the developed product. The colonies of the fungus were counted with a colony counter. (IS 5403: 2012 method)

3. Total Plate Count

The total plate count of the developed product was carried out by Standard operating procedure for Enumeration of Micro-organisms Colony Count Technique at 30°C (TPC). The shelf-life was assessed for 7th and 10th day to check for the growth of any micro-organism (mold, yeast, bacteria) on the developed product. The colonies of microbial growth were counted with a colony counter. (IS 5402: 2012 method)

RESULTS AND DISCUSSION

1. Sensory Evaluation

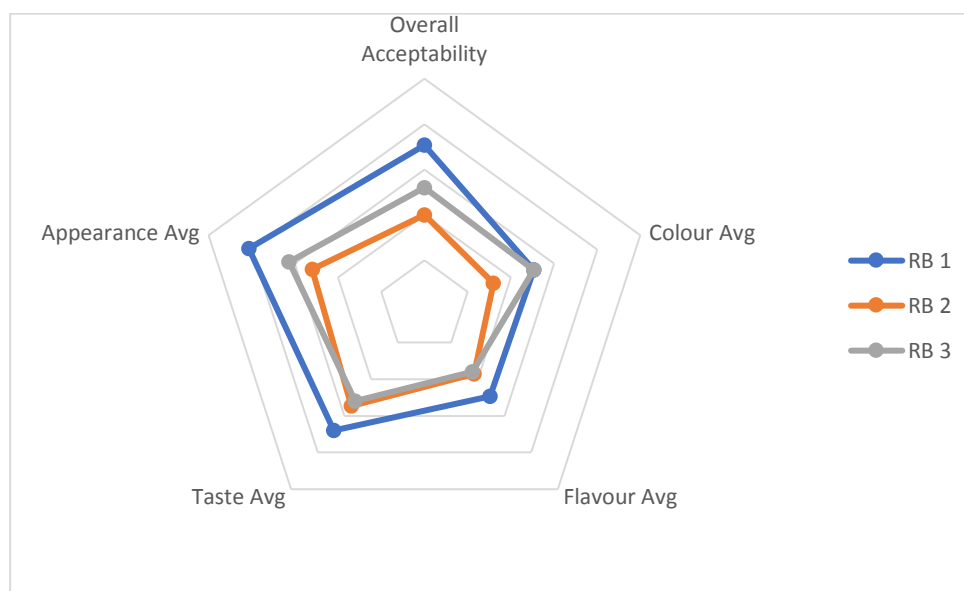


Figure 6: Chart showing the average score of multiple formulations rated over multiple parameters to arrive at the most palatable and popular version

Sensory evaluation was conducted by a semi-trained professional panel of 30 members over parameters like colour, flavour taste, texture and overall acceptability was arrived at for multiple variations. The variations were graded on a hedonic scale and the average readings were used to arrive at the most palatable and popular formulation. Different parameters were rated differently by panel members and an average score of the parameters rated was used to arrive at the most popular and the most palatable version among the formulations (T. L Harry 2010). The results are as displayed in Figure 6.

The average score for colour for formulation 1(RB1) and 3(RB3) were 7.26 followed by formulation 2(RB 2) with an average score of 6.8. The flavour of RB 1 was rated among the highest with an average rating of 7.23 followed by 6.93 for RB 2 followed by 6.90 of RB 3. Taste for RB 1 was the highest rated formulation with an average rating of 7.7 followed by 7.36 and 7.33 for RB 2 and 3 respectively. The texture of RB 1 was found to be most favoured with an average rating of 8.03 followed by 7.3 and 7.56 for RB 2 and 3 respectively. Formulation 1 with 100% ragi flour was found to be the most popular and palatable option among the developed products.

2. Nutritional Analysis

The nutrient analysis of the developed product was made and the per 100g analysis made for carbohydrates, energy, protein, fat, calcium, iron and folic acid.

The results of the nutrient analysis are shown in Table 4. The results of the nutrient analysis were 64.2g of total carbohydrates, 406 of energy, 5.1 g of protein, 11.1g of fat, 4.6 g of fibre, 196 mg of calcium, 5.1mg of iron and 38.1 µg of folic acid. To address the EAR of the selected subjects a quantity of 70g have to be consumed per day to ensure supplementation to the selected subjects to address the EAR. Therefore 75g of Ragi Brownie will be supplemented daily to the subjects with calcium deficiency for 5 days a week. The supplementation period will be for 90days.

Table 4: Nutrient Analysis

Product	Total Carbohydrate (g)	Energy (Kcal)	Protein (g)	Fat (g)	Fibre (g)	Calcium (mg)	Iron (mg)	Folic Acid (µg)
Ragi Brownie	64.2	406	5.1	11.1	4.6	196	5.1	38.1

3. Shelf-life Analysis

Shelf-life analysis of the processed product was made to analyse the shelf life of the product. The observed results were for 7th day and 10th day respectively. The pH of the product was 6.5 and 6.8 on 7th and 10th day respectively. Total fungal count was <10 cfu/g and 1x10² cfu/g for 7th and 10th day respectively. The bacterial count was observed to be 230cfu/g and 48x10²cfu/g on 7th and 10th day respectively (Table 6). The result of both total fungal count and total bacterial count shows that the colony count was within the acceptable limit for 7th day and the colony count went beyond the acceptable limit within 10th day. Therefore, the product will have a shelf life or rather we can say the developed product, Ragi Brownie, need to be consumed within 10 days of manufacturing (M.C Nicoli2012). Figure 7 represents the results of Total Plate Count of Ragi Brownie for 7th and 10th day respectively. Figure 8 represents the results of Total Fungal Count of Ragi Brownie for 7th and 10th day respectively.



Figure 7: Total Plate Count analysis using Colony count Technique for 7th day and 10th day

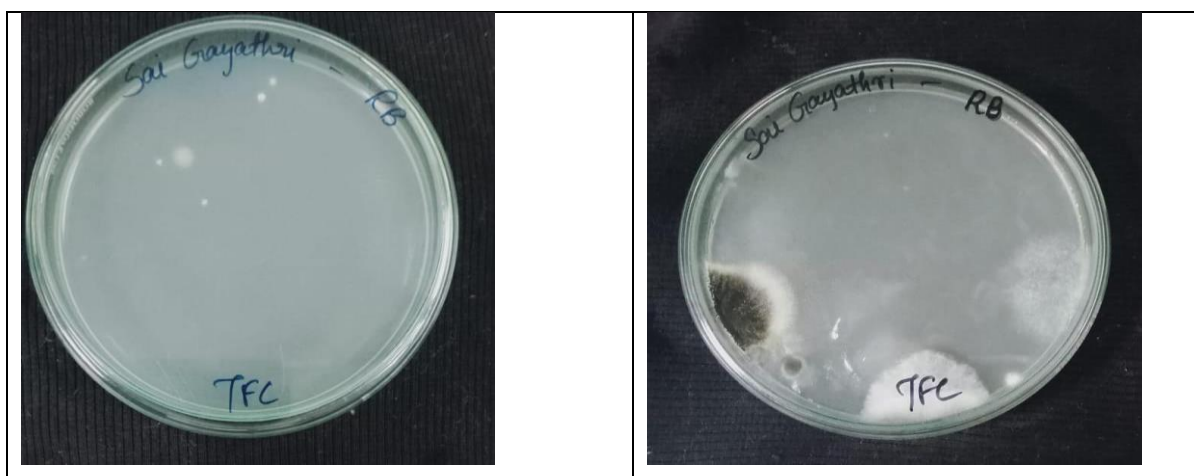


Figure 8: Total Fungal Count analysis using Colony count Technique for 7th day and 10th day

Table 6: Shelf life Analysis

Shelf life study	7 th day	10 th day
pH	6.5	6.8
Total Fungal Count	Less than 10cfu/g	1x10 ² cfu*/g
Total Bacterial Count	230cfu/g	48X10 ² cfu/g

*cfu-colony forming unit

4. Costing

The formulation 1 was arrived at using 100% Ragi flour. The cost required for developing 100g of the product is given in Table 5.

Table 5: Cost Calculation

Proportion of Ragi Flour	Amount	Cost (in Rupees)
Ragi Flour(g)	50	3.5
Jaggery(g)	40	2.8
Sesame seeds(g)	20	4
Curd(ml)	50	3.5
Oil(ml)	5	0.75
Cocoa powder(g)	1	1.5
Baking powder(g)	1	0.3

The cost calculation of 100g of Ragi Brownie made with 100% ragi flour is 16.35 rupees. Therefore, the cost of 75g of Ragi Brownie which will be used for supplementation is 12.26 rupees.

CONCLUSION

The study was a fruitful attempt at arriving at a product suitable for the intervention of calcium deficiency. Ragi Brownie was prepared to meet one-third of the estimated average requirement of sedentary young adult women. The Ragi Brownie was developed in three formulations and formulation 1(i.e.) RB 1 which contains 100 % ragi flour was accepted by the sensory panel. The Ragi Brownie was analyzed for various nutrient content and it has an appreciable amount of calcium (i.e.) 196mg to meet one-third nutritional requirement of young adult women. The shelf-life analysis was carried out for a period out 7th and 10th day and the results show that Ragi Brownie should be consumed within 10 days from manufacturing. The subjects with calcium deficiency will be supplemented with 75g of Ragi Brownie per day for 5 days a week. The cost of 75g of Ragi brownie is 12.26 rupees. The ingredients used for the preparation of Ragi Brownie can be easily procured from the local market. The consumption of the Ragi Brownie regularly will bring the micronutrient deficiencies of calcium under control.

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STUDY ON LIFESTYLE AND DIETARY HABITS OF ADOLESCENT GIRLS DURING MENSTRUATION

SHRADDHA MISHRA¹, KALPANA GUPTA², SANGEETA GEHLOT³

¹ Research Scholar, Department of Kriya Sharir, Faculty of Ayurveda, IMS, BHU, Varanasi, Uttar Pradesh

² Professor and Head, Department of Home Science MMV, BHU, Varanasi, Uttar Pradesh

³ Professors, Department of Kriya Sharir, Faculty of Ayurveda, IMS, BHU
Varanasi, Uttar Pradesh 221005

HSAI Membership No.- HSAI-2022-UP-1041-LF

Email Id:ashraddhamishra32@gmail.com

ABSTRACT

The onset of menarche or the beginning of menstruation for girls is the first sign of maturity in adolescence (10 to 19 years). There are multiple traditional and social beliefs in India, which act as a blockage to awareness about hygiene maintenance among adolescent girls, majority of Indian girls are even not aware of menstruation before menarche. This study is a small attempt to know early adolescent girls' lifestyle and dietary patterns regarding their reproductive health. This is a cross-sectional study conducted on 100 adolescent girls aged 12 to 15 years in a rural area of the Varanasi district of Uttar Pradesh. A self-administered pretested questionnaire was used to collect the data. The questionnaire is comprised of three sections related to general information, menstrual hygiene, management, and dietary habits of adolescent girls. The mean age of menarche is 12.8 years, and 66% of respondents have regular menses at intervals of 28 days. 90% of respondents use sanitary pads but 41% of girls use them for 8 or more 8 hours and 10% of respondents use cloth as an absorbent during menstruation. 62% of respondents suffer from abdominal pain, 45% take medicine to relieve abdominal pain, and 43% feel irritated. 81% of respondents eat an iron-rich diet, 17% eat fruits daily, and 42% drink 1.5-liter water a day. Most girls face menstruation-related health problems and nearly half of the girls use absorbents for a longer duration which is harmful to their reproductive health so there is a need for awareness about proper hygiene, and maintenance, and strategies should be planned to create awareness about the role of diet in menstrual health among adolescent girls which will further develop healthy habits related to their reproductive health.

Keywords: Adolescent, Menstruation, Health, Hygiene, Dietary Habits.

INTRODUCTION

The term adolescence comes from the Latin word 'adolescere' meaning 'to grow' or 'to grow to maturity'. The term adolescence includes mental, emotional, and social maturity as well as physical maturity. (Developmental Psychology; 2017) Adolescence begins when children become sexually mature or from puberty and ends when they reach the age of legal maturity. According to WHO the age of adolescents is from 10 to 19 years of age group.

Several physical and emotional changes take place during adolescence. The first real indication that a girl's reproductive mechanism is becoming mature is 'menarche' or the first menstrual flow. This is the beginning of a series of periodic discharges of blood, mucus, and broken-down cell tissues from the

uterus that will occur approximately every twenty-eight days until the girl reaches menopause, in the late forties or early fifties. (Human Physiology: An Insight; 2010)

In India menstruation is still considered something unclean or dirty, even though it is a natural process. (Dasgupta A and Sarkar M; 2008). Various studies reveal that most girls (approximately seventy-one percent) in India lack awareness about menstruation before menarche. (Menstrual Health Landscape of India; 2016) and, several social and traditional beliefs related to menstruation prohibit or act as a blockage for adolescents to get the right information regarding hygiene management during menstruation. More than 50 percent of rural women use an unhygienic method for menstrual management, while in urban areas nearly 80 percent of women are using hygienic practices. (National Family Health Survey-4; 2015)

Therefore, this study is executed to explore the problems and hygiene practices of rural adolescent girls during menstruation falling in the age group of 12 to 15 years, because it is an initial age of menstruation in which the girls generally lack awareness about the actual changes occurring in their body. Some factors are related to lifestyle like physical activities (Kulshrestha S and Durrani A.M.; 2019), eating habits, and hormonal imbalance, which can cause menstrual problems or reproductive health-related problems. Adolescent girls perceived their diets in the light of appearance and body shape, so a deviation occurs in their eating habits (Dietetics; 2018). Sometimes, it becomes severe and takes the form of eating disorders that affect their menstrual health. One of the most dominating factors in menstrual health is nutritional status and dietary habits. Different studies show that dietary changes are the most significant cause of decreased menarcheal age in the last fifty years. (Beatrice O. M. et al 2014), (Krieger N. et al. 2015). So, in this study, the dietary habits of adolescent girls are also surveyed.

Role of Diet in Adolescent Menstrual Health

Girls need to ensure adequate intake of iron as they lose 0.5mg /day by way of menstruation. The daily menstrual loss of iron is computed from the iron content of blood lost during the menstrual period averaged over a month. If this lost iron is not replaced, it predisposes to iron deficiency anemia. Girls would require an additional 8 micrograms/kg to compensate for menstrual blood loss. Alpha linoleic acid helps in relaxing muscles and blood vessels of the uterus and reduces abdominal pain before, during, and after the menstrual period. Iron is needed for hemoglobin synthesis necessitated by the considerable expansion of blood volume. During adolescence, 800 mg of calcium and 800 mg of phosphorus per day are needed as bone growth demands calcium. So about 150 mg of calcium must be retained every day to allow for increased bone mass. Adolescents with less bone mineral density are susceptible to osteoporosis later in life. The need for thiamine, riboflavin, and niacin increases directly with increased caloric intake. Premenstrual tension can be reduced if adolescent girls consume 1000mg/day of vitamin B6. Folic acid and vitamin B12 are essential for DNA synthesis in rapid tissue synthesis during adolescence. Physical activity is also a major factor that can prevent premenstrual dysphoric disorder (PMDD) in adolescent girls. (Dietetics; 2018).

As literature proved that the menstrual habits of the female are the key to their overall reproductive health. After reviewing the, it is found that in the area of menstrual health of adolescent girls, no objective parameter has been done especially in the rural area of Varanasi district. So, the author has tried to find out the menstrual hygiene practices (which are quoted as the lifestyle in this research paper) performed by rural girls during their early menstrual years when they are not much aware of the phenomenon of the menstrual cycle.

OBJECTIVE OF THE STUDY

- ❖ To study the menstrual hygiene maintenance practices among adolescent girls.
- ❖ To study the problems faced by adolescent girls during the menstrual cycle.
- ❖ To study the dietary habits of adolescent girls.

MATERIAL AND METHODS

Study Design and Participants: This was a cross-sectional study conducted on 100 adolescent girls between the ages of 12 to 15 years after getting permission from the College Administration.

Study Area: The data was collected from a rural area of the Varanasi district of Uttar Pradesh. Two colleges name G M V Intermediate College Gangapur and S K D Inter College Mangari Varanasi were randomly selected for data collection.

Study Period: The data for the study was conducted from February to March 2019.

Sampling Technique: Simple random sampling method has been used for the collection of the data from adolescent girls in the rural area of Varanasi.

Data Collection: A self-administered pretested questionnaire was used to collect the data. The questionnaire is comprised of three parts, the first part contains questions that are related to general information about the subjects. The second part of the questionnaire comprises 14 questions related to information on the menstrual onset, hygiene maintenance of subjects during menstruation, and problems that occur during menstruation. The third part of the questionnaire contains 11 questions related to dietary habits and subjects' awareness about their diet and physical activities during menstruation.

Selection Criteria: The girls residing in Varanasi, falling in the age group of 12 to 15 years, willing to participate were included in the study. Those who were not following the inclusion criteria were excluded from the study.

RESULT

Among the 100 adolescent girls, the mean age of onset of menarche was 12 years 8 months and 66% of respondents have regular menses at an interval of 28 days and around 34% of adolescent girls have irregular menses.

Hygiene Practices or lifestyle of Adolescent girls: 90% of respondents used sanitary pads and 10% of respondents used cloth as an absorbent during menstruation. 40% of respondents were changing their sanitary pads within 5 hours, 28% of respondents were changing within 8 hours, 19% of respondents were changing within 3 hours and 13% of respondents were changing their pads after 8 hours. 69% of respondents were washing their undergarments in Dettol, 18% of respondents were drying their undergarments in sun, 8% of respondents used to wash their undergarments in warm water and 5% of respondents were ironing their undergarments after washing them. 40% of respondents changed their sanitary pads within 5 hours, 28% changed in 8 hours, 19% changed within 3 hours, and 13% changed after 8 hours. (Table 1)

Problems faced by respondents during menstruation: 62% of respondents suffered from abdominal pain, 19% of respondents faced weakness, 17% of respondents had no complications or very few

symptoms, 1% of respondents had swelling in the leg, and 1% of respondents had the problem of vomiting during menstruation. 43% of respondents felt irritated, 28% had no emotional changes, 17% felt stressed, 11% felt anxiety, and 1% felt stress and irritation. (Table 2) 45% of respondents take medicine to get relief from abdominal pain, 30% of respondents consumed hot beverages, 16% of respondents performed the exercise to get relief, and 9% of respondents used warm water to cure their abdominal pain. (Table 3)

Dietary Habits of Adolescent Girls: 81% of respondents were eating an iron-rich diet but 19% of respondents did not eat iron-rich foods. (Table 4) 37% of respondents were eating fruits twice or thrice a week, 32% of respondents were eating fruits occasionally, 17% of respondents were eating fruits daily and 14% of respondents eat fruits once a week. 62% of respondents drink milk daily one time, 17% of respondents drink milk twice a day, 14% of respondents drink milk twice or thrice a week and 7% of respondents do not drink milk. (Table 5) Regarding water, 42% of respondents drink 1.5-liter water in a day, 23% of respondents drink 2 liters of water in a day, 21% of respondents drink 3 liters of water in a day and 14% of respondents drink 2.5 liters of water in a day. 83% of respondents eat a fiber-rich diet daily and 17% of respondents do not eat a fiber-rich diet daily.

Through the tables of dietary habits of adolescent girls, it can be said that maximum girls have poor dietary habits like not consuming fruits daily, and less intake of water can lead to gastric complications like abdominal pain and vomiting during menstruation among them which has been shown in table 2 and 3.

Table 1: Respondents according to their lifestyle or hygiene practices during menstruation.

Hygiene Practices		Frequency (%)
Absorbent used	Cloth	10
	Sanitary pads	90
Duration of absorbent used	3 hours	19
	5 hours	40
	8 hours	28
	>8 hours	13
Method of sterilizing clothes	Drying in sun	18
	Washing in Dettol	69
	Washing in warm water	8
	Ironing after washing	5

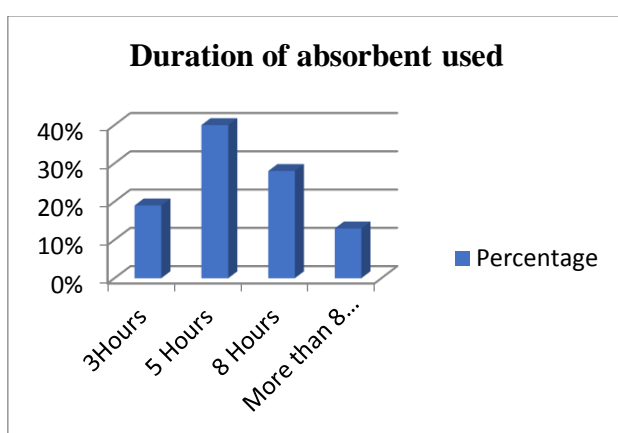
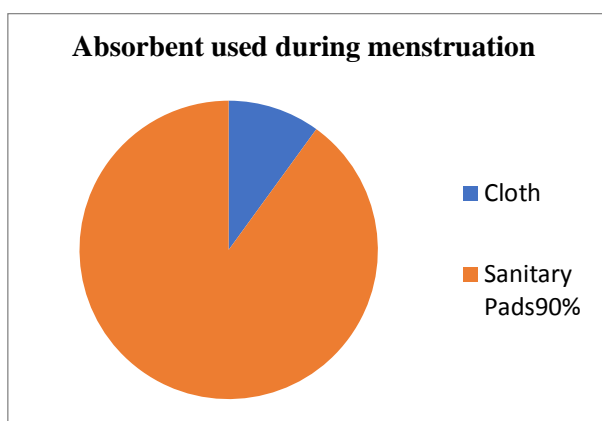


Table 2: Problems faced by respondents during menstruation.

Problems faced by respondents during menses		Frequency
Physical problem	Abdominal pain (Dysmenorrhea)	62
	Weakness	19
	Swelling in legs	1
	Vomiting	1
	No complications	17
Emotional problem	Irritation	43
	Anxiety	11
	Stress	17
	Stress and Irritation	1
	No changes	28

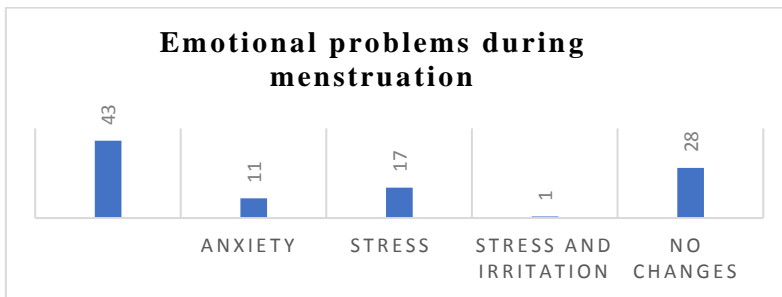
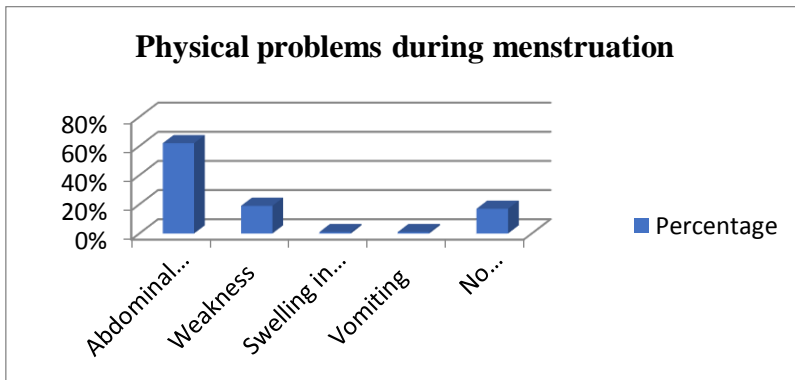


Table 3: Methods used by respondents to get relief from abdominal pain.

Method	Frequency (%)
Use of medicine	45
Consumption of hot beverages	30
Exercise	16
Cure stomach pain with warm water	9

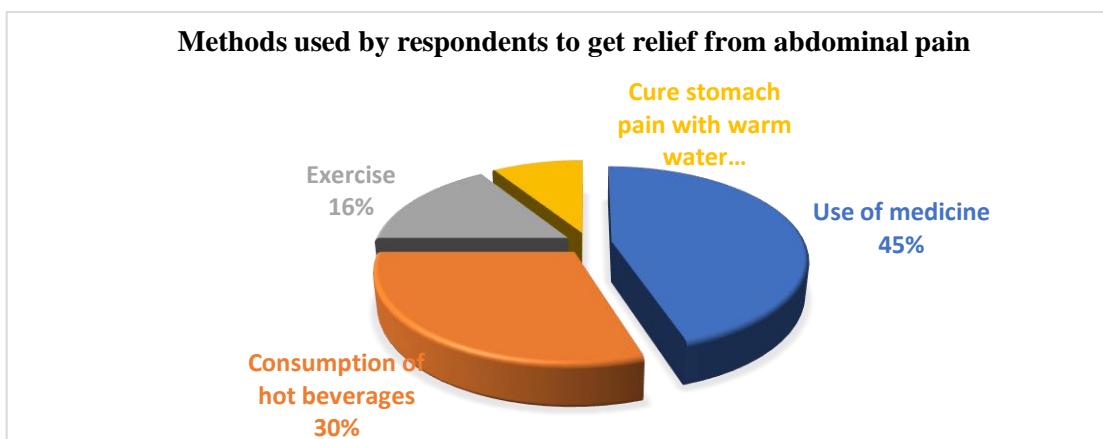


Table 4: Frequency of consumption of iron-rich foods by respondent

Iron-rich foods		Frequency (%)
Green leafy vegetables and green vegetables	Daily	42
	Twice a week	28
	Once a week	11
	No consumption	19
Jaggery, dates, and dry fruits	Daily	39
	Twice a week	18
	Once a week	24
	No consumption	19
Egg, meat-fish	Daily	5
	Twice a week	9
	Once a week	33
	No consumption	53

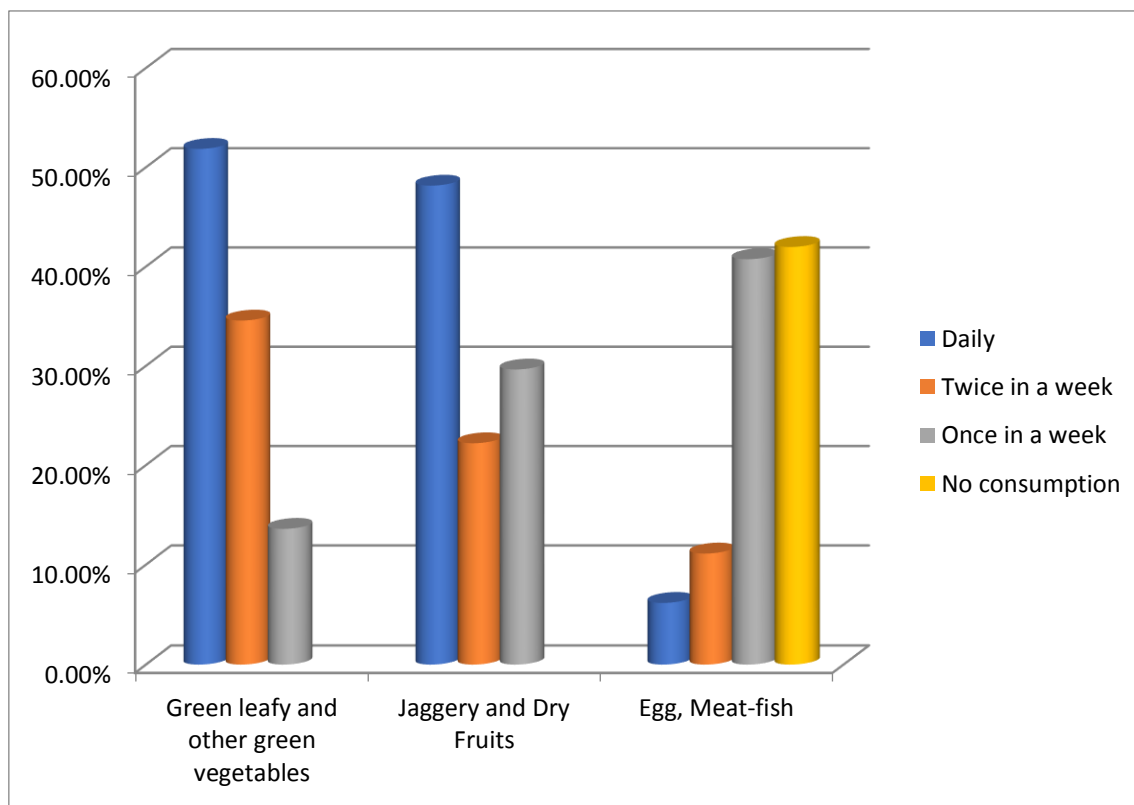
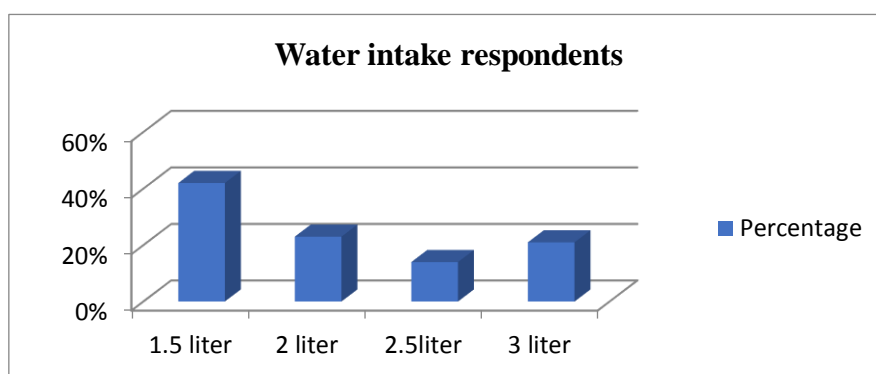


Table 5: Dietary habits of respondents

Foods	Frequency (%)	
Fruit consumption	Daily	17
	Twice – thrice a week	37
	Once a week	14

Milk consumption	Occasionally	32
	Once a day	62
	Twice a day	17
	2-3 times a week	14
	No consumption	7
Water intake (daily)	1.5 liter	42
	2 liters	23
	2.5 liter	14
	3 liters	21



DISCUSSION

In the present study, the mean age of menarche of adolescent girls is 12.8 years, Rama Ravi and others have studied the prevalence of menstrual problems among adolescent school girls in rural Tamil Nadu and found that the mean age of menarche was 12.4 years (R Ravi et al.; 2016) and 87.7% of the girls suffered from menstrual problems, similarly in the present study 83% adolescent girls face menstrual problems. In this study, the prevalence of dysmenorrhea is 62% and in a study of Aligarh, 46.3% of the girls experienced dysmenorrhea. (Kulshrestha S., M Anisa 2019)

(Table 2) Anitha S. and Sinu E. (2015) studied menstrual Knowledge and Coping Strategies of Early Adolescent Girls and found that the majority (72%) used a pad, 6% cloth as an absorbent, and 6.4% used both, similarly in most girls (90%) used a sanitary napkin as an absorbent and rest of them used cloth as an absorbent and 41% of girls use napkins for 8 hours or more than 8 hours. (Table 1) In that study, more than one-third (39%) of them would not do anything during menstruation. Another one-third (31%) revealed that they would stay in bed. Few would resort to home remedies (16%) and self-medications (7%). But in the present study, there is a very high variation in the use of medicine to cure abdominal pain, 45% of girls take painkillers.

In the present study, the problem of irregular menstruation is 34%. Similarly, in a study of Garhwal District, irregular menstruation (28.72%) was observed as a common problem among adolescent girls, and menstrual irregularities were directly related to eating habits and the level of physical activities.

(Negi P. et al; 2018), 41.3% of girls have irregular menstrual cycles, according to a study done in Coimbra, Portugal, by Marques, P. et al 2022. The prevalence of irregular menstruation is higher in Portugal. The major cause can be identified as the changes in lifestyle and dietary habits of the study subjects.

Shalini K. Kanotra and others have studied menstrual patterns and problems among rural adolescent girls. The most prevalent menstrual symptoms were mental irritability (47.9%) (Abhay B.M.; 2010) and in the present study, the most prevalent problem is abdominal pain (62%) followed by irritation (43%). (Table 2)

CONCLUSION

Through the analysis of the data, it can be concluded that half of the girls are not following the hygiene maintenance practice and use the absorbent for a longer duration. More than half of the girls face abdominal pain during menstruation, nearly half of the girls take a painkiller to get relief from abdominal pain during menstruation, and more than half of the respondents are aware of the harmful effect of medicine, but still, they take medicines to get relief from cramps. Approximately half of the girls feel irritation and different emotional changes during menstruation. Nutrition and dietary habit play a dominating role in the menstrual health of adolescents, the emotional changes during menstruation can be overcome by physical activities and dietary modifications. There is a need for awareness regarding hygiene maintenance and the misconception spread about the menstrual cycle in society that it is a natural process that is itself a symbol of the health of reproductive-aged women, and there is a need for awareness regarding the role of diet in several reproductive health benefits of women.

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CORRELATION OF ANTHROPOMETRIC INDICES WITH BLOOD PROFILE OF SCHOOL GOING OBESE ADOLESCENTS

Dr. Sikandra Devi¹ and Ms. Priti Dhankhar²

¹Assistant Professor, Govt. College for girls, sector-14, Gurugram, India*

²Assistant Professor, DAV Girls College, Kosli, Haryana, India

¹sikandra.shanwal@yahoo.co.in, ²prishambhavi12@gmail.com

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ABSTRACT

Obesity results from a chronic imbalance between energy intake and energy expenditure for metabolic purposes and physical activity and tends to increase with advancing age. Childhood obesity has become a serious public health problem in many countries. The incidence of childhood obesity among school going children is on the rise. Diseases normally seen in adults because of obesity are now being seen with increasing frequency in children. About 50% of obese children will become obese adults. The prevalence of hypertension, dyslipidemia, high cholesterol level, type 2 diabetes and non-alcoholic fatty liver disease in children is also increasing parallelly. In the present study data regarding BMI categories revealed that majority of obese respondents from Hisar and Gurgaon city were in Obese Grade-I category. Values of all the blood parameters analyzed were within normal range in both obese as well as non-obese group respondents however values of blood parameters of obese respondents were on slightly upper side. Prevention of childhood obesity is vital in order to live a healthy lifestyle. A healthy diet and an active lifestyle should be followed by adolescents to get rid of several lifestyle-based health issues.

Keywords: Childhood obesity, cholesterol, energy intake, healthy lifestyle.

INTRODUCTION

Overweight and obesity are among the most prevalent nutritional problems in the developed and developing countries. The increasing prevalence of obesity in children and adolescents is considered as one of the most serious public health concerns in this century (Güngör, 2014). The problem of obesity is confined not only to adults but also to children and adolescents. The prevalence of overweight and obesity among children and adolescents aged 5-19 has risen dramatically from just 4% in 1975 to just over 18% in 2016. The rise has occurred similarly among both boys and girls in 2016, 18% of girls and 19% of boys were overweight (WHO, 2020).

Obesity results from a chronic imbalance between energy intake and energy expenditure for metabolic purposes and physical activity and tends to increase with advancing age. Genetic, environmental and behavioral factors (poor appetite control, unhealthy eating habits, lack of exercise) influence the balance between energy intake and output. Overweight in children/adolescents is caused by lack of physical activity, unhealthy eating patterns, or a combination of both with genetics and lifestyle playing important roles in determining a child's

weight. The incidence of childhood obesity among school going children is on the rise. Diseases normally seen in adults because of obesity are now being seen with increasing frequency in children, particularly type 2 diabetes. It is notable that overweight children and adolescents have a higher likelihood of becoming obese adults and to present health-related problems early in life including diabetes, cardiovascular disease (CVD) and dyslipidemias (Lissau *et al.* 2004). Overweight during childhood predicts adult obesity, which is associated in turn with several chronic diseases, including coronary heart disease, hypertension, abdominal hernia and psychological stress (Hanley *et al.*, 2000).

Hence, this study aimed to verify the relationship between the hematologic profiles with obesity in school going adolescents.

OBJECTIVES

1. To assess nutritional status of obese children.
2. To study correlation of anthropometric measurements with blood profile of obese adolescents.

HYPOTHESES

The data was collected to test the following hypotheses

Ho: There is no relationship between anthropometric measurements with blood profile of obese adolescents.

H_A: There is a positive relationship between anthropometric measurements with blood profile of obese adolescents.

MATERIALS AND METHODS

The present study was conducted purposively on school going children in Hisar and Gurgaon city of Haryana State. The study was conducted on school children. For the selection of respondents, Govt. and Private schools from different areas of the Hisar (n=17) and Gurgaon (n=14) city were selected. In these schools, the children in the age group of 9-15 years representing different socio-economic status were approached for baseline survey. A total of 400 obese children were selected randomly (200 each from both cities). Hundred healthy school going children having no history of obesity and matching the same age as those of obese children were taken as non-obese (50 each from both cities). The information on socio-economic status, food consumption pattern, food habits and physical activity of the children was gathered using self-developed questionnaire.

Biochemical assessment

Biochemical assessment was carried out to measure blood glucose and lipid profile. Ten per cent of the obese respondents not having obesity related degenerative diseases were selected and their fasting blood samples were collected and analyzed for glucose, serum triglycerides, serum cholesterol, HDL and LDL-cholesterol. Same numbers of non-obese respondents were

matched to age, sex and socio-economic status and their fasting blood samples were collected and analyzed for above mentioned parameters. Glucose concentration in blood was analyzed by glucose oxidase peroxidase method, colorimetrically using Autopak Kit supplied by Bayer Diagnostics, Gujrat, India.

Statistical analysis

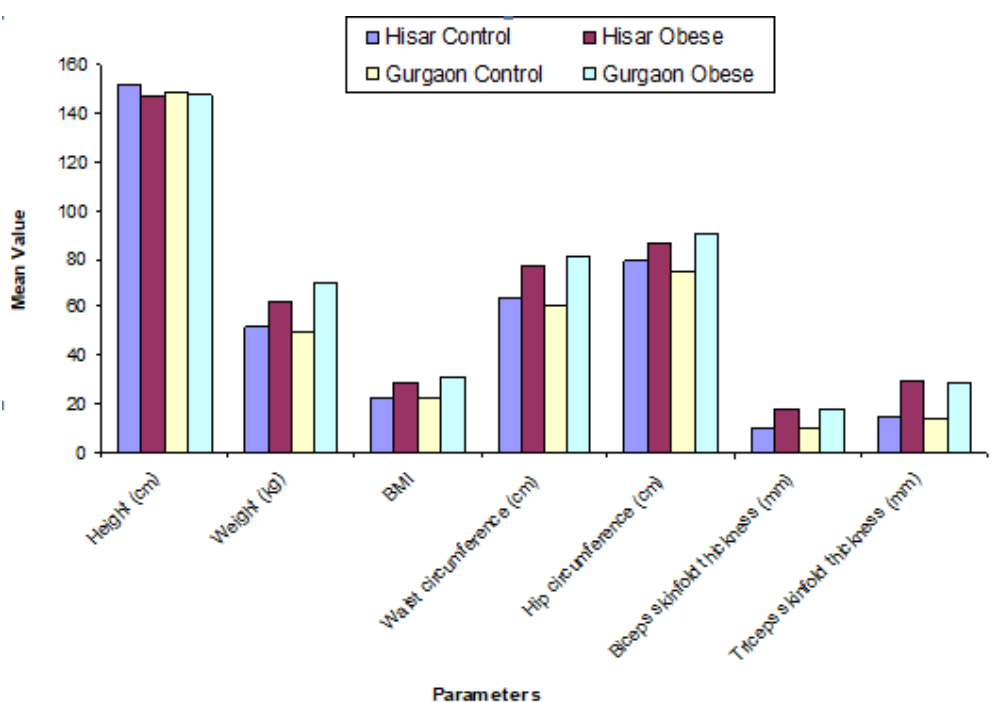
The data were analyzed statistically using percentage, mean, standard error, Duncan's multiple range tests and 'Z' test. The coefficient of correlation was computed to test the relationship between variables.

RESULTS AND DISCUSSION

Anthropometric measurements of respondents

Data regarding anthropometric measurements shown in figure 1, revealed that mean values for most of the parameters (weight, BMI, waist circumference, hip circumference, waist hip ratio, biceps and triceps skinfold thickness) for obese respondents were significantly higher than non-obese group respondents except mean value for height which was significantly higher in non-obese group respondents in both the cities. Mean values for weight and BMI of obese respondents from Gurgaon city were also significantly higher than weight and BMI of the obese respondents from Hisar city. According to Srilakshmi (2006) a person weighing 10% more than the standard weight is overweight and 20% more is obese. Nearly Overweight and obesity are now on the rise in low- and middle-income countries, particularly in urban settings and 38.2 million children under the age of 5 years were found overweight or obese (WHO,2020).

Figure 1: Anthropometric measurements of respondents

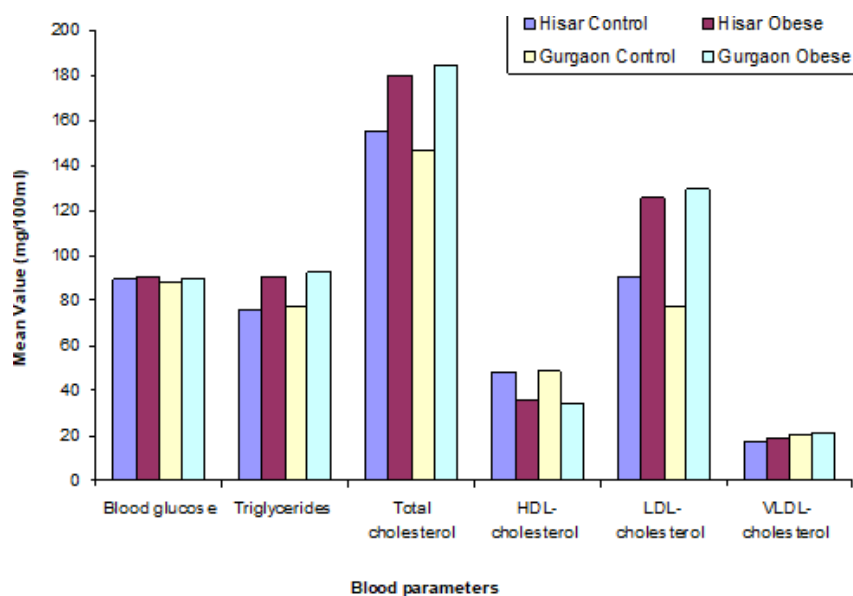


Menon *et al* (2007) conducted a study on 36 children (26 boys and 10 girls, aged 1.5 to 15 years) and 37 adults (21 men and 16 women, age 25 to 69 years) with obesity and 29 non-obese (15 children and 14 adults). They reported that all anthropometric parameters were higher in obese subjects compared to non-obese subjects. McGloinet *al.* (2002) reported that obese subjects were significantly heavier and had a greater BMI than the non-obese subjects.

Blood profile of respondents

Blood samples of respondents were analyzed for blood glucose and serum samples were analyzed for total cholesterol, HDL-cholesterol and triglycerides (Figure 2). A non-significant difference was observed in the mean values of blood glucose of obese and non-obese group respondents of both cities. Menon *et al.* (2007) observed no difference in fasting blood glucose levels of obese and non-obese children.

Figure 2: Blood profile of respondents



From the figure 2 it can be concluded that values of triglycerides, total cholesterol and LDL-cholesterol were significantly higher in obese respondents when compared to non-obese group respondents in both the cities. Mean value of HDL-cholesterol in obese respondents was significantly lower as compared to non-obese group respondents in Hisar as well as in Gurgaon city. Values of blood glucose and serum VLDL-cholesterol were similar for non-obese and obese respondents from both the cities. Similar findings were reported by Abdullah *et al.* (1999). They reported that values of blood glucose, total cholesterol and triglycerides in obese respondents were within normal range. Menon *et al.* (2007) reported that serum total cholesterol, triglycerides and LDL-cholesterol levels were significantly higher in obese children compared to non-obese. Saffari *et al.* (2012) also reported that overweight and obese male had higher systolic and diastolic blood pressure than lean controls.

Table 1: Average daily energy intake, energy expenditure and energy balance (Kcal/day) of respondents

Variables	Hisar		Gurgaon	
	Non-obese (n=50)	Obese (n=200)	Non-obese (n=50)	Obese (n=200)
Energy intake	2031.20±14.72 ^c	2752.59±43.74 ^b	2066.68±14.70 ^c	2936.55±50.90 ^a
Energy expenditure	2174.46±13.92 ^a	2113.70±15.11 ^b	2193.90±13.28 ^a	2107.78±16.18 ^b
Energy balance	143.26±3.65 ^c	638.89±7.16 ^b	127.22±3.66 ^c	828.77±6.22 ^a

n = Number of respondents

Mean with same superscript are not significantly different

From table 1 it can be concluded that average daily energy intake by obese respondents was significantly higher than that of non-obese group respondents in both the cities. Energy expenditure by obese respondents was significantly lower than that of non-obese group respondents that might have led to higher energy balance in obese respondents from Hisar and Gurgaon city. Less amount of time spent for physical activity might be a contributing factor in less energy expenditure and high energy balance by obese respondents in both the cities. Contrary to these finding, Caballero *et al.* (2003) reported that in a study of 5106 children, energy expenditure was found same between obese and non-obese subjects. However, earlier workers reported higher energy expenditure in obese subjects than that of non-obese subjects (Goran *et al.*, 1998, Delany *et al.*, 1995 and Treuthet *et al.*, 1998).

Table 2: Correlation coefficient of weight with blood parameters of respondents

Correlation	Hisar		Gurgaon	
	Non-obese (n=50)	Obese (n=200)	Non-obese (n=50)	Obese (n=200)
Blood glucose	0.28	0.17	0.21	0.09
Total cholesterol	0.02	0.39*	0.15	0.31*
S. triglycerides	0.24	0.07	0.17	0.04
Serum HDL-cholesterol	0.19	-0.31	0.15	-0.54*

Serum cholesterol	LDL-	0.16	0.30*	0.08	0.51*
Serum cholesterol	VLDL-	0.15	0.12	0.11	0.05

n = Number of respondents

* Values are significant at 5% level

Correlation coefficient of weight with all blood parameters was studied and it was noticed that weight was non-significantly correlated with blood glucose of all respondents from both cities (Table 2). Weight was positively and significantly correlated with total cholesterol level of obese respondents in Hisar ($r=0.39$) as well as in Gurgaon city ($r=0.31$). A non-significant correlation was observed between weight and serum triglycerides level of all respondents. Weight was positively correlated with serum HDL-cholesterol level of non-obese group respondents of both cities whereas negatively correlated with serum HDL-cholesterol level of obese respondents from Hisar city. A significant and negative correlation was observed between weight and serum HDL-cholesterol level of obese respondents ($r=0.54$) from Gurgaon city. Weight was found to be positively and significantly correlated with serum LDL-cholesterol level of obese respondents from Hisar as well as Gurgaon city. In a study done in Lagos, an urban area of Nigeria, higher BMI was significantly associated with hypertensive range systolic and diastolic Blood Pressure (Oduwole *et al.* 2012). Whereas a non-significant correlation was observed between weight and serum-LDL-cholesterol level of non-obese group respondents from both cities. A non-significant correlation was also observed between weight and serum VLDL- cholesterol level of all respondents. Hence, it can be concluded that weight was significantly and positively correlated with total cholesterol and serum LDL-cholesterol level of obese respondents whereas negatively and significantly correlated with serum HDL- level cholesterol of obese respondents. Gong *et al.* (2013) revealed that overweight and obese adolescents have an increased incidence of high blood lipid levels. Change *et al.*, (2015) reported that compared with the lean control subjects, the obese subjects had obvious insulin resistance, abnormal lipid profiles, and low-grade inflammation. The overweight subjects only exhibited significant insulin resistance and low-grade inflammation. Sachdev *et al.* (2005) reported positive correlation of weight with all the risk factors except HDL-cholesterol, for which the correlation was negative.

Table 3: Correlation coefficient of caloric intake with blood glucose and of fat intake with serum total cholesterol, HDL-cholesterol, LDL-cholesterol, VLDL cholesterol and triglycerides among obese and non-obese respondents

Correlation	Hisar		Gurgaon	
	Non-obese (n=50)	Obese (n=200)	Non-obese (n=50)	Obese (n=200)
Caloric intake and blood glucose	0.14	0.26	0.19	0.20
Fat intake and total cholesterol	0.25	0.47*	0.17	0.33*

Fat intake and HDL-cholesterol	0.34	-0.52*	0.29	-0.68*
Fat intake and LDL-cholesterol	0.11	0.58*	0.13	0.59*
Fat intake and VLDL-cholesterol	0.12	0.29	0.15	0.23
Fat intake and Triglyceride	0.18	0.37*	0.19	0.38*

n = Number of respondents

* Values are significant at 5% level

A positive correlation was found between calorie intake and blood glucose level of obese and non-obese group respondents in both cities (Table 3). Similarly, positive correlation was found between fat intake and total cholesterol level of non-obese group respondents from both cities but a positive and significant correlation was observed between fat intake and total cholesterol level of obese respondents in Hisar as well as in Gurgaon city. Fat intake was also noticed to be positively correlated with HDL-cholesterol level of non-obese group respondents from both cities whereas a negative and significant ($P < 0.05$) correlation was found between fat intake and HDL-cholesterol of obese respondents from Hisar and Gurgaon city. Though a positive correlation was found between fat intake and LDL-cholesterol level of non-obese group respondents but a positive and significant ($P < 0.05$) correlation was observed between fat intake and LDL-cholesterol level of obese respondents in Hisar as well as in Gurgaon city. Data in Table 3 further shows the positive correlation between fat intake and VLDL-cholesterol level of all respondents (non-obese and obese) from Hisar and Gurgaon city. A positive correlation was noticed between fat intake and triglycerides level of non-obese group respondents but this correlation was found positive and significant ($P < 0.05$) in case of obese respondents from Hisar as well as Gurgaon city. Similarly, high cholesterol level was seen in studies done among school going children by Shahid *et al.*, (2017) and Das *et al.*, (2017) and reported hypertension was 7.5 and 19.7% of the study population, respectively.

Table 4: Correlation coefficient of BMI with energy intake, energy expenditure, energy balance and fat intake

Correlation	Hisar		Gurgaon	
	Non-obese (n=50)	Obese (n=200)	Non-obese (n=50)	Obese (n=200)
Energy intake	0.16	0.06	0.08	0.08
Fat intake	0.11	0.25*	0.15	0.27*
Energy expenditure	0.15	0.07	0.08	0.09

n = Number of respondents

* Values are significant at 5% level

Data in Table 4 showed that body mass index was positively correlated with energy intake and energy expenditure of all respondents from Hisar as well as Gurgaon city, but the correlation was non-significant. In comparison to this, body mass index was found to be positively and significantly ($P < 0.05$) correlated with fat intake by obese respondents from Hisar city ($r=0.25$) and Gurgaon city ($r=0.27$). A non-significant correlation was found between BMI and fat intake of non-obese group respondents in both cities. This is clear from the table that BMI was significantly and positively affected by fat intake of obese respondents. In Bhopal, among the children aged 14-17 years, a highly significant association ($P < 0.01$) of sex, BMI status of the respondents, sedentary lifestyle, reduced physical activity and higher intake of junk foods was reported (Patnaik *et al.*, 2015). Valiyaparambilet *al.*, (2021) reported that there is a high significant association $p < 0.001$ of BMI and blood pressure was seen. There is a significantly positive correlation analyses revealed a strong positive relationship between hypertension and obesity in children of private schools ($r=0.61$), which indicates that as obesity increases, hypertension in children increases.

CONCLUSION

Anthropometric measurements of the respondents from both the cities showed significant differences in all the parameters of non-obese and obese respondents except that a non-significant difference was observed in height of non-obese group respondents from Gurgaon city. Various studies have shown that hypertension and obesity-related metabolic disorders are increasingly prevalent among overweight and obese children. It was found that among the obese respondents, weight and BMI of respondents from Gurgaon city was significantly higher as compared to respondents from Hisar city. BMI categories revealed that majority of obese respondents from Hisar and Gurgaon city were in Obese Grade-I category. Percentage of obese respondents in Obese Grade- I and II categories was higher in Gurgaon city than that of Hisar city.

Data regarding blood profile of respondents revealed that values of triglycerides, total cholesterol and LDL-cholesterol were significantly higher in obese respondents when compared to non-obese group respondents in both the cities. Mean value of HDL-cholesterol in obese respondents was significantly lower as compared to non-obese group respondents in Hisar as well as in Gurgaon city. Values of blood glucose and serum VLDL-cholesterol were similar for non-obese and obese respondents from both the cities. Positive correlation of weight was noticed with fat intake, total cholesterol and LDL-cholesterol. However, weight was found negatively correlated with HDL-cholesterol level of obese respondents from both the cities. Positive correlation of weight was noticed with fat intake, total cholesterol and LDL-cholesterol. However, weight was found negatively correlated with HDL-cholesterol level of obese respondents from both the cities. A relationship has been observed between anthropometric measurements and blood profile of obese adolescents hence the null hypothesis has been rejected.

Recommendations

1. Fried and junk food consumption should be minimized.
2. Children should be encouraged to participate in outside activities rather than interior activities such as watching television, playing computer games, and so on. School intervention programs are the most effective way to promote and encourage techniques of preventing overweight/obesity.

3. Nutrition education must be offered to school students, their parents, and educators in order to avoid and solve serious nutritional disorders.

Need for future research

The preliminary findings of this study suggest that more research is needed to determine the relationship between anthropometric measurements and blood profile in obese teenagers. More research should be done to better understand the role of obesity in various health problems.

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IN VITRO STUDY ON PHYTOCHEMICAL, ANTIOXIDANT, ANTIDIABETIC AND ANTICANCER EFFECT OF CHIA (*Salvia hispanica. L*): CHIA SEED, GERMINATED AND MICROGREENS

Ms. T. Sathyabharathi¹, Dr. S. Janaki Alias Priya²

¹PG scholar, ²Assistant Professor, Department of Home Science, Women's Christian College, Chennai – 600 006 India

²Email: drjanakipriya@gmail.com
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ABSTRACT

Microgreens are currently accepted as a novel functional food for their phytonutrient concentrations than mature leaves. The chia seed, germinated chia and chia microgreens samples were subjected to an ethanolic extraction assessed for phytochemical analysis and potential antioxidant activity using DPPH and FRAP assay. While the antidiabetic and anticarcinogenic activity was examined using alpha-amylase enzyme inhibition and MTT assay. The ethanol extract of germinated chia showed the presence of phytochemicals. The chia microgreens showed the presence of alkaloids, terpenoids, tannins, flavonoids, and steroids and the absence of glycosides. The quantitative analysis proved the ethanolic extract of Germinated chia contained more amounts of phenols when compared to chia seed and chia microgreens, and the flavonoid content of Chia Microgreens is higher when compared to chia seed and germinated chia. Further, GC-MS analysis revealed the presence of volatile constituents in the chia seed. Chia seed had greater radical scavenging activity when compared to germinated chia seed and chia microgreens, whereas germinated chia seed possesses greater ferric ion-reducing capacity than the chia seed and chia microgreens. Germinated chia exhibited greater α -amylase inhibition when compared to chia seed and chia microgreens. Microgreens have a higher anticarcinogenic potential when compared to chia seed and germinated chia.

Keywords: Chia-seed, Germinated-chia, Chia-microgreens, phytochemical, antioxidant, anticarcinogenic, antidiabetic.

INTRODUCTION

Diet and nutrition are most important factors in maintaining and promoting good health throughout life. For many past years of mankind, plants have been used as a source to alleviate or cure chronic illnesses such as diabetes, hypolipidemic, anti-arthritic, cardiovascular diseases, cancer, antibacterial etc. Nowadays, consumers are showing more attention and interest in gaining knowledge on the health benefits of food and looking for foods that help reduce the economic and social costs of treating non-communicable diseases. Chia (*Salvia hispanica L*) is one of the *Lamiaceae* family's annual herbaceous plants Chia seeds can be used as nutraceutical or functional foods. It has various health benefits, such as anti-carcinogenic, anti-inflammatory, anti-obesity, antioxidant, and antiradical activities. Furthermore, its consumption also reduces postprandial glucose levels and improves insulin tolerance. Chia does not have an anti-nutritional or toxic effect on human health. Germination improves the nutritional and nutraceutical value of

seeds by causing changes in the chemical composition, vitamins, and minerals availability, increasing the levels of free amino acids, dietary fibre, and other components. It reduces the incidence of cancers, heart diseases and diabetes. Germination lowers cholesterol and regulates the absorption of glucose from the digestive system (Donkor et al., 2012). Microgreens are young vegetable greens. It is a newly emerging crop that has a dense source of nutrition. It contains a greater amount of nutrients and health promoting micronutrients. The smaller amount may provide similar nutritional effects to the larger quantities of mature vegetables. The daily consumption of microgreens has nowadays increased due to higher concentrations of bioactive components than mature greens, which are essential for human health. Microgreens are speciality leafy green crops harvested shortly after the first true leaves have emerged. They are harvested just above the roots and consumed fresh as salad greens (Xiao et al., 2012).

OBJECTIVE

In vitro study on phytochemical, antioxidant, antidiabetic and anticancer effect of chia (*salvia hispanica.l*): chia seed, germinated and microgreens

MATERIALS AND METHODS

Sample growth and preparation

The chia seeds were sprayed with water and spread on sterile stackable trays for the germination process at room temperature (Pająk et al., 2019). Chia (*Salvia hispanica. L*)microgreen has been organically grown using soil enriched with vermicompost under environmental conditions. A 50g sample of chia seeds (local market, Chennai, India) was sprinkled in soil-filled plastic pots at an even depth. During the first 48 hours of germination, pots were kept in darkness in high humidity. After germination, the Containers were exposed to ambient light and watered three times daily. Microgreens are harvested at a 2-3 inches height after 7-8 days using sharp, sterile scissors to slice them on the soil surface. They were tested for defects, and unusable stems and leaves were discarded.

Preparation of extract

40 g of Chia seed sample was crushed and soaked in 100ml of ethanol for 72h. The pale-yellow supernatant liquid was filtered by the Whatman filter paper. 40g of the Germinated chia seed sample was dried at room temperature under constant observation to avoid contamination. After drying, the sample was crushed and soaked in 100ml of ethanol for 72h. The pale-yellow supernatant liquid was filtered by Whatman paper. Chia microgreens were washed with tap water 3-4 times. After washing, the 100g CM sample was taken in the conical flask and soaked in ethanol for 72h. Then the extract was filtered with the help of Whatman filter paper.

Phytochemical screening

Qualitative analysis of phytochemical

The crude ethanolic extract of chia seed (*Salvia hispanica.L*), germinated chia and chia microgreens were subjected to qualitative phytochemical analysis for the presence of various

classes of active phytoconstituents such as alkaloids, glycosides, steroids terpenoids, tannins, flavonoids and phenol.

Quantitative analysis of phytochemical

The ethanolic extract of chia seed (*Salvia hispanica.L*), germinated chia and chia microgreens were examined for quantitative phytonutrient content using specific reagents and following standard methods.

Estimation of total phenols

The Folin-Ciocalteu reagent method was used to determine the total phenolic compounds of chia seed (*Salvia hispanica.L*), germinated chia and chia microgreens with slight modifications. One hundred μL extract (1mg/mL) was mixed with 900 μL of methanol and 1 mL of Folin-Ciocalteu reagent (1:10 diluted with distilled water). After 5 min, 1 mL of Na_2CO_3 (20%) solution was added. The mixture was then allowed to stand for 30 min incubation in the dark at room temperature. The absorbance was measured by UV-VIS spectrophotometer at 765 nm. The total phenolic content was expressed in the gallic acid equivalent ($\mu\text{g}/\text{mg}$ of extract), a standard reference compound.

Estimation of total flavonoids

The total flavonoid content of chia seed (*Salvia hispanica. L*), germinated chia and chia microgreens were determined using the aluminium chloride reagent method with slight modification. Five hundred μL of the extract was mixed with 500 μL of methanol and 500 μL of 5% (w/v) sodium nitrate solution, followed by 500 μL of 10% (w/v) aluminium chloride was added and incubated for 5 min at room temperature. Then 1 ml of 1 M NaOH solution was added. The total volume was made up to 5 mL with distilled water. Absorbance was measured at 510 nm using a spectrophotometer. The result was expressed as ($\mu\text{g}/\text{mg}$ of extract) quercetin equivalent.

Gas Chromatography-Mass Spectrometry (GC-MS)

GC-MS analysis, the samples chia seed (*Salvia hispanica. L*), germinated chia and chia microgreens were injected into the HP- 5 columns (30 m X 0.25 mm i.d with 0.25 μm film thickness), Agilent technologies 6890 N JEOL GC Mate II GC-MS model. Following chromatographic conditions were used: Helium as a carrier gas, the flow rate of 1 mL/min, and the injector was operated at 200°C, and the column oven temperature was programmed as 50-250°C at a rate of 10°C/min injection mode. Following MS conditions were used: ionization voltage of 70 eV; ion source temperature of 250°C; interface temperature of 250°C; mass range of 50-600 mass units. The results were compared using the spectrum of the known components stored in the National Institute Standard and Technology (NIST) library database.

In vitro antioxidant assays

DPPH \cdot radical scavenging assay

A rapid, simple and inexpensive method to measure the antioxidant capacity of food involves the use of the free radical, 2, 2-Diphenyl-1- picrylhydrazyl (DPPH). The antioxidant activity of chia seed, germinated chia and chia microgreens extract was measured based on the

stable DPPH free radical reduction method. One mL of 0.1 mM DPPH solution in methanol was mixed with 1 ml of various concentrations (100-600 µg/mL) of extracts. The mixture was then allowed to stand for 30 min incubation in the dark. Distilled water was used as the reference standard. One mL methanol and 1 mL DPPH solution were used as the control. The decrease in absorbance was measured using UV-Vis Spectrophotometer at 517 nm. The sample concentration required to inhibit 50% of the DPPH free radical (IC₅₀) was determined. The percentage of inhibition was calculated using the following formula:

$$\% \text{ Of DPPH radical inhibition} = \frac{\text{Control-Sample}}{\text{Control}} \times 100$$

Ferric (Fe³⁺) reducing power assay

One mL of plant extract of different concentrations (50 - 300 µg/mL) was mixed with 1 mL phosphate buffer (0.2 M, pH 6.6) and 1 mL of 1 % (w/v) potassium ferricyanide [K₃Fe (CN)₆]. The mixture was then incubated at 50°C for 20 min. One mL of 10%(w/v) trichloroacetic acid was added to each mixture to that 1 mL mixture of 0.1%(w/v), FeCl₃ was added, and the absorbance was measured at 700 nm using Spectrophotometer. Distilled water was used as a standard reference. Reducing concentration (RC 50) an amount of sample required to reduce the free radicals (Fe³⁺) by 50 % parameter was calculated to interpret the FRAP results. The percentage of inhibition was calculated using the following formula:

$$\% \text{ Of Fe}^{3+} \text{ reduction} = \frac{\text{Sample-Control}}{\text{Sample}} \times 100$$

In vitro antidiabetic activity

Alpha amylase enzyme inhibition assay

Alpha - amylase enzyme inhibition assay was carried out based on the starch iodine test. The total assay mixture was composed of various concentrations of chia seed, germinated chia and chia microgreen extract. 10 µL of alpha amylase was prepared in 0.02 M sodium phosphate buffer (pH 6.9 containing 6mM sodium chloride) and was incubated at 37°C for 10 min. Then soluble starch (1%, w/v) was added to each reaction set and incubated at 37°C for 60 min. One hundred µL of 1 M HCL was added to stop the enzymatic reaction and followed by 200 µL of iodine reagent (5 mM I₂ and 5 mM KI) was added. The colour change was noted, and the absorbance was read at 595 nm. IC₅₀ value was calculated to interpret the results.

$$\% \text{ of } \alpha\text{- amylase enzyme inhibition} = \frac{\text{Sample} - \text{Control}}{\text{Sample}} \times 100$$

MTT Assay on MCF-7 breast cancer cell line

MTT assay was used to assess the rate of cell proliferation. The MCF-7 breast cancer cells obtained from NCCS (National Centre For Cell Science, Pune) were cultured in Rose-well Park Memorial Institute (RPMI) medium, supplemented with 10% fetal bovine serum, penicillin/streptomycin (250 U/mL), gentamycin (100µg/mL) and amphotericin B (1mg/mL) obtained from Sigma Chemicals, MO, USA. All cell cultures were maintained at 37°C in a humidified atmosphere of 5% CO₂. Cells were allowed to grow to confluence over 24 h before use. Cell viability was measured with the conventional MTT reduction assay, as described previously with slight modification. Briefly, breast cancer cells were seeded at a density of 5×10³ cells/well in

96-well plates for 24 h, in 200µL of RPMI with 10% FBS. Then culture supernatant was removed and RPMI containing various concentrations (5–160µg/mL) of the test compound was added and incubated for 48 hours. After treatment, the cells were incubated with MTT (10µL, 5mg/mL) at 37°C for 4 hours and then with DMSO at room temperature for 1 hour. The plates were read at 595 nm on a scanning multi-well spectrophotometer. Data represented as the mean values for three independent experiments

$$\text{Cell viability (\%)} = \frac{\text{Mean OD}}{\text{Control OD}} \times 100$$

RESULTS AND DISCUSSION

Phytochemical analysis

Qualitative analysis of phytochemicals

The ethanol extract of chia seeds showed the presence of phytochemicals such as alkaloids, terpenoids, tannins, flavonoids and phenol, and the rest of glycosides and steroids were absent. The ethanol extract of germinated chia showed the presence of alkaloids, terpenoids, tannins, flavonoids, glycosides and steroids. The chia microgreens showed the presence of alkaloids, terpenoids, tannins, flavonoids, and steroids and the absence of glycosides.

Quantitative analysis of phytochemical

Quantitative analysis was carried out to estimate the number of phytochemicals (phenols and flavonoids) present in chia seed, germinated chia and chia microgreens. The results are presented in table 1.

Table 1: Estimation of total phenols and flavonoids present in chia seed, germinated chia, and chia microgreens

S.no	Phytochemical	Quantity present			F value	P value
		Chia seed	Germinated chia	Chia microgreens		
1	Phenols (mg /g gallic acid equivalent)	257.52	809.96	267.39	453.47	2.84
2	Flavonoids (µg QE/g) QE-Quercetin Equivalent	441.3	43.10	218.96	586.2	1.32

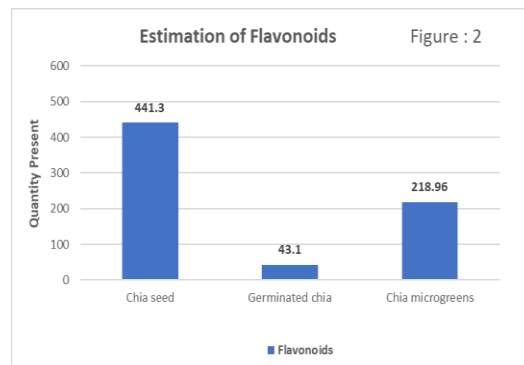
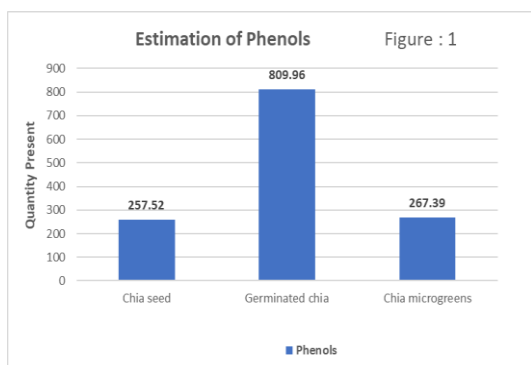


Figure 1: Phenol content of chia seed, germinated chia and chia microgreens

Figure 2: Flavonoid content of chia seed, germinated chia and chia microgreens

Phenols

From Table 1 and Figure 1, the results have shown that, 257.52, 809.96 and 267.39 mg/g gallic acid equivalent phenols are present in per gram of chia seed, germinated chia and chia microgreens, respectively. Germinated chia contained more amounts of phenols when compared to chia seed and chia microgreens and it was statistically significant (Sarasvathi et al., 2017). It acts as an antioxidant, can protect cell constituents from oxidative damage and thus reduce the risk of various degenerative diseases associated with oxidative stress (Pandey et al., 2009).

Flavonoid

Table 1 and Figure 2 shows that the total flavonoid content in chia seed, germinated chia and chia microgreens are 43.10, 218.96 and 441.3 $\mu\text{g QE/g}$, respectively. Flavonoid present in chia seed was 84.95mg QE/g. Flavonoids are a group of bioactive compounds with positive effects, such as potent antioxidant, anti-inflammatory, and antiplatelet activities.

Gas chromatography–Mass Spectrometry (GC–MS)

Gas chromatography-mass spectrometry (GC-MS) was used to identify the bioactive compounds present in chia seed, germinated chia and chia microgreens. Eight bioactive compounds were identified in chia seed, eleven compounds in germinated chia and seven compounds were identified in chia microgreens. In Figures 3,4 and 5 the X-axis represents the retention time and the Y-axis represents relative abundance. The interpretation of the mass spectrum of GC-MS results was elucidated using National Institute Standard and Technique database (NIST). The compounds particularly present in chia seed, germinated chia and chia microgreens were identified by making their mass spectral fragmentation pattern of respective peaks in the chromatogram with those stored in using National Institute Standard and Technique database (NIST- MS, 1998). The mass spectrum of the unknown component was compared with the spectrum of the known components stored in the NIST library. The second highest peak was identified to be Oleic acid. Oleic acid has been associated with beneficial effects on cardiovascular disease and serum lipids, and cancer protection (Wei et al., 2016). Eleven volatile bioactive compounds were identified in germinated chia. The highly eluted peak in chia microgreens was Heptanoic acid ,4-methoxyphenyl ester. The second highest peak was identified to be Flavone (Figure 5).

Figure 3: Bioactive constituents identified in chia seed by using GC MS

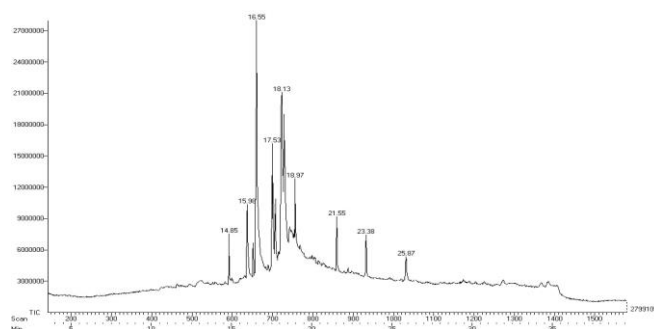


Figure 4: Bioactive constituents identified in germinated chia seed by using GC-MS

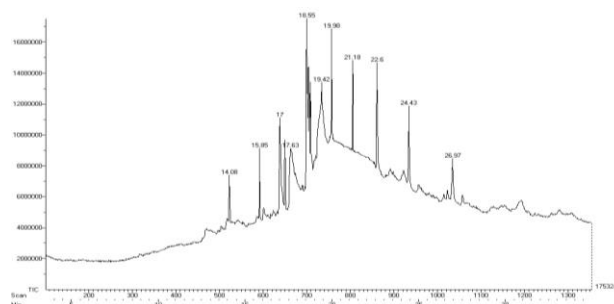
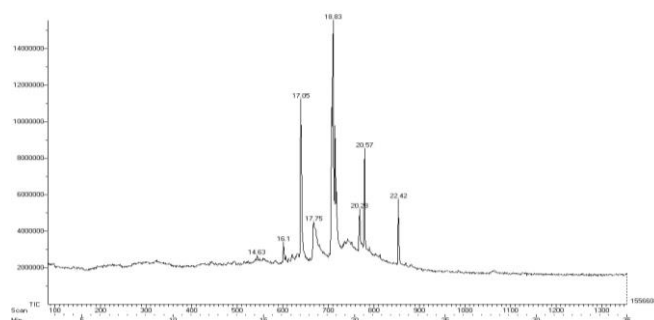


Figure 5: Bioactive constituents identified in chia microgreens seed by using GC-MS



IN VITRO ANTIOXIDANT ASSAYS

DPPH[•] radical scavenging assay

Using the DPPH method, the ethanol extract of chia seed, germinated chia and chia microgreens were used to investigate the antioxidant activity. The reference standard used for comparison was ascorbic acid. The radical scavenging activity of ethanolic extract of (*Salvia hispanica. L*) chia seed, germinated chia, chia microgreens are presented in Table 5. Table 5, figure 7 shows that the radical scavenging activity of chia seed, germinated chia and chia microgreens seeds increased with the concentration and was statistically significant ($p < 0.05$). Based on the results, it is evident that the ethanol extract of chia seed had greater radical scavenging activity when compared to germinated chia seed and chia microgreens.

Table 5: Comparison of radical scavenging activity of chia seed, germinated chia and chia microgreens by using DPPH method

Concentration (µg/mL)	Percentage inhibition of Chia seed	Percentage inhibition of Germinated chia	Percentage inhibition of Chia microgreens	f value	p value
50	22.80 ± 1.01	34.10 ± 0.16	9.66 ± 0.48	3.996	0.041
100	68.11 ± 0.38	82.41 ± 0.66	36.58 ± 0.36		
150	70.72 ± 0.84	85.03 ± 0.06	44.40 ± 0.12		
200	79.72 ± 0.43	91.45 ± 0.67	55.90 ± 1.22		
250	94.43 ± 0.59	93.12 ± 0.65	58.4 ± 0.69		
300	97.47 ± 0.59	94.55 ± 0.60	59.09 ± 0.91		

Comparison of samples and standard IC 50 value (µg/mL)

Ascorbic acid was used as a standard for DPPH radical scavenging activity, and the standard curve is presented in Figure 6, IC50 (Inhibition Concentration at 50%) is the antioxidant concentration which can inhibit 50 per cent of activity of free radical.

Table 6: Inhibition percentage of ascorbic acid standard chia

concentration	Inhibition percentage of ascorbic acid (standard) (µg/ml)
5	37.545
10	57.22
15	73.84
20	84.185
25	95.115
30	95.555

Table 7: Comparison of IC₅₀ value of chia seed, germinated and chia microgreens

Sample	IC ₅₀
Standard ascorbic acid	8.73µg/mL
Chia Seed	73.41µg/mL
Germinated chia	73.41µg/mL
Chia microgreens	178.89µg/mL

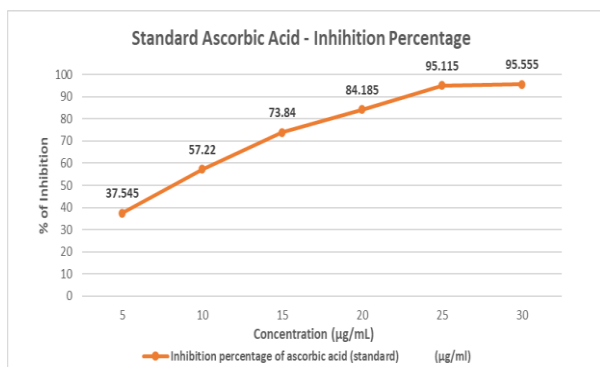


Figure 6: Standard Ascorbic Acid

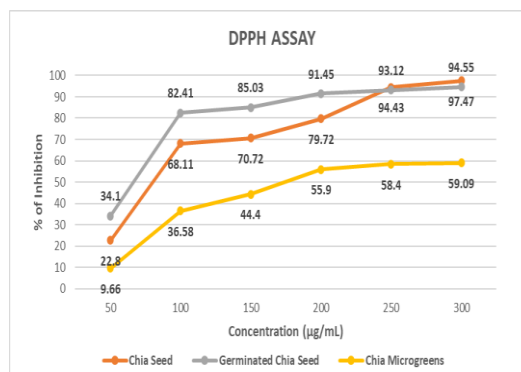


Figure 7: Comparison of radical scavenging activity of chia seed, germinated chia and chia microgreens by using DPPH method

From Table 7, it is evident that the IC₅₀ value of an ethanolic extract of chia seed, germinated chia required to inhibit 50% of free radicals, was 73.41µg/mL. In contrast, chia microgreens were 178.89µg/mL. While comparing the ability to scavenge free radicals, it is found that chia seed and germinated chia had a more exceptional ability to inhibit 50 per cent of free radicals at lower concentrations (73.41µg/mL) than chia microgreen (178.89µg/mL). When the sample is compared to the IC₅₀ value of the standard ascorbic acid (8.73 µg/mL), the test samples require a higher concentration to inhibit 50 per cent radical, respectively.

FRAP

Ferric reducing antioxidant power (FRAP) assay is a commonly used method that uses antioxidants as reductants in a redox-linked colorimetric reaction, wherein ferric (Fe³⁺) is reduced to ferrous (Fe²⁺). The antioxidant-reducing capacity of ethanolic extract of (*Salvia hispanica*. L) chia seed, germinated chia, and chia microgreens are presented in the table.

Table 8: Comparison of Ferric reducing antioxidant power (FRAP) of chia seed, germinated chia and chia microgreens

Concentration (µg/mL)	Percentage reduction % of Chia seed	Percentage reduction % of Germinated chia	Percentage reduction % of Chia microgreens	F value	p value
100	23.51 ± 0.55	58.89 ± 0.19	30.23 ± 0.41	5.220	0.019
200	53.29 ± 0.82	78.12 ± 0.19	55.01 ± 0.41		
300	62.78 ± 0.91	90.92 ± 1.11	58.88 ± 0.24		
400	65.34 ± 0.50	91.94 ± 0.09	67.01 ± 0.04		
500	72.59 ± 0.59	92.97 ± 1.11	69.08 ± 0.10		
600	72.75 ± 0.19	94.37 ± 0.58	72.50 ± 0.22		

From Table 8 and Figure 8, the ferric reducing antioxidant power FRAP (Fe³⁺) of chia seed, germinated chia and chia microgreens seeds increased with the concentration and was statistically

significant ($p < 0.05$). Based on the results, it is evident that the ethanol extract of germinated chia seed possesses greater ferric ion-reducing capacity than the chia seed and chia microgreens.

Comparison of samples and standard RC 50 value ($\mu\text{g/mL}$)

For FRAP (Ferric reducing antioxidant power) assay, the ascorbic acid was used as the standard and standard curve is presented in Figure 9. RC50 (Reducing Concentration 50%) is the antioxidant concentration ($\mu\text{g/mL}$) that can reduce 50 per cent of the activity of free radicals. Table 10 shows the RC50 value of chia seed was $187.65 \mu\text{g/mL}$, germinated chia was $84.90 \mu\text{g/mL}$ and chia microgreens were $181.78 \mu\text{g/mL}$.

Table 9: Reduction % of ascorbic acid standard concentration

concentration	Reduction percentage of ascorbic acid standard
5	38.31
10	51.915
15	65.18
20	74.105
25	75.245
30	77.405

Table 10: Comparison of RC_{50} v value of chia seed, germinated chia microgreens

Sample	RC_{50}
Standard ascorbic acid	$9.63 \mu\text{g/mL}$
Chia Seed	$187.65 \mu\text{g/mL}$
Germinated chia	$84.90 \mu\text{g/mL}$
Chia microgreens	$181.78 \mu\text{g/mL}$

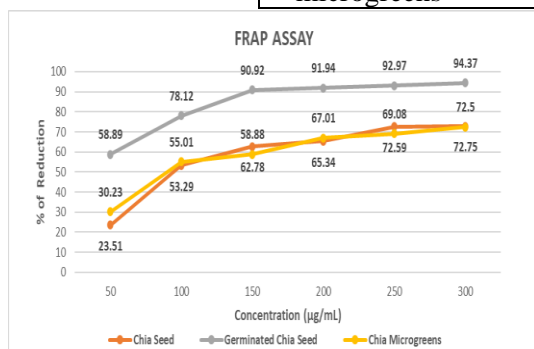


Figure 8: Comparison of Ferric reducing antioxidant power (FRAP) chia seed, germinated chia and chia microgreens

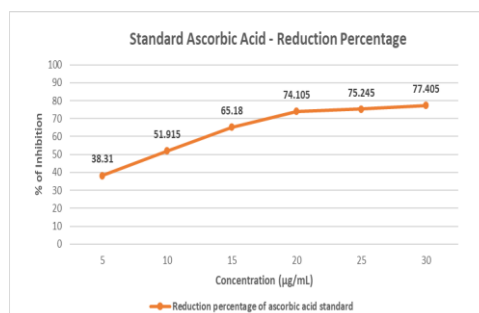


Figure 9: Standard Ascorbic Acid

From the RC_{50} results, it is evident that germinated chia ($84.90 \mu\text{g/mL}$) can reduce ferric ions with lower RC_{50} concentration when compared to chia seed ($187.65 \mu\text{g/mL}$) and chia microgreens

(181.78 µg/mL). If the sample is compared to the RC50 value of the standard ascorbic acid (9.63 µg/mL), the test samples require a higher concentration to reduce 50 percent of free radicals.

In vitro antidiabetic activity Alpha amylase enzyme inhibition assay

Alpha amylase enzyme inhibition assay is a widely used in vitro antidiabetic method used to determine the antidiabetic potential of the chia seed, germinated chia and chia microgreens based on the starch iodine colour formation. Alpha amylase is one of the key enzymes for digestion, which is responsible for the conversion of starch into simple sugars like dextrin, maltose, and glucose. One of the effective methods to control diabetes is to inhibit the activity of the alpha-amylase enzyme. From Table 11 and Figure 10, the inhibiting power of chia seed, germinated chia and chia microgreens seeds increased with the concentration and was statistically significant (p<0.05). Based on the results, it is evident that germinated chia has a more potent alpha-amylase inhibiting activity (92.95 ± 0.07 %) at 300 µg/mL when compared to chia seed and chia microgreen.

Table 11: Alpha amylase enzyme inhibition activity of chia seed, germinated chia and chia microgreens

Concentration (µg/mL)	% of alpha amylase enzyme inhibition of Chia seed	% of alpha amylase enzyme inhibition of Germinated chia	% of alpha amylase enzyme inhibition of Chia microgreens	F value	p value
50	4.60 ± 0.562	57.65 ± 0.353	3.402 ± 0.05	8.044	0.004
100	14.89 ± 0.007	80.55 ± 0.622	8.225 ± 0.318		
150	44.95 ± 0.09	88.355 ± 0.530	25.189 ± 0.86		
200	68.44 ± 0.49	91.375 ± 0.714	43.525 ± 0.657		
250	71.59 ± 0.72	92.235 ± .671	51.875 ± 0.289		
300	75.32 ± 0.33	92.955 ± 0.077	55.97 ± 0.05		

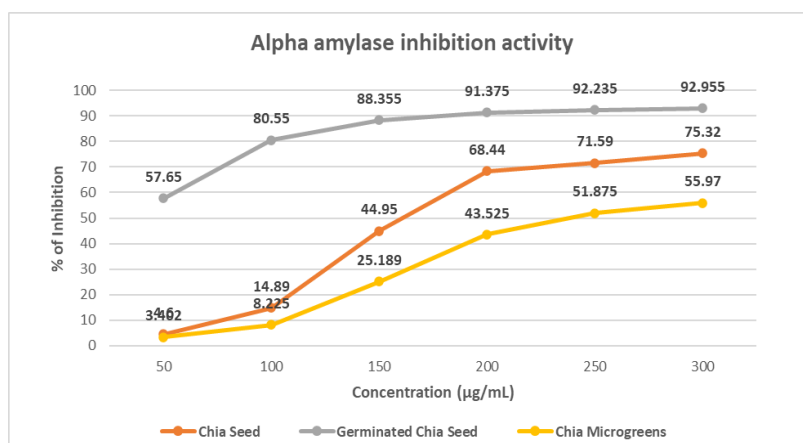


Figure 10: Alpha amylase inhibition activity of chia seed, germinated chia and chia microgreens

Estimation of anti-carcinogenic potential of chia seed, germinated and microgreens by the MTT assay:

Chia seed has natural antioxidants such as phenolic kaempferol, chlorogenic acid and caffeic acid, kaempferol glucoside and quercetin have positive effects against cancer. Ayerza et al., 2007 reported that chia seed has antitumor activity by stimulating apoptosis in human leukaemia

cells due to the presence of protocatechuic acid. In this study, the MTT assay was performed on the MCF-7 breast cancer cell line, to assess the anti-cancer potential of the chia seed, germinated chia and chia microgreens. The samples (chia seed, germinated chia and chia microgreens) were taken in various concentrations such as (5, 10, 20, 40, 80 and 160 μ L respectively), and the colour developed (absorbance) was read at 595nm. The growth inhibition percent and cell viability percent were determined. The absorbance values for duplicate tests were noted in the ELISA reader at 595nm. Table (12,13 &14) tabulates the percentage of cell viability and death cells recorded at varying concentrations of the chia seed, germinated chia and chia microgreens, respectively.

Table 12: Absorbance at different concentration of the chia seed

Concentration(μ L)	OD @ 595		% live cell	%death cell
	I	II		
5	0.948	0.923	76.79	23.21 \pm 0.01
10	0.875	0.846	69.94	30.06 \pm 0.02
20	0.693	0.687	56.08	43.92 \pm 0.004
40	0.597	0.582	47.14	52.86 \pm 0.01
80	0.494	0.477	39.62	60.38 \pm 0.01
160	0.396	0.394	32.06	67.94 \pm 0.001

Plate 1: Per cent growth inhibition exhibited by the chia seed at various concentrations

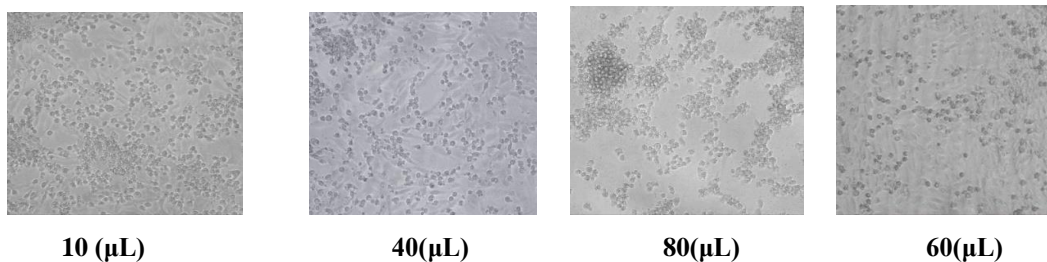


Table 13: Absorbance at different concentration of the germinated chia

Concentration(μ L)	OD @ 595		% live cell	%death cell
	I	II		
5	0.907	0.906	99.77	0.23 \pm 0.07
10	0.893	0.888	98.01	1.99 \pm 0.003
20	0.855	0.849	93.78	6.22 \pm 0.004
40	0.787	0.764	85.36	14.64 \pm 0.001
80	0.526	0.534	58.33	42.67 \pm 0.005
160	0.278	0.281	30.76	69.24 \pm 0.002

Plate 2 : Per cent growth inhibition exhibited by the germinated chia at various concentrations

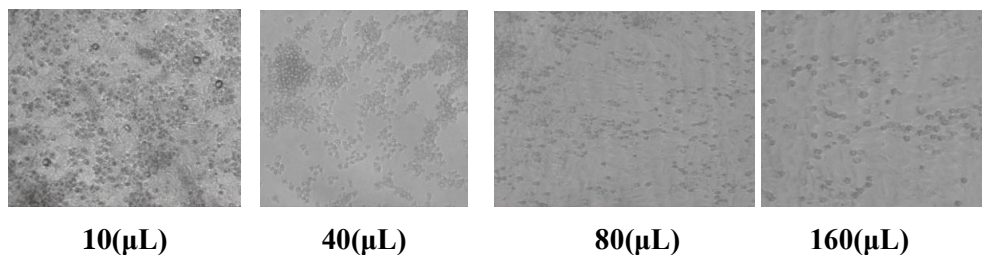


Table 14: Absorbance at different concentration of the chia microgreens

Concentration(µL)	OD @ 595		% live cell	%death cell
	I	II		
5	0.909	0.903	76.79	0.28±0.004
10	0.903	0.898	69.94	0.89±0.003
20	0.845	0.839	56.08	7.32±0.004
40	0.747	0.754	47.14	17.4±0.004
80	0.496	0.505	39.62	44.91±0.006
160	0.218	0.211	32.06	76.39±0.004

Plate 3: Per cent growth inhibition exhibited by the chia microgreens at various concentrations

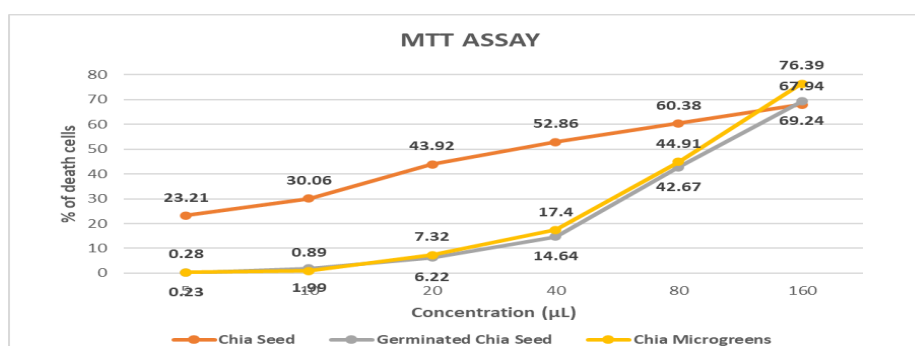
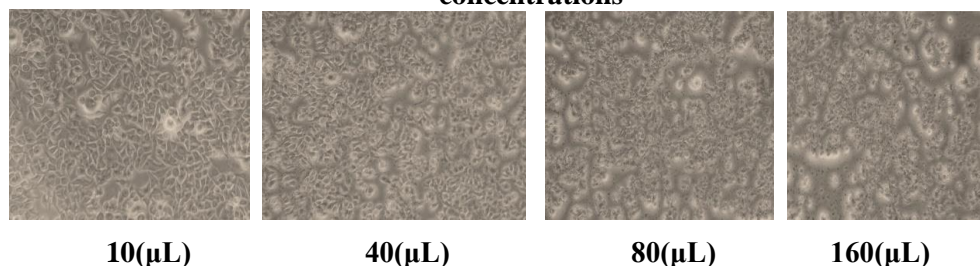


Figure 11: Per cent of death cells at various concentrations of chia seed, germinated chia and chia microgreens

From Table (12, 13, 14) and Figure 11, it is evident that ethanol extract concentration of the chia seed, germinated chia and chia microgreens increases, and the rate of cancer (MCF-7) viability was found to decrease. Among these, microgreens have a higher anti-carcinogenic potential when compared to chia seed and germinated chia. The anti-carcinogenic potential of microgreens (76.39

%) was observed to be more than chia seed and germinated chia (67.94 % and 69.24 %, respectively) at 160 μ L concentration.

CONCLUSION

In day-to-day life, a well-balanced and healthy diet is essential for a normal healthy lifestyle. The increased prevalence of non-communicable diseases increases the risk of high mortality. Thus, a healthy diet will help protect against non-communicable diseases (NCDs) and malnutrition in all its forms, including diabetes, heart disease, stroke, and cancer. Consumption of plant-derived phytochemicals may help prevent non-communicable diseases since microgreens are gaining popularity as a new culinary ingredient and have a dense source of nutrition. Germinated seed also provides a higher amount of nutrition and phytochemicals, which helps to prevent diseases. In the present study, the germinated chia seed proved to possess the highest antidiabetic activity. Chia microgreens have higher anti-carcinogenic potential when compared to germinated chia. Therefore, chia microgreens can be included as a part of a healthy diet.

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A STUDY OF ANGANWADI CHILDREN'S PARENTS REGARDING THEIR KNOWLEDGE ON EARLY CHILDHOOD CARE AND EDUCATION (ECCE)

AKSHAYA.E¹ and Dr. NISHA VIKRAMAN²

¹Research Scholar, ²Assistant Professor

Department of Home Science, St Teresa's College (Autonomous),

Mahatma Gandhi University, Ernakulam, Kerala 682011

E-mail: akshaya.e97@gmail.com ,

HSAI life membership Number: HSAI-2022-KL-1040-LF

ABSTRACT

Parents' knowledge and awareness of child development norms, milestones, care giving approaches, and processes as well as their familiarity with child-care strategies, can help foster positive parent-child interactions, which lead to holistic child development. The early childhood is the most crucial period of a child's life; parents need to have thorough knowledge about this period. Knowledgeable parents are better at raising their children. The study aimed to examine the parents' knowledge of early childhood care and education and the influence of other factors on their knowledge. 197 parents of Anganwadi children were selected and studied using a self-designed rating scale. Major findings of the study include that the parents' overall knowledge regarding early childhood care and education was more than 75%, which is excellent. Both the rural and urban parents show good knowledge of ECCE. It was found that age doesn't greatly influence the parents' beliefs of ECCE. There was a significant difference observed between unemployed workers and craft and related trade workers knowledge on ECCE. The mean score of all the variables did not differ with educational qualifications. There was no significance between knowledge of ECCE and differences in income. But the standard deviation is lower with parents whose income is between 61663 and 123322 rupees and higher with rupees up to 6174. In conclusion, parents have good knowledge about ECCE in the contemporary era and it is not influenced by their location, age, or educational background.

Keywords: Anganwadi, Awareness of ECCE, Early Childhood Care and Education, Parental knowledge, parenting.

INTRODUCTION

Numerous studies have already demonstrated the importance of parental knowledge in how parents perceive their children's behavior, how they parent, and ultimately how their children develop (Vale-Dias et al., 2018). To grow, protect, and develop the human being by bestowing upon its abilities and physical, psychic, and cultural achievements which could offer him an identity and self-dignity. Early education is composed of a total of individual and socially existent or organized experiences from which the child benefits in its toddler period (Clipaa and Gavrilita, 2017). The decisions made today and the actions taken by parents and society during early childhood will have a long-lasting impact on the child's individual advancement. In a broader sense, the progress of the country will be well-recognized and clear (Clipa *et al*, 2016). Parent's beliefs and expectations about education influence the home environment they provide for their children. It can affect their motivation and literacy level (Annonciata, and Nadege, 2020).

Early childhood education refers to the learning opportunities available during the early years of a child's life. Early childhood education is crucial for a child's ethical, intellectual, physical, social, aesthetic, and early language development and skills (Ng *et al*, 2020). Since schools and preschools share the responsibility of educating children with their parents, parental

involvement affects the functioning of these institutions (Tal *et al*, 2022). The parent's perspective on the early childhood education their children get at early childhood centers is referred to as their understanding of that education. Early childhood education entails involving kids in learning activities that support their growth and development in all areas (Sukutha and Bakuza, 2021). Parents' expectations about their children's future educational achievement are determined by their beliefs and judgments about their children's potential (Chan and J-B. Li, 2020).

Parents must send their kids to school as part of their responsibility to provide an education for them. Parents are responsible for supporting their children's education by sending them to an educational institution. The assistance offered can take the form of picking schools with amenities that help both the educational process and the advancement of the students (Fitria *et al*, 2020). Each community and parent have different perceptions about education, especially early childhood education, which includes perceptions about teaching methods, the classroom environment, and the stage at which it will teach (Fitria *et al*, 2020). It is common for parents to have different expectations for their children who attend an early learning center when they are three to five years old. Some parents expect their children to engage in academic learning activities. As a result of formal school-based education, activities such as writing, reading, and learning numbers are associated with academic activities (Boyd, 2018).

JUSTIFICATION OF THE STUDY

Only a few researches have so far looked at parents' expectations about ECCE (Zhou *et al*, 2007). Understanding what parents consider to be major elements of ECCE arrangements after their children are enrolled may help to make a more accurate assessment of how parents interact with these programs and what qualities ultimately matter the most to families. Current study tries to explore about the parental knowledge of Early Childhood Care and Educational.

OBJECTIVES

1. To evaluate parents general awareness on ECCE
2. To find out the relation between parents location and general awareness on ECCE
3. To understand the relation between parents age and general awareness on ECCE
4. To know the relation between parents profession and general awareness on ECCE
5. To study the relation between parents education and general awareness on ECCE

METHODOLOGY

The study was conducted in the Kannur district, Kerala. To understand parents' perception of early childhood care and education, 197 mothers having at least one child attending Anganwadi center were selected as sample. Four ICDS projects have been selected for collecting data namely, Edakkad ICDS, Iritty ICDS, Kuthuparamb ICDS, and Thalassery ICDS in the Kannur district. The sample includes 114 mothers from rural Anganwadi and 83 from urban. The age of the sample was above 18 years. Both working and unemployed mothers were selected for the study. The data collection was done in September 2022 through a purposive sampling method with a self-designed rating scale. The rating scale contains 25 questions related to the general awareness of early childhood care and education. Each statement has 5 options such as, Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree. Each option has a score ranging from 1 to 5. So a sample can score a maximum of 125 and a minimum of 25. Before the data collection, a pilot study

consisting of 30 samples was conducted and modifications were made accordingly. Cronbach's Alpha test gave a score of 0.793 and hence the rating scale is reliable. After getting permission from the district program officer the researcher approached Anganwadi centers and parent knowledge of ECCE rating scale was administered to the parents of Anganwadi children with instructions to complete all questions honestly. The data was analyzed through SPSS with mean, standard deviation, frequency, one sample Z test, and ANOVA.

RESULTS AND DISCUSSION

The results of the study titled “A study on parents of Anganwadi children's knowledge of Early Childhood Care and Education” are discussed below,

Parent’s general awareness on ECCE

To find the level of General awareness on ECCE, the respondents were asked questions on five point Likert scale. The responses were scored as 1 for ‘Strongly disagree’, 2 for ‘Disagree’, 3 for ‘Don’t know’, 4 for ‘Agree’ and 5 for ‘Strongly agree’. The total score of the 25 questions for all 197 respondents is found out.

Based on that calculated the mean % score of level of parents general awareness on ECCE $\left[MPS = \frac{MeanScore \times 100}{Maximumpossiblescore} \right]$. This score is classified into one of the four groups as poor or low if the mean % score is less than 35%, average if the mean % score is between 35 to 50 per cent, good or medium if the mean % score lies in the interval 50 to 75% and excellent or high if the mean % score is above 75%. A one sample Z test is carried out to test the significance. The following table gives the Mean, SD, Mean % Score and Z value of the variable considered.

Table 1 Mean, Standard deviation and z value for parents general awareness on ECCE

<i>Variable</i>	<i>N</i>	<i>Mean</i>	<i>Standard Deviation</i>	<i>Mean % score</i>	<i>CV</i>	<i>z</i>	<i>p value</i>
General awareness on ECCE	197	77.44	7.15	77.44	9.23	4.796	<0.001

The mean percentage score of General awareness on ECCE is 77.44% which indicate that the level of General awareness on ECCE is high or excellent. The CV indicates that this score is stable as the value is less than 20%. To test whether the sample information that observed exists in the population or to verify that the level of General awareness on ECCE is high or not, a hypothesis was formulated.

H₀: The level of General awareness on ECCE is equal to 75 percent of total score (H₀:MPS=75%)

H₁: The level of General awareness on ECCE is more than 75 percent of total score (H₁:MPS>75%)

To test the above hypothesis used a one sample Z test and the result is exhibited in Table 1. From the table the p value is less than 0.05 and z value is positive, which indicates that the test is significant. Hence we reject the null hypothesis and conclude that the level of General awareness on ECCE is more than 75% i.e. excellent.

Tang, et al. (2022) revealed that 68% of parents were unfamiliar with Malaysian government policy on ECCE, but 84.3% believe the government should educate them about ECCE.

In another study by Qadiri & Manhas (2009) found that the majority of parents (25%) believed that children who attend early childhood development centres (ECD) develop good health and hygiene habits, pre literacy skills (19%), and communication skills (16%). Likely, Vlasov & Hujala (2017) found in their study that parents are better informed about early childhood care and education to child development.

Parent’s location and general awareness on ECCE

Consider the location of the respondents and test the hypothesis,

H_{1a}: The mean Score of General awareness on ECCE is the same for both respondents in rural and urban areas

An independent sample Z test is used to compare the mean scores of variables of two different groups, that is, rural and urban areas. Hence a Z test was conducted, and the results are shown in Table 2. The result shows that no significant difference exists between rural and urban areas for General awareness on ECCE as the p value in this case is more than 0.05. So we accept the hypothesis H_{1a}.

Table 2 Mean, Standard deviation and Z value for Location

<i>Variable</i>	<i>Location</i>	<i>N</i>	<i>Mean</i>	<i>Standard Deviation</i>	<i>Z</i>	<i>p value</i>
General awareness on ECCE	Rural	114	77.46	7.16	0.033	0.973
	Urban	83	77.42	7.17		

Miller & Votruba-Drzal (2013) revealed that children in large urban and rural areas attend preschool with less advanced academic skills than children in small cities and suburbs. Rural children's lower attendance was explained in part by less favorable home environments and increased use of home-based rather than center-based preschool. Parents in large cities had less knowledge of ECCE programmes, which contributed to their children's lower achievement. Lee & Burkham (2002) found that urbanization is associated with the development of early academic skills, with rural children falling behind their more urban peers in kindergarten achievement. Bornstein, et al. (2008) found in his research comparing rural versus urban parenting styles, rural parents are less aware of ECCE programmes and are less emotionally supportive, more intrusive, and harsher than more urban parents.

Parent’s age and general awareness on ECCE

H_{2a}: The mean Score of General awareness on ECCE is the same for different age groups

A one sample analysis of variance is used to test hypotheses about means when there are three or more groups of one independent variable. In this case, age group considered to be the independent variable, which included four groups (a) 18-20 (b) 21-31 (c) 32-42 (d) 43-53. So ANOVA was used to compare the mean scores of different age groups and the result is exhibited in Table 3.

Table 3 Mean, Standard deviation and F value for Age

<i>Variable</i>	<i>Age</i>	<i>N</i>	<i>Mean</i>	<i>Standard Deviation</i>	<i>Z</i>	<i>p value</i>
General awareness on ECCE	18-20	1	77.00		1.495	0.217
	21-31	121	76.71	7.17		
	32-42	69	78.88	7.02		
	43-53	6	75.67	7.28		

The results of the ANOVA test depicted in Table 3 reveals that the statistical value of p is more than 0.05 for the variables. So it was concluded that the mean score of the variables do not differ with age groups. Hence we accept the hypothesis H_{2a}

Udayanga (2021) found that another factor preventing families from considering ECCE prudently is a lack of age-appropriate experiences among parents. Folbre (2006) revealed that teenage women are unaware of ECCE due to a lack of age-appropriate experiences.

Parent’s profession and general awareness on ECCE

Consider the profession of parents and test the hypothesis

H_{3a}: The mean Score of General awareness on ECCE is the same for different professions

A one sample analysis of variance is used to test hypotheses about means when there are three or more groups of one independent variable. In this case, profession was considered to be the independent variable, which included six groups (a) Unemployed (b) Craft & Related Trade Workers (c) Skilled Agricultural & Fishery Workers (d) Skilled Workers and Shop & Market Sales Workers (e) Clerks (f) Others. So ANOVA was used to compare the mean scores of different professions and the result is exhibited in Table 4.

Table 4 Mean, Standard deviation and F value for Profession

<i>Variable</i>	<i>Profession</i>	<i>N</i>	<i>Mean</i>	<i>Standard Deviation</i>	<i>Z</i>	<i>p value</i>
General awareness on ECCE	Unemployed	154	78.26	7.17	2.308	0.046
	Craft & Related Trade Workers	33	73.88	6.73		
	Skilled Agricultural & Fishery Workers	3	76.00	0.00		
	Skilled Workers and Shop & Market Sales Workers	4	75.75	5.50		
	Clerks	2	80.50	4.95		
	Professionals	1	74.00			

The results of the ANOVA test depicted in Table 4 reveals that the statistical value of p is less than 0.05 for General awareness on ECCE. So it was concluded that the mean score of General awareness on ECCE differs with professions. Hence we reject the hypothesis H_{3a}. Since the ANOVA test indicate that the significant difference exist among the professions for General

awareness on ECCE, a post hoc test or multiple comparison test has conducted for identify which among the professions differs significantly and the result is exhibited in the Table 5. The result of the analysis indicates that for General awareness on ECCE, significant difference is observed between Unemployed and Craft & Related Trade Workers. The significant different group is indicated by (*).

Ghosh (2019) found that the father's employment status in a regular job (rather than a casual job) increased the likelihood that a child would attend preschool, whereas mothers' employment had no effect on preschool attendance. Children with stable employment fathers are more likely to be aware of ECCE programmes and to encourage their children to attend preschool (Han, 2004).

Table 5 Multiple comparison tests

Dependent Variable			Mean Difference	Std. Error	Sig.
General awareness on ECCE	Unemployed	Craft & Related Trade Workers	4.40879*	1.348	0.001
	Craft & Related Trade Workers	Unemployed	-4.40879*	1.348	0.001

*. The mean difference is significant at the 0.05 level.

Parents education and general awareness on ECCE

Consider the education of parents and test the hypothesis

H_{4a}: The mean Score of General awareness on ECCE is the same for different educational qualifications

A one sample analysis of variance is used to test hypotheses. In this case, different educational qualifications was considered to be the independent variable, which included six groups (a) Illiterate (b) Primary school certificate (c) High school certificate (d) Intermediate or diploma (e) Graduate (f) Profession or Honours. So ANOVA was used to compare the mean scores of different qualifications and the result is exhibited in Table 6.

Table 6 Mean, Standard deviation and F value for Education

<i>Variable</i>	<i>Education</i>	<i>N</i>	<i>Mean</i>	<i>Standard Deviation</i>	<i>Z</i>	<i>P value</i>
General awareness on ECCE	Illiterate	1	78.00		1.360	0.241
	Primary school certificate	6	81.00	7.35		
	High school certificate	65	78.51	7.00		
	Intermediate or diploma	27	77.15	8.24		
	Graduate	78	77.15	6.91		
	Profession or Honours	20	74.40	6.58		

The results of the ANOVA test depicted in Table 6 reveals that the statistical value of p is more than 0.05 for all the variables. So it was concluded that the mean score of all the variables do not differ with educational qualifications. Hence the hypothesis H4a was accepted.

Schober & Spiess (2013) investigated and revealed that highly educated parents are more likely to be aware of ECCE resources for their children, resulting in positive associations between family socioeconomic status and parental educational aspirations. Ghosh (2019) in his study found that parents with primary school education and higher education have more awareness of ECCE and indicated that early education and school readiness were important reasons for enrolling their child in preschools. While compared to children whose parents had only completed primary school, children with higher levels of parental education (i.e., secondary school or higher) were more likely to attend preschool. Many parents who did not enroll their children in preschool were unaware of the benefits of early education for their children, and this knowledge was influenced by parental educational level (Hewett, et al. 2014).

CONCLUSION

The likelihood of parents engaging in practices that promote their children's healthy development is positively correlated with parental knowledge of child development. Historically, most scientific research has focused on school-aged children. The current study has tried to reveal parents general awareness of early childhood care and education. According to the finding of this study, the overall knowledge regarding early childhood care and education among the parents was more than 75% i.e. excellent. Parental knowledge can sustain the literacy rate among children in Kerala. Not only can the literacy rate holistic development of the younger generation can be maintained appropriately. Even though many studies concluded that compared with urban parents, rural parents have less knowledge of ECCE. But the current study has revealed that both rural and urban parents show good knowledge of ECCE. It was found that age doesn't influence greatly on beliefs of the parents on ECCE. Future research can include teenage parents' perceptions of ECCE. The result of the analysis indicates that for General awareness of ECCE, a significant difference is observed between Unemployed and Craft & Related Trade Workers. It was concluded that the mean score of all the variables does not differ with educational qualifications. The parents with qualification equal to or below primary education were lower in number. Further studies can be done on parents whose educational qualifications are below primary education. Future studies can be conducted among fathers of Anganwadi children. Due to a lack of availability, the current study can't explore the tribal population. The research gaps can be addressed in future studies.

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METACOGNITIVE AWARENESS AMONG HIGH SCHOOL STUDENTS

Dr. Arati Chakra¹, Ms. P.Vasantha² and Dr. K. Anuradha³

¹ Assistant Professor, Department of Home Science, KVR Government College for Women (Autonomus), Cluster University, Kurnool

² Lecturer in Home Science (Guest), Department of Home Science, KVR Government College for Women (Autonomus), Cluster University, Kurnool

³ Professor, Department of Home Science, Sri Venkateshwara University, Tirupati
Email: aratikvrgdc@gmail.com

ABSTRACT

Metacognition is cognition of one's own cognition. The meta cognitive activities involve planning, reflecting, monitoring, and evaluating own learning processes. Basically, there are two components of metacognition: knowledge and regulation of cognition. The present study has been taken up to find out metacognitive awareness of high school students. It also tries to find out the difference of selected variables like age, gender, birth order, grades of study, and locale of school on metacognitive awareness. Metacognitive Awareness Inventory (MAI) developed by Schraw and Dennison (1994) was adopted to assess the metacognitive awareness of students. The results revealed that majority of high school students are good in metacognitive awareness. There is significant difference in metacognitive awareness based on age of the students and locale of school.

Keywords: Cognition, Metacognition, Metacognitive awareness

INTRODUCTION

Cognition is the process of acquiring knowledge and understanding the world around us. Cognitive strategies are the basic mental abilities we use to perceive, understand, think, memorise, analyse, and learn. It includes recalling information from memory, analysing sounds and images, making associations or comparing different pieces of information, and drawing inferences. Metacognition is "cognition about cognition", "thinking about thinking", "knowing about knowing", becoming "aware of one's awareness" and higher-order thinking skills. According to John Flavell (1979), metacognition is the insight you have about your own cognitive processes. He considers meta cognitive activities to be different from cognitive activities. The meta cognitive activities include learners' planning, reflecting, monitoring, and evaluating their own learning processes.

Metacognition can take many forms; it includes knowledge about when and how to use particular strategies for learning or for problem-solving. There are generally two components of metacognition: (1) knowledge about cognition and (2) regulation of cognition. There are three different types of metacognitive knowledge namely Declarative, Procedural and Conditional Knowledge. Declarative knowledge refers to knowledge about oneself as a learner and about what factors can influence one's performance. It is also referred to as "world knowledge". Procedural knowledge refers to knowledge about doing things. This type of knowledge is displayed as

heuristics and strategies. A high degree of procedural knowledge can allow individuals to perform tasks more automatically. The conditional knowledge refers to knowing when and why to use declarative and procedural knowledge. Similar to metacognitive knowledge, "regulation of cognition" contains three essential skills: 1. Planning: refers to the appropriate selection of strategies and the correct allocation of resources that affect task performance. 2. Monitoring: refers to one's awareness of comprehension and task performance. 3. Evaluating refers to appraising the final product of a task and the efficiency at which the task was performed. This can include re-evaluating strategies that were used. Having metacognition awareness helps students to improve academic achievement.

JUSTIFICATION OF THE STUDY

Students of high school are in the transitional period of early adolescence. During this stage they become increasingly conscious of cognitive capacities, strategies for processing information, and factors that help or hinder performance. In high school there is growing pressure of studies and requirement of a systematic method of studying. Most students don't spend much time thinking about how they learn; rather they try to learn through rote memory. However, some students fail to establish appropriate strategy in studying. Metacognition enables students to adjust to changeable problem-solving tasks, demands and contexts (Dosoete, Roeyers, & Buysse, 2001). Metacognition can help students to be more aware of their action, and how to apply appropriate cognitive strategy in different situations. In this study an attempt has been made to find out the metacognitive awareness of the high school students with following objectives:

OBJECTIVES

1. To assess metacognitive awareness among high school students in Tirupati
2. To study the difference of selected student variables on metacognitive awareness of high school students .

Based on the above objectives the following hypotheses were framed:

HYPOTHESES

1. There was no significant gender difference in metacognitive awareness score of high school students.
2. There was no significant age difference in metacognitive awareness score of high school students.
3. There was no significant difference in metacognitive awareness score of high school students based on their birth order.
4. There was no significant difference in metacognitive awareness score of high school students based on their grades of study.
5. There was no significant difference in metacognitive awareness score of high school students according to locale of school.

LITERATURE REVIEW

A comprehensive review of literature is done to understand the Metacognitive Awareness and its associations to other demographic variables is presented here under

Batha and Carroll (2007) presented a study to determine the relationship between metacognition and decision making. Ninety-eight university students were divided into three decision-making ability groups: average, below average, and above average. Results demonstrated a relationship between metacognitive awareness and decision-making performance. Regulation of cognition was shown to have a greater impact on decision making than did knowledge of cognition. Metacognitive strategy instruction was found to be beneficial to those in the below-average group, but not those in the average or above-average groups.

Schneider (2008) reviewed developmental trends in research on metacognition in children and adolescents. The relevant literature indicated that developmental trends in declarative and procedural metacognitive knowledge clearly differ. The findings for declarative metacognitive knowledge showed steady improvement through childhood and adolescence, mainly due to increases in knowledge about strategies, the results are not clear for procedural metacognition. Age trends observed for this component of metacognition are significant for self-control activities but not pronounced for monitoring abilities.

Young, A. and Fry, J.D (2008) examined the metacognitive awareness inventory (MAI) (Schraw and Dennison,1994) to determine the academic achievement in college students. Correlations were found between the MAI and cumulative GPA as well as end of course grades. Scores on the MAI significantly differ between graduate and undergraduate students. Teachers recommend the use of the MAI as a potential screening tool to identify students requiring metacognitive strategy intervention.

Alt (2015) studied relationship between educational approach based on constructivist theory and self-efficacy beliefs of undergraduate students. The result showed that students in the Problem based learning course perceived the learning environment as more constructivists and having high academic self-efficacy relative to the traditional lecture-based environment. The involvement of students in high-order meta-cognitive learning is main positive predictor of academic self-efficacy in students.

Diaz (2015) taken up qualitative study to find the effects of metacognitive strategies to help young learners in retaining vocabulary. The findings showed that metacognitive strategy training has positively contributed to vocabulary acquisition skills, as participant were able to use of metacognitive strategies to increase their vocabulary learning.

Karaali (2015) showed how metacognition can be used in the mathematics classroom, through a case study. Every week students were asked to evaluate their own progress and review their development in light of their personal goals. Positive affective changes were found in the students through the course of the semester. He claims that the regular metacognitive and self-reflective activities help students keep their focus on learning.

Van de Kamp & et.al (2015) studied influence of explicit instruction of meta-cognition on students' divergent thinking. A quasi-experimental design was adopted on 147 secondary school students in visual arts education. In the experimental condition, students attended a series of regular lessons with assignments on art reception and production, and they attended one intervention lesson with explicit instruction of meta-cognition. Results showed that explicit instruction of meta-cognitive knowledge had a positive effect on fluency and flexibility, but not on originality.

Rico & Ertmer (2015) compared the role of the instructor in student-centred and problem centred educational strategies for facilitating discussions. It has been found that problem-centred discussions include meta- cognitive questioning, peer facilitation, etc.

Jaleel, S. and Premachandran, P (2016) studied the metacognitive awareness of secondary school students in relation to Gender, Locality and Type of Management of school. The findings showed that more than 29.3 percent the student are average and around 40 percent are high in metacognitive awareness. The study showed that there was no significant influence of Gender, Locality and Type of Management on the Metacognitive ability of students. In term gender mean metacognitive awareness score of girls was higher than that of boys and students of rural area scored higher than urban area.

Goupil and Kouider (2019) suggested that a core system of metacognition appears very early in development, whereas explicit and human specific forms of metacognition slowly emerge to progressively allow children to communicate their metacognitive representations to others.

Chen, C. and et. al (2022) conducted experimental study to find the impact of metacognition enhancement program named Circling Curriculum for Metacognition Training (CCMT). Results indicated that experimental group exhibited better metacognitive ability than the control group in most dimensions of metacognitive ability.

Nordahl, H. and et.al (2022) found that metacognitive beliefs causing social anxiety and social self-beliefs and imply that negative social self-beliefs might be a product of metacognition. The clinical implications are that metacognitive beliefs should be the central target in treatments of social anxiety.

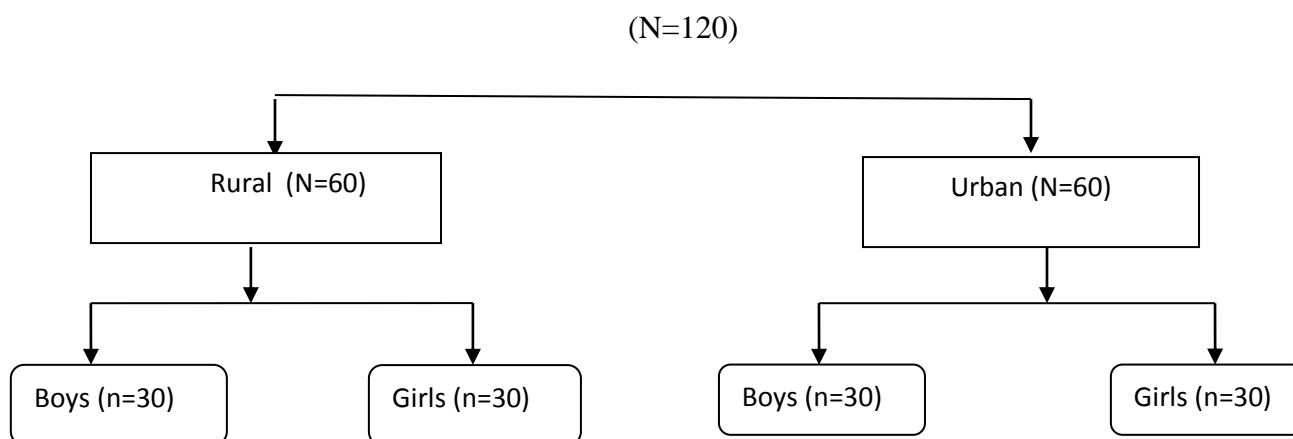
MATERIALS AND METHODS

The aim of present research was to study metacognitive awareness of high school students studying 7th, 8th and 9th in rural and urban schools of Tirupati, Andhra Pradesh. Ex-post-facto research design was adopted for conducting this study.

Method of data collection:

Systematic stratified purposive random sampling procedure was adopted to collect sample from 120 high school students (60 Boys and 60 Girls) from urban and rural schools of Tirupati. All the schools present in rural and urban areas were listed and one school from each area selected randomly. Permission was taken from head of the institutions to collect data from the students. From each area 60 students were selected by giving equal consideration to Boys and Girls.

Flow Chart for Sample Selection



The Table 1 shows gender wise and area wise distribution of sample students.

Table-1 Gender wise and area wise distribution of the sample

S. No	Type of the school	Boys		Girls		Total
		Number	Percentage	Number	Percentage	
1.	Rural	30	50.00	30	50.00	60
2.	Urban	30	50.00	30	50.00	60
Total		60	100.00	60	100.00	120

General Information Schedule was prepared to collect the basic details of the respondents. The student variables included in the study are - age, gender, birth order, grade of study, and locale of the school. A Metacognitive Awareness Inventory (MAI) developed by Schraw and Dennison (1994) was adopted to assess the metacognitive awareness of sample students. The inventory has 52 items with true or false responses. Items were classified into eight subcomponents under two broader categories, Knowledge of Cognition and Regulation of Cognition. Internal consistency for the instrument was found to be 0.95 with a test-retest reliability of 0.85. The structural validity, predictive validity, face validity and content validity have also been confirmed for the test. The tool was translated to Telugu (Regional Language) for enabling the rural students to read and understand the scale. For the Telugu version of MAI test-retest reliability was conducted after a gap of 3 weeks. The reliability value was found to be 0.75. The score 1 was given for the 'true' and 0 for 'false' responses. Minimum possible score is 0 and maximum 52. Higher score indicates good meta cognitive awareness.

RESULTS AND DISCUSSION

The raw data obtained were coded, tabulated and analyzed by SPSS software using appropriate statistical techniques. The results are presented and interpreted as follows:

- Profile of the students
- Metacognitive Awareness
- Relationship between student variables and metacognitive awareness

Profile of the sample

The general profiles of the students included in this study are age, gender, and birth order, grade of study and locale of the school. The descriptive statistics of these variables are shown in table 2 and discussed below.

Table - 2 Distribution of the sample according to student variables (N=120)

S. No.	Variables		Number	Percentage
1.	Gender	Boys	60	50.0
		Girls	60	50.0
		12 years	19	15.8

2.	Age	13 years	48	40.0
		14 years	34	28.4
		Above 15 years	19	15.8
3.	Birth order	First child	63	52.50
		Second child	44	36.7
		Third child& above	13	10.8
4.	Grade of study	7th	41	34.2
		8 th	39	32.5
		9 th	40	33.5
5	Locale of the school	Rural	60	50.0
		Urban	60	50.0

Table-2 shows the distribution of sample according to selected students variables: gender, age, birth order and grade of study and locale of the school. The sample was selected to include equal percent of boys and girls. Around 55 per cent of students were in the age group of below 13 years and 45 per cent were above 14 years. In the sample, 52 percent were first born, 36 per cent were second born and 10 per cent were third or later born children. Based on locality equal numbers of students were selected from rural (50 percent) from urban area school (50 percent).

Metacognitive Awareness

Metacognitive knowledge is also called Metacognitive awareness is what individuals know about themselves and others as cognitive processors. The metacognitive awareness of the sample was assessed using Metacognitive Awareness Inventory developed by Schraw & Dennison, 1994. The score ranges from 0-52. The mean score of meta cognitive awareness was shown in table. 3

It is evident from the table.4 that there was no significant difference between boys and girls in their metacognitive awareness score as the t-value (0.609) was not significant. However, it can be inferred from table. 4 that girls have higher meta cognitive score in comparison to boys. These results are in congruence with findings of Jaleel & Premachandran (2016). This might be due reason that high school girl shows more seriousness and involvement in studies in comparison to boys.

Metacognitive Awareness of High School Students based on Age

In order to compare the metacognitive awareness of high school students based on their age, mean, standard deviation and t - values were calculated and tabulated below in below table 5.

Table-5 Metacognitive Awareness of High School Students based on Age

S. No	Age	Metacognitive Awareness score		f-value
		Mean	S.D	
1.	12 years (n=19)	28.15	9.221	2.611* P<0.039
2.	13 years (n=48)	27.59	8.414	
3.	14 years (n=34)	28.58	9.322	
4.	Above 15years (n=19)	31.43	8.17	

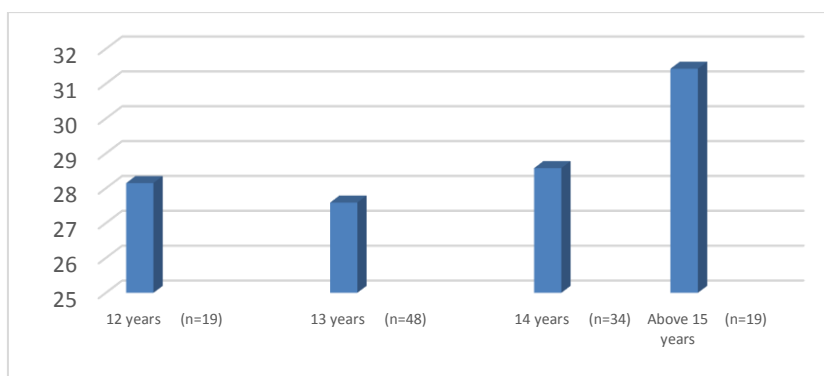


Fig 2. Metacognitive Awareness of High School Students based on Age.

An observation of table - 5 and figure 2 showed that the sample student’s metacognitive awareness score differed significantly according to their age. The f-value 2.611 was found to be significant at 0.05 levels. From the table-5 it can be inferred that as the age increases, the metacognitive score of sample students also increased. These results are in line with the studies of Schneider (2008), who reported that age trends were observed for metacognition and were significant for self-control activities but not for monitoring abilities.

Metacognitive Awareness of High School Students based on Birth Order

In order to compare the metacognitive awareness of high school students based on Birth order, mean, standard deviation and t values were calculated and tabulated below in below table. 6.

Table-6 Metacognitive Awareness of High School Students based on Birth Order

S. No	Birth order	Metacognitive Awareness score		f-value
		Mean	S.D	
1.	First child(n=63)	30.66	8.37	1.353@ P<0.262
2.	Second child(n=44)	30.29	9.81	
3.	Third child& above(n=13)	26.15	9.96	

It is evident from table-6 that there was no significant difference in the metacognitive awareness score of sample students according to birth order. The f-value was 1.353, which is not significant. Comparatively first and second born children have more metacognitive awareness score than later born children. This might be due to the reason that first and second born children get more parental attention and guidance for the development of thinking and cognition.

Metacognitive Awareness of High School Students based on Grade of Study

In order to compare the metacognitive awareness of high school students based on Grade of study, mean, standard deviation and t- values were calculated and tabulated below in below table. 7.

Table-7 Metacognitive Awareness of High School Students based on Grade of Study

S.No.	Grade of study	Meta cognitive Awareness Score		f-value
		Mean	S.D	
1.	7th class (n=41)	30.63	8.114	1.712@ P<0.185
2.	8th class (n=39)	27.89	7.853	
3.	9th class (n=40)	31.52	10.916	

It is evident from table -7 that there was no significant difference in the metacognitive awareness score of sample students according to grade of study. The f-value was 1.712 which is not significant. However, it can be observed from the table - 7 that comparatively 9th class students have higher mean metacognitive awareness score than 7th & 8th class students.

Metacognitive Awareness of High School Students based on Locale of the School

In order to compare the metacognitive awareness of high school students based on Locale of the school, mean, standard deviation and t values were calculated and tabulated below in below table 8.

Table-8 Metacognitive Awareness of High School Students based on Locale of the School

S. No	Locale of school	Metacognitive Awareness score		t-value
		Mean	S.D	
1.	Rural (n=60)	33.10	9.36	3.883***
2.	Urban (n=60)	26.98	7.82	P<0.000

It is evident from table-8 that there was significant difference in the metacognitive awareness score of sample students studying in rural and urban schools. The t-value was 3.883 which were significant at 0.000 level. Comparatively students studying in rural schools have more metacognitive awareness score than those studying in urban schools. The results are incongruence with the findings of previous studies that metacognitive awareness of rural area secondary school students was significantly higher than urban students (Jaleel and Premachandran, 2016)

CONCLUSIONS

Metacognition is the awareness of "thinking about how we think". It helps us to understand our action, feelings, needs and behaviours that allow us to adapt to the challenges of life. The findings of this study shown that majority of high school students were good in metacognitive awareness skills. There is significant difference in metacognitive awareness of high school students based on their age and locale of school. The mean metacognitive awareness of students increases significantly with their age. Metacognitive awareness of rural area students was significantly higher than urban area students. The mean metacognitive awareness of girls was higher than boys but found to be insignificant. In terms of birth order, first born and second born children metacognitive awareness is better in comparison to later born children.

All the students are not equally motivated to perform well in academics and other aspects of life. Metacognition is a powerful technique for students to understand their own cognitive abilities and learning processes and consciously bring desirable changes in their learning behaviour to improve their academic performance. Hence, Metacognitive thinking techniques must be inculcated in children for promoting self-awareness, problem solving, decision making, resilience and other important life skills to do best in their life.

LIMITATIONS AND SUGGESTIONS FOR FURTHER RESEARCH

This study is limited to 120 high school students studying in Tirupati, Andhra Pradesh. Similar studies can be taken up with large sample for different age groups (varied educational level) to understand the development of metacognitive awareness among children. The findings of the present study also point towards future directions for epidemiological research to identify the trends and correlates of metacognitive skills among children.

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ATTITUDE TOWARDS PSYCHOACTIVE SUBSTANCES AMONG EMERGING ADULTS

Geetika Sachdeva ¹ and Simran Kaur ²

¹ Assistant Professor, ² Research Scholar,

Department of Human Development, J.D. Birla Institute,

Affiliated to Jadavpur University, Kolkata, West Bengal, India.

E-mail: ¹geeths1111@gmail.com, E-mail: ²simkaur9298@gmail.com

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ABSTRACT

Emerging Adults are a positive force of a nation and are responsible for the future productivity. India has fallen into the viscous cycle of consuming psychoactive substances, causing threat to health and becoming a social concern. It is a universal phenomenon with its roots in history and tradition. The aim of the study is to assess the 'Attitude towards Psychoactive Substances among Emerging Adults'. A self-prepared questionnaire containing 22 questions was circulated to deduce the objective of the study. The study revolved around the emerging adults (both male and female) belonging to the age group of 18-25 years. The data was collected by snowball sampling from 107 female and male respondents. The collected data was analyzed with the help of graphical representations and t-test. From the results, it was found that there is no significant difference in the attitude towards psychoactive substances among emerging adults. Also, it was analysed there is no significant difference in the awareness towards ill effects of psychoactive substances among emerging adults. It can be stated that peer pressure, lack of knowledge, curiosity, stress, media influence and cultural norms play a major role in consumption of psychoactive substances. The influence of psychoactive substances continues to grow, drawing an even larger number of people universally, which is a serious issue and needs constant monitoring.

Keywords: attitude, awareness, consumption, emerging adults and psychoactive substances.

INTRODUCTION

The World Health Organization (WHO) defines a Psychoactive Substance as a substance that when taken in or administered into one's system, affects mental processes (perception, consciousness, cognition or mood and emotions). Psychoactive substances are powerful demon that enters an individual's life and takes over it. The emerging and adapting world of Psychoactive Substances is creating devastating effects on users worldwide. They are harmful to mankind, adversely affecting physical as well as psychological wellbeing, especially of the youth of any nation as college is often the time where people begin to engage in substance use. Alcohol and marijuana are the substances that are initiated by college students. Alcohol is the leading substance of abuse for this demographic, with marijuana being the topmost drug of choice, according to the U.S. Department of Health and Human Services (HHS) Office of Adolescent Health (2018). Emerging adults often referred to as College Students is the period between the late teens and early twenties; ages 18-25, (*Society for the Study of Emerging Adulthood, 2016*). Early adulthood, is taken as a period for establishing personal and economic independence, career development, and for many, selecting a mate, learning to live with someone in an intimate way. For some, it can also be a period for starting a family, or rearing children. (Santrock, 2011). They may feel that only after consuming alcohol and/or drugs they fit in their social circle. Substance abuse can reduce inhibitions, and elevate self-confidence levels temporarily. Drugs and alcohol can potentially numb or minimize

difficult emotions for a short time and may provide a desired escape from reality. Abuse of psychoactive substances becomes a priority for society in the last decades of the 20th century.

REVIEW OF LITERATURE

Consumption of these substances is increasingly precocious and has reached high rates of incidence and prevalence associated with serious health risks. For several centuries, psychoactive substances have been widely used all over the world for various reasons.

Several other psychoactive substances are utilized in societies for one medicinal purpose or the other. (*Department of Psychiatry, University of Botswana Medical School, 2018*). Using drugs or alcohol at a young age before the brain is fully developed can create a host of emotional, physical, social, behavioural, and interpersonal issues. According to the National Institute of Drug Abuse, abuse of alcohol and drugs by college students may present unique circumstances wherein specialized treatment methods are ideal to foster a healthy lifestyle for a long-term recovery. Considering a varied range of active use of substance among college students (18-25 years).

IMPLICATIONS OF THE STUDY

The study on "Attitude towards Psychoactive Substances among Emerging Adults" can have several implications, both for individuals and society as a whole. Here are some potential implications:

1. **Understanding Substance Use Patterns:** The study can shed light on the attitudes of emerging adults (usually individuals aged 18-25) towards various psychoactive substances such as alcohol, tobacco, marijuana, prescription drugs, and other illicit drugs. Understanding these attitudes can help identify potential patterns of use and associated risks.
2. **Risk Perception and Prevention Efforts:** The findings of the study can reveal how emerging adults perceive the risks and benefits of using psychoactive substances. This information can be invaluable for designing targeted prevention and intervention programs to address misconceptions and promote healthier attitudes towards substance use.
3. **Policy Implications:** The study can have implications for drug policies and regulations. If a significant portion of emerging adults holds favorable attitudes towards certain substances, policymakers may need to reevaluate existing policies and develop more effective strategies to regulate their availability.
4. **Substance Use Disorders:** Understanding attitudes towards psychoactive substances can provide insights into potential risk factors for the development of substance use disorders among emerging adults. Early identification of risk factors can lead to more effective prevention and early intervention efforts.
5. **Co-Occurring Mental Health Issues:** The study may uncover associations between attitudes towards psychoactive substances and mental health conditions. Identifying these relationships can help healthcare professionals address underlying mental health issues that may contribute to substance use.
6. **Cultural and Societal Factors:** The study can reveal cultural and societal influences on attitudes towards psychoactive substances. Different cultural norms and social contexts can play

a significant role in shaping these attitudes, and understanding these factors can inform culturally sensitive prevention and treatment approaches.

7. **Educational Interventions:** The findings of the study can inform educational initiatives targeted at emerging adults to increase awareness of the potential risks associated with psychoactive substances and promote responsible decision-making.
8. **Healthcare Provider Training:** Healthcare providers can benefit from the study's insights to better understand their patients' attitudes towards psychoactive substances. This understanding can improve communication, early detection of problematic substance use, and the provision of appropriate support and treatment.
9. **Substance Use Trends:** The study can contribute to the broader understanding of substance use trends among emerging adults. This knowledge can aid in predicting future patterns of substance use and identifying emerging public health concerns.
10. **Long-term Outcomes:** Researching attitudes towards psychoactive substances among emerging adults can help track the long-term consequences of their attitudes and behaviors, providing valuable data for longitudinal studies on substance use and associated outcomes.

In conclusion, the study on "Attitude towards Psychoactive Substances among Emerging Adults" can offer valuable insights into the factors influencing substance use among this population, informing prevention, intervention, and policy efforts to promote healthier behaviors and reduce potential risks associated with substance use.

AIM

The aim of this study is to understand the attitude and opinions towards psychoactive substances among emerging adults.

OBJECTIVES

1. To determine the significant difference and compare the attitude towards consumption of psychoactive substances among emerging adults (males and females).
2. To determine the significant difference between the awareness towards the ill effects of psychoactive substances among emerging adults. (males & females).
3. To examine the contributing factors i.e., the reason behind consumption of psychoactive substance in emerging adults. (males & females).

HYPOTHESIS

H₀₁: There is no significant difference in the attitude towards psychoactive substances among emerging adults (males and females).

H₁: There is significant difference in the attitude towards psychoactive substances among emerging adults (males and females).

H₀₂: There is no significant difference in the awareness towards the ill effects of psychoactive substances among emerging adults. (males & females).

H₂: There is significant difference in the awareness towards the ill effects of psychoactive substances among emerging adults. (males & females).

METHODOLOGY

Participants

To fulfil the aim of present study, data was collected online due to the covid-19 pandemic through snowball sampling from 107 respondents. The study was carried out with emerging adults of the age range of 18-25 years. The respondents were both male and female individuals. The respondents consented to fill the self-prepared Google form. The questions in the form were prepared keeping the above stated objectives. For analysing the data, Ms-Excel software was used and statistical functions were applied.

RESULTS AND DISCUSSIONS

To determine the significant difference and compare the attitude towards consumption of psychoactive substances among emerging adults (males and females), according to the null hypothesis (H₀), that there is no significant difference in the attitude towards psychoactive substances among emerging adults (males and females). However, according to alternate hypothesis (H₁), there is significant difference in the attitude towards psychoactive substances among emerging adults (males and females). In order to test the above given hypothesis, Hypothesis Testing for t-Test: Two-Sample Assuming Unequal Variances was used and following results were obtained using the Excel Software. The results indicated that calculated value of t-Stat < t-Critical two-tail, that is $1.8 < 1.98$ at 0.05 level of significance. According to, t-Test: Two-Sample Assuming Unequal Variances if the value of calculated t-Stat is less than that of t-critical two tail value, the null hypothesis is accepted in the above given case. Therefore, it can be stated that there is no significant difference in the attitude towards psychoactive substances among emerging adults (males and females).

Table 1 Statistical results of the Comparison of Attitude towards Psychoactive Substances among emerging adults.		
Descriptive Statistical Measurement	Males	Females
Mean	1.86	1.90
Standard Deviation	0.12	0.13
Coefficient of Variation	6.45%	6.84%

Table two states the comparison of Attitude towards Psychoactive Substances between males and females with respect to Mean, Standard Deviation and Coefficient of Variation.

Table 2 Statistical results of the Attitude towards Psychoactive Substances among emerging adults by running t-test	
t-Test: Two-Sample Assuming Unequal Variances	

t Stat	1.80
P(T<=t) two-tail	0.07
t Critical two-tail	1.98

Thus, it can be said that there is a slight difference of attitude after comparing the results; it can be seen that the mean value of Attitude towards Psychoactive Substances between males and females is 1.86 and 1.907 respectively, and the standard deviation between males and females is 0.13 and 0.12 respectively. From the value of respective means, it can conclude that there is no significant difference between the attitude of males and females towards the consumption of psychoactive substances, but the attitude of female category is more variable than compared to the male category.

To determine the significant difference between the awareness towards the ill effects of psychoactive substances among emerging adults. (males & females). According to the null hypothesis (H_0), there is no significant difference in the awareness towards the ill effects of psychoactive substances among emerging adults. (males & females). According to alternate hypothesis (H_1), there is significant difference in the awareness towards the ill effects of psychoactive substances among emerging adults. (males & females). In order to test the above given hypothesis, Hypothesis Testing for t-Test: Two-Sample Assuming Unequal Variances was used and following results were obtained using the Excel Software.

Table 3	
Statistical results of the Awareness towards the ill effects of Psychoactive Substances among emerging adults by running t-test	
t-Test: Two-Sample Assuming Unequal Variances	
t Stat	0.66
P(T<=t) two-tail	0.51
t Critical two-tail	1.98

The results indicated in the above table show the calculated value of t-Stat < t-Critical two-tail, that is $0.66 < 1.98$ at 0.05 level of significance. According to, t-Test: Two-Sample Assuming Unequal Variances if the value of calculated t-Stat is less than that of t-critical two tail value, we accept null hypothesis. Thus the null hypothesis is accepted in the above given case. Therefore, there is no significant difference in the awareness towards ill effects of psychoactive substances among emerging adults (males and females).

To examine the contributing factors i.e., the reason behind consumption of psychoactive substance in emerging adults. (males & females). It is observed that a maximum of 27% male and 26% female respondents, reported that people consume drugs/alcohol due to stress from the various responses stated in the question. Stress has long been known to increase vulnerability to addiction. When drugs are introduced to the body, it causes a euphoric feeling. The brain's communication system of sending, receiving and processing information is hampered. After consuming psychoactive substances, a natural neurotransmitter called dopamine is produced in high levels and the normal production of dopamine is prevented. After repeated use of substances, the brain adjusts to the dopamine surge and encourages the brain to repeat the activity; which is why emerging adults turn to drugs and alcohol to reduce stress and deal with challenges like peer pressure,

relationship problem, making their own decisions, academic stress and other stress related problems.

Also, according to the opinion of the second highest responses, 23% male and 22% female respondents reported that people consume drugs/alcohol due to peer pressure. There is a transition from adolescence to young adulthood. In order to explore their identities, individuals start pulling away from their parents as peer groups can help in identity formation, as stated by Erik Erikson. Peers can inspire their friends in supportive or destructive ways when it comes to drug use. In various circumstances, social pressure may prevent or indulge people from using drugs or persuade them to use or not use any drugs at all. Thus, peer pressure is a major contributor to substance use.

Curiosity is also one of the reasons behind consumption of psychoactive substances in emerging adults. 19% male and 15% female respondents opted for this option. During the 5th stage of psychosocial development: Identity vs. Role Confusion by Erik Erikson, adolescence become curious and start to explore themselves and their identity through personal beliefs and goals. At this stage, curiosity is strong. Individuals wish to fit in the social group and become popular. They might use uncomfortable ways to be accepted; and this may lead to consumption of psychoactive substances and eventually they may fall into addiction.

Apart from the above responses it was also noted that media influence, lack of knowledge and cultural norms, were also an indicative factor behind consumption of psychoactive substances.

CONCLUSION

The developmental challenges encountered during the transition (adolescence to adulthood) from school to college to pursue a career need to be addressed successfully. The youth suffer fear, anxiety and stress that greatly affect their mental health which causes sleep problems, and body complaints such as muscle tension. Psychoactive substances meddle with the functioning of the brain and causes changes in attitude, perception, opinion, emotions, or behaviour. Different risk factors of substance use are salient at different times of life. The threat to consume substances has reached a segment where the traditional ways of viewing the use needs to be reassessed. Traditionally, psychoactive substances were used by pastors in religious ceremonies, used for medical purposes and also by general population in a socially accepted manner. The consequences of dependence on psychoactive substances are a growing problem, in the society. This habit not only affects health, education and occupational career, but it also incurs an enormous financial and social burden on the society. The key to sail through this crisis is building emotional resilience (the ability to adapt to stressful situations) amongst the youth. Building resilience can help improve one's life and happiness as well as reduce and prevent substance use in youth and adults. The usage of substance can be reduced with supportive programs. This creates a safe and supportive community and connecting families to different resources that will promote healthy behaviour. Therefore, focus on individual abilities or strengths can help build resilience and reduce substance use. Thus, socio-emotional learning is a critical aspect of any student's holistic development. An individual will have social and emotional wellness, mindfulness and self-care by inculcating resilience. Although, substance use may seem impossible to eradicate, there are concrete measures that can be taken to decline the hold of psychoactive substances.

SUGGESTIONS FOR FUTURE RESEARCH

1. Standardised test can be used for deriving accurate results.
2. Different stages of development can be taken into consideration to have a comparison between attitudes towards the use of psychoactive substances.
3. Low socio-economic background can be taken into consideration.
4. The aspect of treatment can also be taken into consideration.
5. A study can be done on the Individuals who consume psychoactive substances to understand their quality of life.

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USE OF COMMUNICATION TECHNOLOGIES IN ROMANTIC RELATIONSHIPS: IMPACT ON FORMATION, PROCESS AND RELATIONSHIP QUALITY

Nandhini Jaganathan¹ Dr. Jigisha Gala² Nishrin Ghadiyali³

¹Research Scholar, ²Assistant Professor, ³PhD Research Scholar

Department of Human Development and Family Studies

Faculty of Family and Community Sciences

The Maharaja Sayajirao University of Baroda

E-mail: jigisha.gala-hdfs@msubaroda.ac.in

ABSTRACT

Contemporary technological changes have made romantic relationships more common, closer in terms of space and time and also more challenging as evident in some negative outcomes. The current study engaged 120 emerging adults from Delhi and Vadodara, aiming to understand the influence of technological use on the formation, maintenance and quality in romantic relationships. Quantitative inventories such as CTFS and PRQC supplemented by few qualitative questions were used to assess the media use patterns, frequency and relationship quality of emerging adults. Findings reveal that the positive aspects of communication technologies such as intimacy, passion, love and connectedness, warning for trust and commitment issues leading to misunderstanding, stalking and intimacy avoidance. In conclusion, using technology in a relationship is deeply embedded, unavoidable but also desirable and neutral; augmenting that which is already there, be it connectedness or the feeling of isolation and insecurity, hence educating emerging adults to develop positive relationship skills is the key to healthy relationships.

Keywords: Communication technologies, emerging adults, romantic relationships, relationship quality

INTRODUCTION

Forming intimate relationships is an important milestone for emerging adults as it plays a major role in identity formation, strengthening the social connections leading to a mutually satisfying bond (Off, 2016). The increasing influence of technology in romantic relationships cannot be ignored. According to Madell and Muncer (2007), young adults often prefer to use technology-assisted communication as it gives them control over the social interactions and hence it has become integral in the formation, maintenance and dissolution of these relationships. Variety in forms of communication media has led forming romantic relationships easy but the maintenance of it becomes challenging, with time proving technology to be a barrier within the relationship, adversely impacting its quality.

REVIEW OF LITERATURE

Mobile Technologies, Romantic Relationships, Relationship Quality *Relationship Formation*

In recent years, in the context of relationship formation, the advancement of the technology has brought adults to gradually enter into new behaviors such as hanging out, sexting, online dating and talking to multiple people at the same time to determine compatibility. The concept of online dating has become very common these days for very obvious reasons. First, it has become easy to meet like-minded people on the internet than in real life. Secondly, the concept of actually getting help from friends and dating someone from your acquaintance is not involved when it comes to online dating. Third, the visual pressure is reduced and the choice of self-disclosure becomes easy. Online dating does not pressure one to do anything that one would be expected to do in face-to-face setting; on the contrary, online dating provides one with the advantage of terminating the conversation whenever one wants (Valkenburg & Peter, 2007). Last, technology has also helped individual with social anxiety to interact and disclose their true self to other people through these media. Dating sites, Social networking sites (SNS), Chat rooms, virtual worlds have not only increased intimacy between couples but it has also allowed individuals to meet new people when they are in search of new relationships (Campbell & Murray 2015).

Relationship Maintenance

Interactive forms of technology in romantic relationships provide more closeness and connection to the couples (Coyne, et al., 2011). Text messaging is the most commonly used technology, because of which many couples prefer texting over phone calls most of the time also because of the privacy it affords (i.e., lack of verbal noise). This form of interaction makes these couples more confident, open to all types of conversations, better emotional connect and positive interaction with their partners. According to McDaniel and Coyne (2014), with reference to relationship maintenance, texting has increased the intimacy between partners by making them more available giving their full supply of attention for their connection. Studies reveal that emerging adults in romantic relationships feel that using text messages frequently lead to a positive connection in their relationships, which also improves the quality of relationships (McDaniel & Coyne 2014; Coyne et al., 2011). Individuals in long distance relationships have found these technological advancements very useful for relational maintenance (Off, 2016).

Given the positive and useful aspects of technology-assisted communication in relationship maintenance, other concerning factors may lead to relationship deterioration. The monitoring levels of a relationship increases when the partner feels insecure and uncertain about their significant other. If a person feels uncertain about their partner's feelings then stalking and keeping track of the partner's whereabouts, become common place to regain certainty (Fox & Warber, 2014). Technology usage, if not regulated well becomes troublesome while communication with partners online and with time start hindering face to face communication also. Technology is appealing, accommodating and easily accessible and individuals can also use these technologies for gratifying activities which can undermine the intimacy in a romantic relationship. This, has also paved way for the partners to choose technology over meeting their significant others (Campbell & Murray 2015).

The concept “phubbing” has come into play for a long run which literally means to be “snubbed” by someone with a “phone” call or a text message during a time when you are in a close proximity but are still greeted by a phone call or a text message. It creates a danger where the partner feels that their partner is not present in the conversations, they feel left out and odd. The urge of the person to respond to someone else’s voice call, text message or a social media notification gives an image to their romantic relationship partner that they are prioritizing their mobile phone before them (Roberts & David, 2016).McDaniel and Coyne (2014) explains how technology interferes relationships leading to partners having strong bond with the cell phones rather than with each other, also multitasking has come into fashion resulting in “Alone together” conditions (Roberts& David, 2016).

Relationship Dissolution

Break-ups in relationships leave individuals in the stage of stress along with the mood swings with low life satisfaction and sadness. With the development of technology, Individuals have developed a habit of first avoiding their significant other on all the social media and then gradually breaking-up with them for good, this way has decreased the traditional ways of break-up like dropping a hint, starting an argument and such (Robert & Raquel, 2012). The level of avoiding the person that the individual is going to break-up has increased and with SNS, instant text messaging and other technology mediated communication, the dissolution of relationships have become easier.

RESEARCH OBJECTIVES

Broad Objective

- To understand the influence of technological use on the formation, maintenance and quality in romantic relationship.

Specific Objectives

- To examine the patterns of digital media use and its influence on the nature and quality of romantic relationships.
- To know the gender differences the differences across cities (Delhi & Vadodara) in the aforementioned objective.

METHODOLOGY

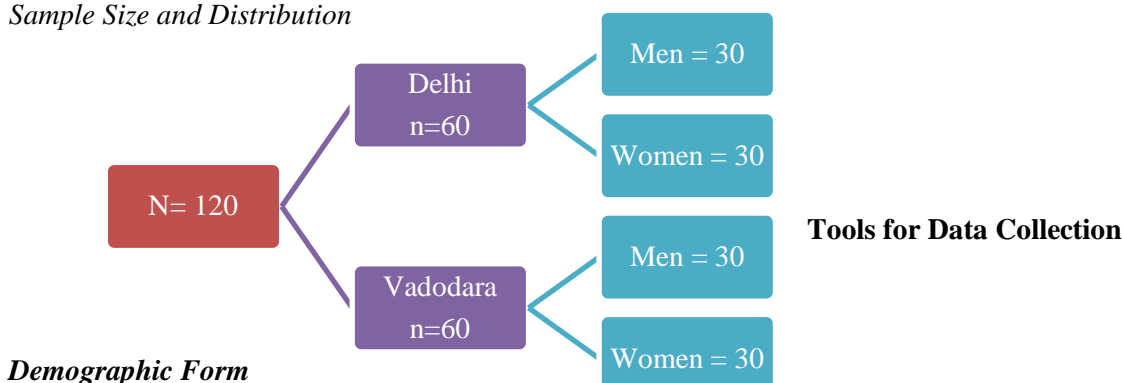
Research Design

The present study adopts a quantitative research design supplemented by few qualitative questions to understand the relationship between frequency of technology use, level of commitment and the quality of relationship in romantic relationship among committed emerging adults from Delhi and Vadodara. Purposive snow ball sampling technique was used to identify the participants.

Sample Size and Distribution

Figure 1

Sample Size and Distribution



Demographic Form

The demographic form was used to gather participants' personal information which includes their age, gender, state and qualification and information about their romantic relationship such as the duration of relationship and the medium of relationship formation was asked.

Communication Technology Frequency Scale (CTFS)

The Communication Technology Frequency Scale (Off, 2016) was used to measure three variables which includes:

- Frequency of communication technology used with others excluding the partner,
- Perception of partner's use of communication technology with others excluding the participant and
- Use of communication technology with only the partner.

Three subscales are used with a total of 17 items to measure these specific variables. Scoring options range from 0 (*never*) to 6 (*10 or more times a day*) and for amount of time (*less than 1 hour* to *5 or more hours*).

Perceived Relationship Quality Components Inventory (PRQC) Adapted from Fletcher, Simpson, and Thomas, (2000).

The scale covers following domains:

- Relationship satisfaction
- Commitment
- Intimacy
- Trust
- Passion
- Love.

Also two open ended qualitative questions were used along with the above scales to know different aspects of using technology and its impact on the participant's relationship.

The following abbreviations of domains are used in results, discussion and conclusion sections.

CWO - Communicating with others, excluding the partner

PWO - Partner communicating with others, excluding the participant

CWC- Communication within the couple

RS - Relationship satisfaction

RESULTS AND INTERPRETATIONS

Results and interpretations of the study are divided into following sections:

Section 1 Relationship among all domains of CTFS and PRQC

Section 2 - Gender differences among all domains of CTFS and PRQC

Section 3 - Difference in cities among all domains of CTFS and PRQC

Section 4 - Positive impact of using technologies

Section 5 - Negative impact of using technologies

Section 1 Relationship among all domains of CTFS and PRQC

Table 1

Correlation among All Domains of CTFS and PRQC *N=120*

Domain	CW				COM	Intimac		Passio	
s	O	PWO	CWP	RS	M	y	Trust	n	Love
CWO	1	.562*	.579*	-	-.074	-.027	-.125	-.033	-.002
		*	*	.09					
				8					
		119	119	119	119	119	119	119	119
PWO		1	.613*	.06	-.033	.124	-.039	.152	.040
			*	2					
				120	120	120	120	120	120
CWC			1	.17	.127	.233*	.126	.274**	.223*
				6					
				120	120	120	120	120	120
RS				1	.807**	.760**	.650*	.449**	.702*
							*		*
					120	120	120	120	120
Comm					1	.728**	.621*	.439**	.809*
							*		*
						120	120	120	120
Intimac						1	.666*	.635**	.757*
y							*		*
							120	120	120
Trust							1	.323**	.687*
									*
								120	120
Passion								1	.430*
									*
									120
Love									1

** . Correlation is significant at the 0.1 level (2-tailed).

* . Correlation is significant at the 0.5 level (2-tailed).

Table 1 depicts the Pearson Correlations between the domains of the scales used in CTFS and PRQC. Both the domains, viz., communication with other, excluding the partner and partner communicating with others, excluding the participant domains had a negative correlation with all the domains of relationship quality scale, i.e. when the amount of use of technology increases the relationship satisfaction, commitment, intimacy, trust, passion and love decreases. Results indicate how technological distractions may lead to lack of communication within partners resulting in issues related to commitment and intimacy in relationships, whereas, the domain of communication with the partner had a positive and small correlation with domains of intimacy, passion and love.

Section 2 - Gender differences among all domains of CTFS and PRQC

Table 2 Gender Difference with Reference to Domains of CTFS and PRQC

N=120

Domains		t	df	Sig. (2 tailed)	Mean difference
CWO	Equal variance assumed	.257	117	.797	.197
PWO	Equal variance assumed	1.484	118	.141	1.233
CWC	Equal variance assumed	1.588	118	.115	1.600
RS	Equal variance assumed	2.763	118	.007*	1.767
Commitment	Equal variance assumed	3.164	118	.002*	2.733
Intimacy	Equal variance assumed	2.980	118	.004*	1.750
Trust	Equal variance assumed	2.358	118	.020*	1.483
Passion	Equal variance assumed	1.893	118	.061	1.400
Love	Equal variance assumed	3.798	118	.000*	2.167

Significance level < 0.05

Table 3 Mean and Standard Deviation of Gender Difference with Reference to Domains of CTFS and PRQC

N=60

Variables	Gender	Mean	Std. Deviation
CWO	Women	11.85	3.934
	Men	11.65	4.418
PWO	Women	9.33	4.440
	Men	8.10	4.664
CWC	Women	16.58	5.166
	Men	14.98	5.850
RS	Women	18.98	2.633
	Men	17.22	4.195
Commitment	Women	28.07	3.272
	Men	25.33	5.836
Intimacy	Women	18.87	1.944
	Men	17.12	4.113
Trust	Women	18.45	2.600
	Men	16.97	4.121
Passion	Women	15.80	3.579
	Men	14.40	4.473
Love	Women	20.50	1.524
	Men	18.33	4.14

Table 2 and 3 shows the t – test, Mean and Standard deviation of gender difference with reference to domains of CTFS and PRQC. It reveals that there was a significant difference in the relationship satisfaction, commitment, intimacy, trust, and love domain. And there was no significant difference in the domains of communication technology frequency scale and passion. Mean score reveals that the women had the higher mean score than men in all the domains of the perceived relationship quality components scale and communication technology frequency scale. Based on the results, it could be interpreted that men used technology for relationship formation and women used for relationship maintenance as the qualities of relationship by using technology for women were much better than that of men.

Section 3 - Difference in cities among all domains of CTFS and PRQC

Table 4 Difference in Cities with Reference to Domains of CTFS and PRQC

N=60

Variables		t	df	Sig. (2 tailed)	Mean difference
CWO	Equal variance assumed	.268	117	.789	.206
PWO	Equal variance assumed	.119	118	.905	.100
CWC	Equal variance assumed	-1.487	118	.140	1.500
RS	Equal variance	-1.531	118	.129	1.000

Commitment	assumed Equal variance	-1.803	118	.074	1.600
Intimacy	assumed Equal variance	-3.288	118	.001*	1.917
Trust	assumed Equal variance	-2.923	118	.004*	1.817
Passion	assumed Equal variance	-2.268	118	.025*	1.667
Love	assumed Equal variance	-2.669	118	.009*	1.567

Significance level < 0.05

Table 5 Mean and Standard Deviation of Difference in Cities with Reference to Domains of CTFS and PRQC

N=60

Variables	Gender	Mean	Std. Deviation
CWO	Vadodara	11.85	4.317
	Delhi	11.64	4.046
PWO	Vadodara	8.77	5.270
	Delhi	8.67	3.803
CWC	Vadodara	15.03	6.151
	Delhi	16.53	4.820
RS	Vadodara	17.60	4.207
	Delhi	18.60	2.812
Commitment	Vadodara	25.90	5.874
	Delhi	27.50	3.572
Intimacy	Vadodara	17.03	3.840
	Delhi	18.95	2.375
Trust	Vadodara	16.80	3.887
	Delhi	18.62	2.841
Passion	Vadodara	14.27	4.242
	Delhi	15.93	3.795
Love	Vadodara	18.63	3.987
	Delhi	20.20	2.185

Table 4 and 5 show the t – test, Mean and Standard deviation of difference in cities with reference to domains of CTFS and PRQC. It reveals that there was a noticeable difference in the intimacy, trust, passion and love domain and there was no significant difference in the domains of communication technology frequency scale and in relationship satisfaction and commitment

domain. Mean score reveals that the Delhi participants had higher mean than Vadodara participants in all the domains of both the scales. By this it could be interpreted that Delhi being a metropolitan city, owing to busier lifestyles and longer distances, technology is more often used to communicate with their partner as compared with the participants from Vadodara city.

Section 4 - Positive impact of using technologies

Figure 2

Positive Impact of using Technology

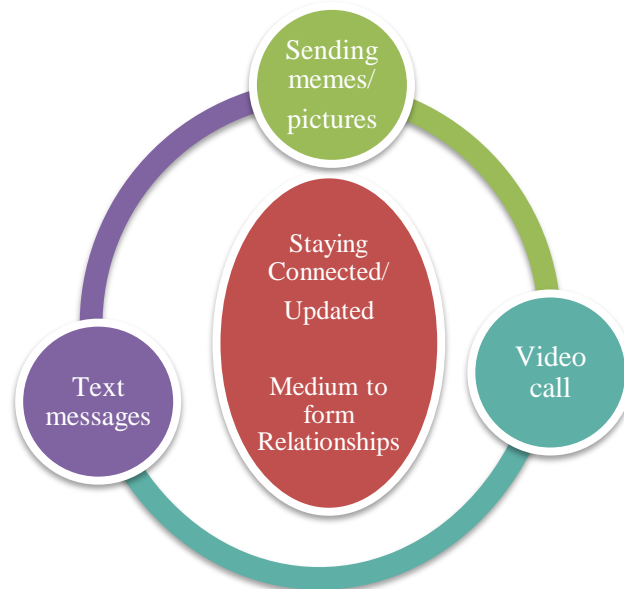


Figure 2 shows the positive impact of using technology in romantic relationship. One of the participants reported

“So in my case technology keeps us connected and updated about each other’s lives... Even if we can’t meet, but through technology we talk for hours and cherish our beautiful moments...”

Out of total 68% of Delhi and 56% of Vadodara participants reported that technology keep us connected or updated. Different ways of connecting through technology reported by participants were sending memes, video calling and texting.

In similar context, a participant reported

“If the girl or boy is far away from each other and if they can’t meet so that time you can use the technology...you can do video call, face time so you can feel like we are together at that moment...”

Largely, text messages were reported as positive impact for those participants who are more comfortable in having conversation through texting than having a face to face conversation. Social media platforms were also emphasized by participants as helpful in relationship formation,

“There are many positive aspects of using technology in a relationship. My relationship began on tinder, I love using social media”

Section 5 - Negative impact of using technologies

Figure 3 Negative Impact of using Technology

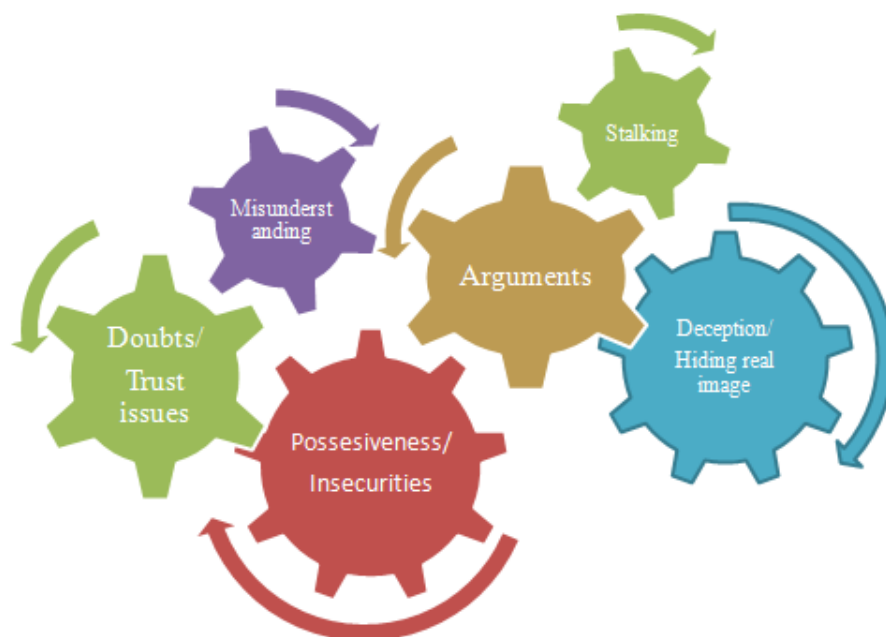


Figure 3 shows the negative impact of using technology in romantic relationship. Overall, 33% of women and 38% of men participants from both the cities reported misunderstanding or misinterpreting tone during texting leading to arguments and conflicts as a negative factor of using technology. In this context, one participant reported

“There are misunderstandings during phone calls as one cannot know the tone of the other person and also the intentions. And sometimes when messages are interpreted in wrong manner “.

Other negative aspects of technology reported by participants are losing interest in conversations due to the social media distractions, over possessiveness, insecurity leading to stalking and unrealistic expectations. Instances of stalking in participants words

“Both me and my partner are on social media, I stalk her because I am afraid, she can cheat on me, so I hide and I stalk her on social media.”.

DISCUSSION

This section discusses the issues brought up in the study.

Major Reasons of Using Technologies

Relationship Development

Technology is used to develop relationships. The current study shows that technology helps in meeting new people, as few participants reported that it makes it easy to meet people online and talk to them and it enhances their self-esteem. Also, expressing feelings through such a medium was perceived easier, as few men mentioned that they express their feelings with full confidence, but they become shy when they communicate through offline medium. According to

some participants, technology can also be used as a tool which helps to know more about the person with whom they are planning to start a relationship. Based on the results it is seen that men used technology for relationship formation than women as total number of participants who started their romantic relationship through online medium were men compared to women.

Relationship Management

As per the review of literature, the current research shows how using technology is seen as a key ingredient to maintaining and enhancing long distance relationships (Off, 2016). As few participants mentioned that in long distance relationships, technology is the medium through which the relationship can be maintained and if it was not for technologies such as texts, Whatsapp, Skype or social networking sites, these relationships would not be so possible.

The nature of the technology itself, being accessible and quick, is one of the main reasons such romantic relationships can be enhanced. Few participants stated that communication through technology is faster, easier, and available when you cannot be with your partner in person. Another participant highlighted technology increased the intimacy, as they can talk all day and it makes them feel closer when they are physically distant. Based on the results it is seen that women use technology more for relationship maintenance than men, as women were more satisfied and have a better relationship quality by using technology in their relationship (Muscanell & Guadagno, 2012). Finding of this study reveals, in spite of forming a relationship through online participants wanted to meet their significant others in person to gain trust and to be in a satisfactory relationship.

Emerging issues by using technologies

“In dating and life, use text as a tool for light maintenance for connection. Reserve meaningful conversations, arguments or viewpoints subject to misinterpretation for phone or in person”
(Eunice, 2021)

Based on the literature review, the current research shows that the participants level of monitoring or stalking behavior increases in a relationship when the partner feels insecure and uncertain about their significant other (Fox & Warber, 2014). Another reason for stalking behavior were mentioned by a participant that before start a relationship one can know more about that individual by monitoring their regular updates on social networking sites. Contrasting with literature review which says that texting with cell phones have increased the intimacy between partners by making them more available giving their full supply of attention for their connection, the present research shows that mostly conversation through texting lack context and cause misinterpretation of tone due to which it creates misunderstanding and reduces intimacy. Also being available all the time for their partner was not considered as positive thing from few participants, as it leads to the argument when partner doesn't reply or attend calls right away (McDaniel & Coyne, 2014).

Public display of affection (PDA) was mentioned by participants. Based on their responses it was clear that, this action does not promote wellness of their relationship among friends and family and it also doesn't mean that they are showing their level of commitment toward their relationship, instead the reason for their action was more related to having insecurities about their relationship. From the present research it was seen that technology was used more for relationship dissolution, or distracting oneself to avoid conflicts than using it for conflict management. Few participants mentioned that when there was a fight or argument between couple, instead of solving it, the individual voluntarily use technology to distract himself/herself by talking to someone else

in social networking sites. Also, distraction happens between partners when individual was talking to someone during the presence of their partner (Roberts& David, 2016). This indicates the need of awareness among youth regarding the correct utility of valuable technological tools in favor of relationship wellbeing and not against it.

As mentioned by few participants, the concept of being active on social media as a couple has increased the pressure on many relationships also it has created a way to jealousy and depression. It also affects the individual's physical and psychological health, due to which behaving in harmony with the community, acceptance of social reality and the ability to cope with them becomes difficult (Babadi-Akashe et al., 2014). Seeing other couples posting their pictures or videos creates an unrealistic expectation to an individual's mind which leads them to expect the same from their partners also, if these expectations are not fulfilled, the individual gets into depression thinking that their partner is not attracted to them, when in reality, their partner might just not interested in using social media platforms. The pressure becomes too much to show off the relationship and paves way for many fights and arguments.

“Alone together” is a phrase which was also found in the findings of the study, which means that couples might be together in the same room but using their own technological devices, sharing silence. Few participants reported that this action caused distraction between partners when the individual was talking to someone else during the presence of their partner. It can be also connected with the concept of “phubbing”, as along with the partner who is “phubbed” may feel left out or odd one out when their partner is not present in the conversations or paying attention to them (Roberts& David, 2016). This causes a void in their partner; they might feel depressed or it might affect their mental health. This concept of multitasking might prove to be a disadvantage to the relationships and might take away the essence.

CONCLUSION

Romantic relationships play a major role in an emerging adult's life and also emerge as an important milestone in their lives. The study shows the influence of technological use in all domains of relationship quality across genders and cities. Results of the study support as well contradict the past research regarding the relationship quality and impact of using technologies. The current study was able to show the correlation between the frequency of technology use and qualities of relationship in three different patterns (CWO, PWO, and CWC). It concludes that using technology in a relationship is embedded in everyone's life, the negative impact that it creates can be avoided if used in an appropriate way, which can lead to a positive development. Technology is neutral, it only arguments that which is already there, be it connectedness or the feeling of isolation and insecurities.

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DANCE MOVEMENT THERAPY (DMT) FOR ADOLESCENT GIRLS: A COMMUNICATION INTERVENTION FOR MENTAL HEALTH

Pragati Paul¹, Kashish Singh² and Krishna SankarKusuma³

¹ Senior Assistant Professor, ² PG Scholar, ³ Associate Professor

Anwar Jamal Kidwai Mass Communication Research Centre,

JamiaMilliaIslamia, New Delhi, India

Membership number: HSAI-2023-DL-1280-LF

Member Name: Dr. Pragati Paul

Email id: pbhalla@jmi.ac.in, kashishsingh.w@gmail.com, kkusuma@jmi.ac.in

ABSTRACT

The study is an attempt to examine the role of *Dance Movement Therapy (DMT)* in promoting the mental wellbeing of adolescent girls by making them self-aware. Dance is a non-verbal mode of communication, and the goal of the study is to learn how it may be used as a communication intervention for the mental health of teenagers. The implications of the study explore *Dance Movement Therapy* as a community intervention for development communication facilitators and social workers to use this strategy as an icebreaker session. The study employed action research, and the data was collected using qualitative methods like focus group discussions, field observation, and key informant interviews. The study also used intimate and in-depth DMT approaches in a field workshop conducted by the researcher as a facilitator with 11 adolescent girls from Nithari village. The DMT interventions aid in the integration of abilities such as self-awareness, body awareness, and confidence in venting their inner feelings. Major findings of the study reveal that DMT interventions proved to be an efficient component of participatory media as they have the ability to give instantaneous feedback. The study also revealed that *Dance Movement Therapy* can act as an effective instrument for fostering community engagement.

Key Words: Dance Movement Therapy (DMT), Adolescent Girls, Mental Health, Community Intervention, Participatory Method, Gender

INTRODUCTION

The World Health Organization considers mental health a condition of mental wellness that helps people manage life's stressors and develop their potential to give back to their communities by getting educated and earning a living (WHO, 2022). The onset of adolescence is frequently followed by a rise in the prevalence of body image issues in females (Voelker et al., 2015). There are several interventions used to educate and make adolescent girls aware of their bodies and make them feel confident. However, alternative interventions like Dance Movement Therapy have the potential to be more engaging and participatory in nature.

Dance is regarded as one of the best forms of non-verbal communication because it's a particularly personal and potent medium of self-expression through body movements and facial expressions. The movement and performative nature of dance make it suitable for transforming individual's lives. A performance is an activity of a given participant that serves to influence any of the other participants in any way (Schechner, 2020). Thus, performance and participation are interrelated.

Dance is an art that is seen in the Indian Context in festivals, celebrations, and also as an act of storytelling. In India, dance is also seen as a discipline that includes aspects of Natyashastra. Some classical Indian dance forms in India are Bharatnatyam, Kathak, Kuchipudi, etc. (Chakravorty 2004).

Dance movement therapy, as defined by the American Dance Therapy Association (ADTA), is the psychotherapeutic use of movement to promote health and well-being. DMT is an interconnection of mind and body, which broadly means that anything that has an impact on the body will have an impact on the mind. Dance Movement Therapy affects cognitive behaviour and social functioning (ADTA, 2020). It came into practice in India during the 1990s and is rooted in the USA and the United Kingdom.

Meekums (2008) noted that elements of emotional literacy like self-esteem, emotional expression and social function can be developed using Dance Movement Therapy. It is the first time a study related to emotional literacy and DMT has been conducted using a pilot study on teacher perceptions of workshops conducted in a school with a few students in the United Kingdom.

Participatory communication is a discourse between individuals, groups, and organizations that is dynamic, interactive, and transformational and helps people take an active role in their own well-being, both individually and collectively. The scholar explains that participation and communication go hand in hand (Singhal, 2001).

Justification of the Study

In recent times, dance movement therapy has been considered an effective community intervention in the fields of Social Work and Development Communication. According to Crooks & Mensinga (2021), empathy is an essential factor in nonverbal communication. The facilitator develops empathy with the help of movement with the target community. The facilitator moves along with the participant. A sense of trust is developed as one becomes more aware of their body. The research will benefit the field of communication, as the existing literature has not explored DMT as a communication intervention to improve the mental health of adolescents. Therefore, it is imperative to conduct such a study to explore how a performing art like dance can be considered a participatory medium of non-verbal communication between humans for promoting mental health.

OBJECTIVES

1. To examine how Dance Movement Therapy (DMT) can aid in improving the mental health of adolescent girls.
2. To understand the participants' collaborative experiences during the DMT interventions
3. To assess Dance Movement Therapy (DMT) as an effective participatory communication method.
4. To study the views of practitioners regarding DMT as an intimate and inclusive participatory communication tool.

METHODOLOGY

Research Design

Action research has been used for the study, as according to McIntosh (2010), action research and creativity have linkages together. This kind of research is conducted in collaboration with a researcher and the participants, which involves considerable reflexivity. The research is even exploratory in nature, as it is unique in its own way, but at the same time there is a wide range of existing knowledge. Action research acts as an extensive tool of learning for participants as they are actively involved in the research process (Somekh, 2006). The purpose of the study is to discover how dance might be used as a communication intervention for improving adolescents' mental health.

Sampling

The study explored the life journey of eleven adolescent girls belonging to the community of Nithari Village, surviving body image and other related issues, and the impact of dance movement therapy on their lives. Nithari is a hamlet in Sector 31 of Noida, Uttar Pradesh, where immigrants have lived for over 30 years with the Gujjar community. The village is heavily populated with migrants from Bihar, Jharkhand, West Bengal, and other parts of Uttar Pradesh (Singh, 2021). The parents of most of the girls work as domestic workers, masons at construction sites, working on food stalls, etc. in Noida. The research heavily relies on each participant's unique experiences, observations, ideas, and perspectives. This serves as the study's key premise and the primary source of information.

Purposive sampling was used to select the respondents. The inclusion criteria include school-going adolescent girls experiencing body image and other related issues and staying in the Nithari Village. Exclusion criteria include anyone who is not willing to share their life stories in depth. The total sample size of participants is 11, with 3 DMT practitioners. The population group of the study is the school-going adolescent girls experiencing body image and other related issues and staying in Nithari Village.

Data Collection Tools

Since the objectives of the study are related to understanding the in-depth experiences of the participants, the research design selected is qualitative in nature. Key Informant Interviews and Focus Group Discussions (FGD) with participants' guides were designed to collect the data. The research was conducted in four phases.

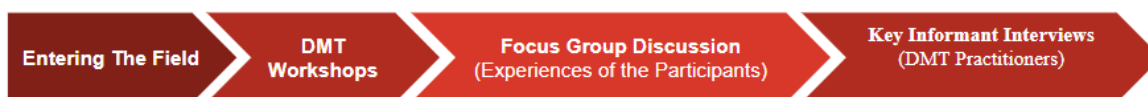


Fig.-2: Phases of the Study

Phase 1: Entering the Field

The first task of the researcher was to identify the target community with whom the workshops would be facilitated. The researcher identified the target community as the adolescent girls from Nithari Village.



Fig.-3: Photo Essay Archive (Singh, 2022)

The researcher then conducted a "Heard, Seen, and Respected" session (Keith McCandless, n.d.) with a group of 12 girls. Initially, the girls were hesitant to speak up about their personal issues, and there was a sense of hidden judgment against each other. Their movements were also restricted. The researcher also engaged with the parents of the girls to seek their consent as the minors were involved in the study. Out of 12 girls, only 11 submitted their consent forms and gave their consent to be a part of the DMT Workshop.

Phase 2: Journey of Workshops

The researcher conducted a DMT workshop with these 11 girls, who gave their consent to be a part of the research as participants. The researcher also acted as the facilitator of the workshop and designed the workshop modules inspired by the interventions she herself observed in the DMT workshops that she has attended as a participant or from academic manuals included in DMT and Psychology journals. A Feedback chart using a Bindi (Sticky Dots, worn in the centre of the forehead by women in India) was also present so that the participants could give anonymous feedback on the workshop, and a Post-it hanging was also present for the girls to write their feedback. Another element added to the room was a chart of Ground Rules for the participants and facilitator.



Fig-4: Participants with the Facilitators (Workshop Archive, September, 2022)

Several DMT interventions were used in the workshop. It was divided into three phases. The first phase included an ice breaking session - “Drawing Together” (Keith McCandless, *Liberating - structures, n.d*) and Warming up movements along with an opening ritual- “Introduction via Movement”.



Fig.-5: Drawing Together Session (Workshop Archive, September, 2018)

Other interventions that were included in the workshop were; Playing with Fictitious Object (Ball, Newspaper), 5 Senses & Soul Technique, Defense Scale Movement, Neurovascular Hold, Group Mirror Sequencing, Guided Imagery for Relaxation, Self-Reflection Activity- “Draw Each Other” and Creating Drama through emotions.



Fig.-6: Participants performing interventions
(Workshop Archive, September, 2022)

Phase 3: Focus Group Discussion to know the participants experience

The third phase of study consisted of Focus Group Discussion as the data collection tool to understand the experience of the participants post the DMT workshop. The participants were fully aware of the study's objectives and purpose, and their participation was entirely voluntary. The FGD was divided into 3 segments; Introduction, Personal & Background Based Questions & finally the Practice Based Questions. In order to add an edutainment element to the FGD, emoji based feedback was also used to answer close ended questions.



**Fig.-7: Participant performing Interventions with the Facilitator
(Workshop Archive, September, 2022)**

Phase 4: Perspectives of Dance Movement Therapy Practitioners/Facilitators

In the fourth phase Key Informant Interviews were conducted with 3 DMT practitioners/facilitators/experts. The interviews were in-depth and semi structured questions were asked. The interviews were conducted on the personal zoom call and lasted for 30 minutes each. The audio and video of the interviews were recorded and later transcribed to be included in the analysis and conclusion. The various DMT experts who were interviewed were; Shubham Srivastav, Founder, The MoveVent Project & Zanaan; Kruttika Joshi Deodhar, Freelance DMT Practitioner & Mental Health Counsellor and Somya Narang, Founder, Katharsis Counseling.

DISCUSSION & FINDINGS

The researcher carried out a thematic analysis following the focus group discussion, key informant interviews and the field observation. The field notes were combined with the data for coding and translation, which were then looked at in four categories, including Community Engagement, Participation & Facilitation, and DMT Practice for Mental Health and Dance for Self Expression.



Fig.-8: Thematic Analysis of Focus Group Discussion supported by Key Informant Interviews & Field Observation of DMT Workshop

Community Engagement

When the researcher entered the community for the first time, the girls were hesitant to speak. However, during the workshop, girls became more familiar with the sense of community as the facilitator conducted team-building exercises like the "Drawing Together" session (Keith McCandless, Liberating structures, n.d.). The facilitator had also set ground rules for all the participants to follow. The rules, like no judgement and everything discussed in the room shouldn't be discussed outside, gave the girls assurance that they could freely engage within the vicinity.



Fig.-9: Participant giving feedback for the workshop

(Workshop Archive, September, 2022)

The study found that the participant's definitions of adolescent mental health issues included stress, overthinking, short-temperedness, anxiety, daytime sleepiness, fatigue, etc. According to the discussion, the majority of girls preferred to be away from home since they dislike doing tasks around the house as most of their parents are working and the girls are keener to go to school and learn. At home, where they have to cope with issues like personal space, family strife, gender discrimination, character assassination, etc., they experience resistance. However, they also contend with body image as their main problem in the outside world. Kruttika Joshi Deodhar, DMT Facilitator, shared that the age of adolescence is the base for developing certain practises. She believes that any kind of expressive art brings authenticity to the table. This, in turn, helps the participants express themselves better. Women and adolescent girls always bear the threshold of the patriarchal setup that we are thriving in. (Personal Interview, 2022). Another participant exclaimed, "I feel light after this discussion. I believe that we should spread awareness about this method in our community, beginning with our family members, so that everyone can utilise it for its benefit." (FGD, 2022). Shubham Srivastav, A DMT practitioner, said, "Simply screening a film cannot make a whole lot of difference in the minds of participants; rather, spaces holding a DMT session are interactive because people are listening and reacting at the same time. There is constant engagement." (Personal Interview, 2022).

DMT Practice for Mental Health

A participant said, "I now feel more confident about my body as I discovered a lot of new things about my own body. (FGD, 2022) The guided imagery intervention made a participant feel that she was actually vacationing in the mountains at that moment. Such is the power of the connection between body and mind. According to the study, when the participants were asked to rate the entire DMT Workshop with the help of a Smiley emoji, all the respondents rated it with a Red Smiley emoji, which means "Loved It". According to the study, the girls manifested a positive outlook towards the interventions and also gave a green signal by flagging off a green smiley emoji as an answer to the question of whether they would use DMT interventions whenever they faced anxiety or stress.

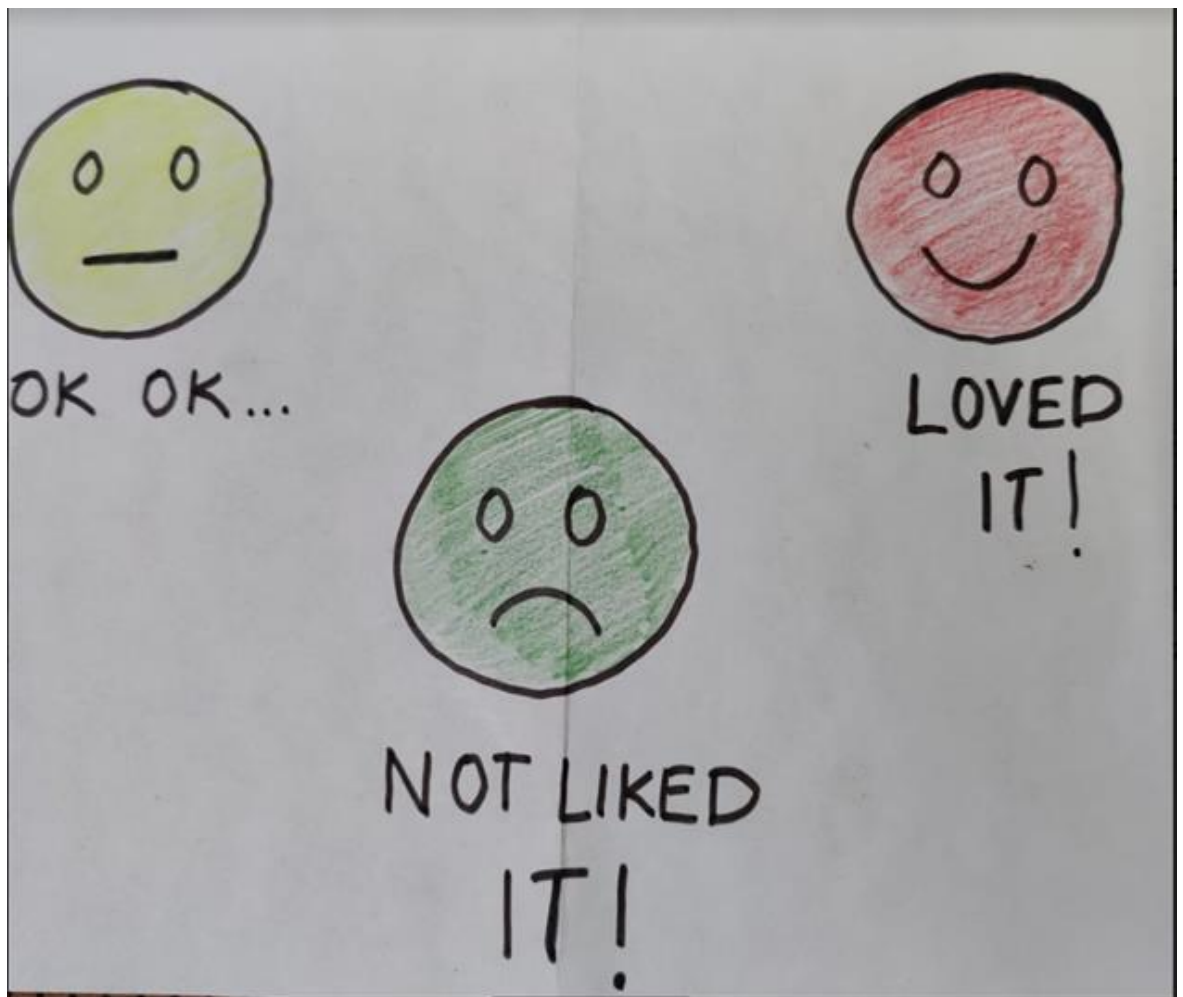


Fig.10: Emoji Drawings created during workshop by participants

A participant exclaimed, "My favourite intervention was Silent Drama because I loved acting and expressing myself". (FGD, 2022) As per Somya Narang, "For improving communication skills, we

use techniques like moving while talking, non-verbal or dumb charades, and other kinds of activities where one narrates a story through non-verbal gestures." (Personal Interview, 2022).



Fig.11: Participants performing DMT Intervention

(Workshop Archive, September, 2022)

One of the participants said, "After the music and meditative movement intervention, I felt relaxed. All my pain and stress came out of my body" (FGD, 2022). In this intervention, participants were asked to move their bodies however they felt like, and soft instrumental music played in the background. A participant expressed that, "I loved the Fictional Object Guided Imagery because I felt the heaviness instantly released once the facilitator instructed that the ball had turned light from being a heavy metal ball." The stress in my mind was released instantly, even without holding the actual object," expressed a participant (FGD, 2022). Selisky (2017) explored the scope of using fictional characters or objects as a DMT intervention for adolescent children to improve anxiety disorder. When the participants were asked to express what changes they had felt in their bodies, one participant instantly said, "Post-session, my feet were hurting." (FGD, 2022). According to Kruttika Joshi Deodhar, DMT works beautifully for battling Body Image issues with adolescent girls, using props like threads, dupattas, or group activities (Personal Interview, 2022).



Fig.12: Participants performing DMT Intervention

(Workshop Archive, September, 2022)

Some participants also suggested some improvements in the DMT Workshop; like the use of dance Mudras and incorporating balancing yogic poses as the interventions also touched upon meditation. (FGD, 2022)

Participation & Facilitation

Group drama gives the participants an opportunity to facilitate as they form their own storylines and work in groups. The term co-creation highlights the role of a facilitator in a participatory communication method that involves the input of the participants too. One of the participants enthusiastically said, "I've conducted awareness drives in the past as well, while I was working with an NGO. I plan to conduct a workshop like this with all my friends." (FGD, 2022).

The facilitator also used a drawing-based partner intervention during the workshop to build relationships between the girls. One of the objectives of the activity was to instill empathy towards each other in terms of body image issues. In this intervention, the facilitator asked the girls to draw each other performing any movement like dancing, saying hi, etc. The drawing session was followed by a brief discussion where the girls reflected on their interpretations of each other. One of the interesting findings from these drawings was that most of the participants also pointed out distinct body features while making each other's drawings, where they highlighted features like dark circles, moles, etc.



Fig.13: Sketch highlighting body and movement of a participant drawn by another participant

(Workshop Archive, September, 2022)

Somya Narang while explaining the role of a facilitator said, “As a facilitator you have to unlearn things before facing the community. (Personal Interview, 2022)

Dance for self-expression

The study found out that one of the respondents quoted during the discussion that DMT is a tool that helps us get self-aware. It makes us accept who and what we are. As per the facilitator’s observation, who is also the researcher of the study, the drama intervention involved the use of Navras, or the nine emotions mentioned in the Natyashastra. Dance thus utilises various emotions to express themselves and acts as an effective non-verbal form of communication. The body has the ability to communicate ideas and attitudes without the use of words through postures, movements, and gestures.

According to Kruttika Joshi Deodhar, DMT can be used by Social workers and development communicators because it is an effective tool to break the ice with the community. There is a certain set of non-verbal communication that happens because not every member of the community will have to talk and respond. One can express themselves simply through movement. DMT is like a pin to start the community members, and once they start, they follow their own path. There is a free space, and no one is there to judge. (Personal Interview, 2022).

CONCLUSION

The role of dance and movement therapy in making the target community of the study, the adolescent girls, aware of their bodies and giving them various tools and interventions to help them feel confident was an important component of the research. The study also revealed that Dance Movement Therapy has the potential to be engaging and interactive as it involves the direct use of the body to vent one's feelings. According to *Moving toward Life* (Halprin & Kaplan, 2015), Anna Halprin urged people to use their own experiences as a source of inspiration and to use the transformative nature of dance to bring about substantive changes in their daily lives. Dance is a good choice for altering an environment because of its mobility and performance aspects. Thus, performance and participation are interrelated (Schechner, 2020).

Another outcome of the study was that the engaging interventions led to the girls being encouraged enough to facilitate such practices in their communities, where there was a demand for mental health care. Group therapy can do wonders for the mental health of people who belong to the same community (Chaiklin & Wengrower, 2009). The DMT interventions gave instantaneous feedback, which proved to be a great aspect of the participatory medium. The study revealed that dance movement therapy can act as an effective instrument for fostering community engagement. Thus, Dance Movement Therapy has the potential to be used in the fields of Development Communication and Social Work as a practice-based method that can spark discussions among community members.

Despite the fact that the study's findings were generally positive, there were numerous obstacles along the way. One of them is time, as it is a valuable commodity when conducting action research because it takes a significant amount of time to plan, execute, and analyze the research data. Another issue that arose was the language barrier. Some participants couldn't understand specific English terms used in the workshop because their English was poor, but the facilitator did her best to translate the meanings of words that the participants couldn't understand. Obtaining consent from the participants' parents was also a challenge.

The sample was restricted to only girls; however, during the field testing, one boy expressed interest in participating after the researcher's first meeting with the adolescents in the community; others didn't show much interest in the workshop pattern. So the research was conducted with female participants, and the data collected for the study was sourced from only young girls. Thus making the pilot study applicable to adolescent girls.

The study found that dance movement therapy encourages people to express their emotions physically and has the potential to be engaging as its authenticity helps build trust within the community. The study revealed that dance can be considered a healing art. Community engagement is essential for public health, communication, and development to empower communities to achieve behavioural and social results to enhance local health and development outcomes (Schiavo, 2014).

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SUPPORTING EARLY LEARNING AT HOME AND IN THE CLASSROOM AMIDST THE COVID-19 PANDEMIC: INSIGHTS FROM PARENTS AND TEACHERS

Pranjali Dev¹, Yatika Arya² and Dr. Priti Joshi³

¹PhD Research Scholar, ²PhD Research Scholar, ³Professor
Department of Human Development & Childhood Studies,
Lady Irwin College, Sikandra Road, University of Delhi,
New Delhi, India 110001

*Email:*pranjali.dev@lic.du.ac.in, yatika.arya@lic.du.ac.in, priti.joshi@lic.du.ac.in

Dr. Priti Joshi -HSAI life membership Number: HSAI-2021-DL-772-LF

ABSTRACT

Young children's education and development was affected due to the Covid-19 pandemic and the subsequent lockdown. While some children experienced the challenges of online learning, others could not access any form of remote learning. This paper studied different ways in which children, parents, and teachers worked together to continue learning in this period. Qualitative research methodology was adopted for this study, and in-depth interviews were conducted with parents and teachers of children in the age group of 3-6 years. Findings were arrived at by using thematic analysis approach and give an insight into building more resilient early childhood programmes. Different strategies used by parents and teachers to manage challenges and support children's development are discussed. It was found that parent-teacher collaboration was beneficial in the online learning experience of young children.

Keywords: Early childhood care and education, online classes, parent-teacher partnership, remote learning approaches, Covid-19

INTRODUCTION

The Covid-19 pandemic brought several changes to the lives of young children. During this time early childhood care and education services had to face a dramatic shift as schools and preschools had to be closed during the lockdown period which lasted for several months. Besides closing of schools, children also had restrictions on their movements as they could not access places like playgrounds which they would regularly go to before the lockdown (Gomes et al., 2021; Okely et al., 2021).

As the pandemic brought abrupt changes in the daily routine of children, it also reshaped ideas and expectations regarding what constitute learning during the preschool years (age group of 3-6 years). Schools and families faced new types of challenges during this time and had to adopt diverse strategies to ease the repercussions arising out of the sudden shift to online mode of teaching learning. Through a study of these challenges and strategies, the authors highlight the lessons learnt during the pandemic. Research presented in this paper is part of doctoral work of the first and second authors (Studies were reviewed and approved by the Institutional Ethical Committee, Lady Irwin College, University of Delhi).

LITERATURE REVIEW

Effects of Covid-19 on the lives of young children

Restrictions due to the lockdown led to different kinds of health problems. Naff et al. (2022), found that there was a general increase in the degree of anxiety, stress and depression among school going children. Among children of three to six years of age, Okely and colleagues found problems like increase in sedentary screen time and sleep disturbances. For young children living in disadvantaged situations, lack of access to outdoor spaces also contributed to restricted movement contributing to health and sleep disturbances (Okely et al., 2021). Findings of a study conducted in Faridabad reported that parents were concerned about their children's mental and emotional well-being due to missing social interactions with peers (Ali & Gupta, 2023). Not only children, but teachers also reported issues like strain on eyes, headache and body ache while facilitating online learning during pandemic (Singh et al., 2023).

The lockdown also had implications on the learning of children. In a study carried out on learning experiences of primary school children in India, it was found that during the pandemic more than 90% of the children lost minimum one language ability including reading familiar words (Research Group, Azim Premji Foundation, 2021). During the lockdown many pre/schools adopted alternative remote learning practices like online learning so that children could continue their education (Rathee, 2022; Singh et. al., 2023). However, many children were put in a disadvantaged situation in this new system. This was illustrated in a study of an elite private school in Delhi. In this study, Rathee (2022) found that the majority of the students had transitioned to online classes during the lockdown in March 2020 by the first week of the new mode being adopted by the school. It was noteworthy that out of the 191 students who had not resumed classes through the online mode, 128 children had taken admission under the economically weaker section (EWS) category, 18 children under the category of disadvantaged group and 10 children with special education needs. This showed that the pandemic impacted the learning of children with special educational needs and children from economically weaker backgrounds more than others. Access to smartphones or laptops and lack of electricity to charge digital devices for online learning posed challenges for many children (Singh et al., 2023). In a data source of the Ministry of Education, it was presented that close to 30 million children in India did not have access to digital technology required for remote learning (Kapur, 2021).

Online education for young children during the Covid-19 pandemic: parents' and teachers' experiences

Online teaching learning during the pandemic brought various challenges and learnings for teachers of young children. Rana & Kumari (2021) found that for six Government school teachers in Delhi, WhatsApp and YouTube were the most common online platforms that were used due to their easy availability and user-friendly features. The teachers in this study found online teaching to be very useful during the pandemic and preferred using asynchronous online teaching sessions with a flexible teaching plan. In various studies, teachers reported having faced challenges such as internet connectivity issues (both at teachers' end or students' end), student attendance, negotiating parental expectations, inadequate parental support and declining student engagement among others (Arora & Chander, 2023; Rana & Kumari, 2021).

The role of parents and families in children's education became even more relevant during the lockdown. This was made evident by the different guidelines and recommendations which

specifically referred to the role of the parent during alternative and online learning (MHRD, 2020; MOE, n.d.). In a study by Ali and Gupta (2023), parents reported different strategies to provide support for online learning during the pandemic like learning and updating their own digital skills, monitoring child's body posture while studying online, and keeping a check on screen time. Parents' feelings of satisfaction regarding online classes were determined by how well their questions and doubts were handled, the technological effectiveness of the school and the learning environment during the online classes (Sharma & Kiran, 2021).

Thus, during the Covid-19 pandemic and subsequent lockdown, parents and teachers of young children were forced to negotiate, adjust, learn and unlearn many things so that they could provide age-appropriate learning opportunities for young children who were just at their foundational stage of education. In this demanding phase, lessons learnt by parents and teachers can be a learning trove for ideas about how to make early educational practices more efficient and resilient in face of unexpected events. This is especially relevant as research has shown that children's development is impacted by the duration of their engagement with digital media and also the type of media (Joshi & Shukla, 2019). Keeping this in mind the following objective was arrived at.

OBJECTIVE

To study the experiences of teachers and parents in supporting children's learning and development during the sudden shift to alternative modes of schooling during the pandemic

METHOD

The research explores the experiences of children, teachers and families during the Covid-19, especially in the context of early childhood development and learning. The studies were carried out in Delhi during the time the country was still under the influence of the Covid-19 pandemic. A qualitative research methodology was undertaken and ten participants (five teachers and five mothers) were interviewed. The data collection was completed between August 2020 to February 2021. During this time, all educational institutions like schools and early childhood services were closed for in-person classes. So, many early childhood education services had initiated alternative ways of reaching children including online learning.

Sample

The participants in this research were five early childhood teachers and five mothers of children aged 3-6 years. The sample was selected through purposive sampling to ensure that the parents and teachers who interacted with 3–6-year-olds were included in the sample. The teachers taught in the early childhood sections (Nursery, Kindergarten) of a private school which catered to children of middle-income families. All the teachers were women and had some form of teacher certification (B.Ed. or Diploma in Elementary Education). The mothers who participated in the study were from middle and low Socio-economic Status (SES) (3 from middle SES and 2 from low SES). All three mothers from middle SES had post-graduate degrees, one mother from the low SES had completed primary schooling, while the other had schooling till Grade eight. During the time of data collection three mothers were employed on a work-from-home basis, one mother worked as a live-in maid and one mother was a homemaker.

Data collection and analysis

The data collection was carried out through in-depth interviews of the teachers and the mothers. While one interview of the parent was carried out face to face, all the other parent and teacher interviews were carried out in distance mode through either a telephonic call, or through video conferencing over Skype or WhatsApp, due to the covid-19 pandemic. The data collected was analyzed through thematic analysis approach.

FINDINGS AND DISCUSSION

The experiences of parents and teachers with remote learning are discussed under four themes. The first two themes focus on online classes for young children. Here, parents' roles and perceptions in regards to online learning are discussed. Also, the importance of parental presence during online classes for young children is highlighted. The third theme addresses the lack of formal support-systems for vulnerable families while the fourth theme is on the health concerns 3-6 years old face because of the lockdown.

Parents' involvement during online classes: making decisions for their children's learning

As the pandemic forced changes in childcare responsibilities, this led to an increased demand of time and resources. Three parents felt that they had to put more time for childcare as compared to before the pandemic. One parent said, "*Virtual classes add pressure to parents...I have to help him do classwork, homework, extra worksheets ...which comes twice a week*". Owing to a lack of time, some **parents had to make choices regarding how much of an online class should the child attend**. One parent of a four-year-old child said,

I don't mind if my child skips the physical education classes which happens twice a week. It's time clashes with my work commitments... also my child is not interested in them as seeing exercise on a screen where you might just see parts of the teacher's body...does not make sense to him.

Children also resisted the new form of online learning in their own ways. For instance, a mother said that her four-year-old child would walk away from the screen during the "show & tell" presentation as he did not like waiting for his turn while the other children spoke. This was generally not a concern during normal face-to-face classes for him.

Some parents wanted shorter online classes of thirty minutes, while others were happy having longer duration classes. **Perception of parents regarding the effectiveness of online classes was influenced by the curriculum content, teaching method and the quantum of work for the child and parent**. One parent felt that it was not possible to squeeze in a five-hour schooling session in a two-and-a-half-hour online class, especially when the curriculum expected that child to do difficult general knowledge questions. However, another parent noted,

The online classes have seen many changes over time... earlier the teachers would try to do a lot, but since they have decreased the curriculum, and have small group classes, things feel less rushed, it also requires less things for parents to do...I know that 30 minutes is the recommended screen time for young children... I don't mind longer online classes... as it depends ...what happens in those classes... here when all they are doing is talking about leaves It's more about conversation and no one way teaching, not only copying or writing something Many times he is not even sitting in front of the screen, but just moving around, but because it's a loudspeaker he can hear everything ... and

respond.... if he was forced to look at the screen, I would be concerned... but that is not what happens.

Parental presence essential for online learning with 3-6 year olds

Affectionate and comforting touch is an important way through which early childhood educators' help children manage their emotions, build connection and mildly direct their actions (Cekaitea & Bergnehr, 2018). In the pandemic teachers lost this very important way of showing children affection. All five teachers cited **concerns about building relationships with young children during remote learning**. For one teacher, remote learning was not a dyadic experience of only teaching the child (unlike face-to-face teaching) but rather here the teacher had to also give simultaneous directions to the parent along with teaching the child. According to her,

Online classes ka matlab kya hota hai..unko ye nahi pata ki ma'am kahaan hain...tabhi hum log parents ko jyada guide karte hain...jab hum parents ko guide karte hain toh wo apne bacche ko apne aap samjhaate hain..... we are teaching from the ppts and the videos and I am taking arts and crafts also...so there are many things...means...hum log ek ghante mein kafi saara kara dete hain but after attending, the parent say ki ma'am, nahi samajhaaya, hume kehna padta hai ki aise nahi..aise karao...matlab unko ideas dene padte hain classes mein ya fir baad mein ... ab jaise homework hai, homework they send us...in the phone..hum logo ko whatsapp ya mails karte hain toh hum log phir ussme se unko dekhke suggestions dete hain..toh ye saari cheezein hai...bohot saari cheezein hain jo hum parents ko sikha rahein hain...and parents are very cooperative.

(A young child does not know the meaning of online classes, they don't know exactly where the teacher is, and that's why we guide the parents more than children, because then only will they be able to help their child understand the meaning of online learning and how to learn through digital screen...We get done a lot in one hour duration of online classes for 4-5 year old's with the help of parents...however parents have questions at the end of the class and sometimes during the class, then I have to guide them and give them ideas, like we have homework, which parents send back on WhatsApp or email, we check it on phone and give them feedback on it and thus there are many things that we are teaching the parents and the parents are very cooperative).

Some parents also gave particular reasons for accompanying their child during online classes. One parent of a four-year-old child said,

While the initial activity classes are going on... things like prayer, show and tell, I may or may not sit with her (child) as I do my chores... but I do sit during the academic class... this helps me to know what areas she needs help in...after all the teacher can only give a fixed time to a concept... So, after the online class, if I feel that she is lagging in something, I can teach her.

Thus, **it was clear in the minds of parents and teachers that the physical presence of a parent was crucial during online classes**. This new and closer relationship between teachers and parents helped them appreciate each other's contribution in the child's learning. A teacher said, *"I am very thankful for the parent's presence during the online classes, otherwise it would have been very difficult to teach such young children over the digital screens"*.

Support systems for vulnerable families

Covid-19 pandemic brought hardships for families of marginalized communities where parents lost their sources of income. This was exacerbated by conditions of physical illnesses and lack of relevant information to mitigate the challenges faced thereof. One participating family was desirous of getting their six-year-old child admitted in school, but they faced problems like death in the family, lack of funds and migration which made it difficult for them to enroll the child in any school in the previous academic session as well as the current one. For many families, for whom learning from school was not an option, parents chose to send their children for private tutoring within the communities to make up for the losses in learning. One mother of a six-year-old child of a low-income family, who felt that enrolment in Grade 1 of school was not possible due to the pandemic (as the “*schools were closed*”), chose to instead send their child for tuitions.

Another cause of concern observed was that not all families had access to digital technology for the purpose of remote learning at home. Furthermore, for many children there was no online learning taking place during the pandemic, mainly because of the growing digital divide (India Today Web Desk, 2021; Kapur, 2021). For one four-year-old child from a low-income family, getting access to digital devices for online classes was difficult. She found help from her mother’s employer who provided such a device.

Managing health concerns

Many parents reported different health concerns arising out of long stay inside their homes due to the pandemic. Five teachers and four parents cited concerns about children spending more time with screens. As children had fewer options of outside play where they could interact with other children, many turned to **digital technologies as a way to spend time**. One parent of a five-year-old child said, “*My child’s screen time has increased as he is not going to school... I have to forcefully make him sleep to reduce TV watching... otherwise he would keep watching TV to pass time*”. It is pertinent to note here that governmental and pediatric associations’ guidelines on online education recommend 3 to 6 year olds to have very limited screen time per day, but they were not practiced even before the pandemic (IAP, 2021; MHRD, 2020; Varadarajan et al., 2021).

Other than this, three parents also reported children having **emotional difficulties**, as a result of lockdown and online classes. This included behaviours of extreme anger, constant fear of the disease as well as extreme resistance to online classes. One mother of a five-year-old child reported,

For a while I seriously considered discontinuing his online classes, because I saw he was not interested in it... he would cry, refuse to get up in the morning and also put off eating breakfast as he knew that then he would have to sit in front of the laptop for the class.

In this case, the child's teacher spoke to the parent and supported her to continue the classes. Thus, parent-teacher dialogue about issues and concerns ensures that new solutions can be created and implemented.

LIMITATIONS

While the Covid-19 pandemic formed the context of the paper, it also presented some challenges to the method of the study. The **sample size had to be limited** to ten participants for two main reasons. The first reason for this was to do with a finding of the study itself, that is, the lack of time the participants had; as one teacher participant in the study pointed out, “*My job has become twenty-four-seven now*”. Almost all the participants had faced challenges in carving out time in their busy daily schedules for the in-depth interview, which sometimes extended for up to 120 minutes. As a result, the interviews were conducted with many breaks and spread over a longer period of time as compared to face-to-face interviews. Secondly, the lack of in-person communication during the pandemic posed challenges in identifying and contacting participants.

Another related limitation of the study was, that **more families from low socio-economic status could not be included** due to lack of access and also because distant interviews (phone or video call based) could not be carried out in the absence of requisite technological devices with the participants.

CONCLUSION

There have been new health and education concerns for young children and their families arising out of covid-19 pandemic. This requires awareness and continuous dialogue among parents and teachers about the prescribed screen time guidelines and other strategies to manage health concerns during remote learning at home. Findings have shown that for online classes, 3-6 year olds require the presence of a parent/adult. From parents’ perspective, it is not the length of online class but the quantity of work (for parent/child), content of the class and method of teaching that makes an online class meaningful. Young children in disadvantaged communities took support from the available community resources wherever available; else, they were left with no choice but to miss schooling altogether. Thus, vulnerable families require more formal support systems.

DIRECTIONS FOR FUTURE RESEARCH

The present paper was an exploration which gave insights into home-school links and also learning through new digital modes. These findings highlighted a need for further investigation in areas related to children’s engagement with digital technologies, in home as well as school. There is a need for research on how linkages between parents and teachers can be strengthened in the context of the ever changing digital world.

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EFFECTIVENESS OF MUSIC INTERVENTION ON PSYCHOLOGICAL STATUS OF PREGNANT WOMEN

Sharanoor Hussain¹ & Dr. Priya M.²

¹Research Scholar, ²Assistant Professor

Department of Human Development, Avinashilingam Institute for Home Science and Higher
Education for Women, Coimbatore

E-mail ID- sharanoorhussain@gmail.com,

HSAI- 2019-AS-421-LF, 2017-TN-29-LF

ABSTRACT

Pregnancy is a period of distinct physiological and psychological changes affecting outcomes. Music is a popular therapy that helps to overcome psychological-related complications. Thus, this study aimed to assess the effectiveness of the music intervention on pregnant women's psychological status. In this quasi-experimental study, 300 pregnant women in the first trimester were selected from government and private health centres in Assam state of Lakhimpur District through purposive sampling. The present study used a Self-structured tool on Pregnancy Psychological Status Scale to assess pregnant women's psychological status. The samples were randomly divided into two groups based on the inclusion and exclusion criteria- the experimental group (30) and the control group (30). Music intervention was given to the experimental group from the fourth month till the end of the eighth month of pregnancy. Independent t-tests, ANOVA, and paired t-tests were employed to analyse the data. A significant difference was observed based on psychological status among the pre-intervention group ($t=4.078$, <0.001) with respect to age. The results showed that pregnant women aged 25-40 had better psychological status than those of 18-24 years. They were also found to be happy, sociable, able to maintain good family relationships, cope with anxiety, and satisfied with their body image. However, the number of pregnancy did not predict significant relation in their psychological status. Music intervention was found significant ($t=4.001$, $P <0.001$) based on the overall psychological status of pregnant women. This research proved that music intervention effectively improves pregnant women's psychological status. The study recommends that healthcare specialists, society, and even family members focus more on identifying the psychological status and its hazardous factors in pregnancy and provide suitable interventions for improving pregnant women's mental health and lifestyle.

Keywords: psychological status, pregnancy, age, number of pregnancies, music intervention.

INTRODUCTION

Pregnancy is a crucial period in every adult female life and is filled with feelings of joy and excitement; nevertheless, negative emotions such as stress, anxiety, depression, mood swing, etc., are prevalent during pregnancy (Lindsay et al., 2019). In the previous decade, many researchers have viewed the impact of stress and other negative feelings on pregnant mothers and fetal development (Lindsay et al., 2019). However, some other studies have revealed that higher stress during pregnancy leads to greater levels of spontaneous preterm childbirth and decreased birth weight (Liou et al., 2016; Staneva et al., 2015).

It has been noticeable that one-fifth of pregnant mothers face psychological complications before or soon after childbirth; however, most difficulties take up to a year to overcome, but some challenges or disorders result in a chronic form (Austin et al., 2008). During the first and third trimesters, approximately two-thirds of pregnant women experience psychological difficulties, including stress, mood swings, anxiety, irritability, and depression, with a clinically proven 10% prevalence of depression in the first trimester (Leon, 1992). Risk factors for depression during pregnancy include a history of miscarriage, stillbirth, depression, unwanted or unplanned pregnancies, marital conflicts, dissimilarities, negative partner reactions, and lack of family support (Leon, 1992). During pregnancy, anxiety results in specific kinds of fear or panic attacks, while anxiety is a bodily response to stress (Cantwell & Cox, 2003). Depression, anxiety, lack of sleep & tiredness, the influence of cortisol, and busyness on pregnancy-related difficulties revealed that it negatively impacts prospective memory (Cutler et al., 2011).

Music therapy, involving a combination of instruments, singing, and body movement, is actively used in psychotherapy to relax the body, reduce anxiety, lower blood pressure, and complement non-pharmacological treatments for psychiatric and behavioural disorders (Skrbina, 2013; Witusik & Pietras 2019; Petot et al., 2019; Bradt et al., 2013). A study revealed that 72.20% of pregnant women listened to music regularly or at least once per week, with 48.50% expressing interest in participating in a music program, indicating that music is a highly accepted intervention to promote the health of pregnant women (Arabin & John, 2013). However, another study revealed that expectant mothers who practice and listen to music before amniocentesis exhibited reduced cortisol levels and anxiety (Ventura et al., 2012). While a batch of pregnant women in a music intervention found that women learning to sing lullabies were found to aid emotional representation, reduce anxiety, and witness a positive experience during pregnancy (Carolan et al., 2012). Many types of research establish the positive impacts of music therapy during pregnancy on decreasing anxiety and stress (Liu et al., 2010; Yang et al., 2009). Indian Classical Music has a significant impact on moods and behaviour, with specific ragas and notes positively influencing individuals' mindsets, as mentioned in the Upanishads, and during early pregnancy, music provided to women has a beneficial effect on the fetus (Kalaivani, 2011)

JUSTIFICATION

Music offers various positive effects on pregnant women and their developing fetuses, including stress and anxiety reduction, fostering bonding, pain management, and improved sleep, making it a valuable tool for promoting well-being during pregnancy. The study aims to assess the psychological status of pregnant women and implement music intervention to enhance their mental state during the prenatal period. Hence the researcher decides to conduct the study to evaluate the maternal psychological status and apply music intervention to improve the psychological status of pregnant women.

OBJECTIVES OF THE STUDY

The study was carried out to

- Assess psychological status and its dimensions among pregnant women based on age and number of pregnancy.
- Assess the effectiveness of the music intervention on psychological status of pregnant women.

HYPOTHESES

H₁-There is no significant difference in the psychological status and its dimensions among pregnant women based on age.

H₂-There is no significant difference in the psychological status and its dimensions among pregnant women based on number of pregnancy.

H₃-There is no significant difference in the effectiveness of the music intervention on psychological status of pregnant women.

METHODOLOGY

Study design

The research design used in this study was a quasi-experimental study that attempts to establish a cause-and-effect relationship between an intervention and an outcome. The sampling method for the current study was the purposive sampling technique, a form of non-probability sampling in which researchers rely on their judgment when choosing population members. After screening eligibility criteria, samples were divided into the control (30) and experimental group (30). Music intervention was given online to pregnant women for five months, from November 2021 to March 2022, which started in the fourth month till the end of the eighth month of pregnancy. The Human Ethics Committee of Lakhimpur Medical College and Hospital, Assam, and Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, approved the study.

Selection of the sample

A total of 300 pregnant women were selected from government and private hospitals in the Lakhimpur district of Assam through purposive sampling. Prior permission/consent was obtained from the pregnant women, their families, and hospitals for the conduct of the study.

Construction of Tool

The psychological status of pregnant women was assessed before and after the intervention programme. The assessment was done with the help of a self-constructed tool named 'PREGNANCY PSYCHOLOGICAL STATUS SCALE.' The tool was designed by referring to various available tools based on psychological status and discussing their emotions and feelings with the pregnant women during this period. The tool was designed to measure the psychological status of pregnant women with 40 statements in seven dimensions, namely happiness (4 items), stress (10 items), anxiety (7 items), Family Relationship (5 items), Socialization (4 items), Physical Health (6 items), and Body Image (4 items). Of 40 items, 17 are true-keyed, and the remaining 23 are false-keyed. A 4-point Likert scale was adopted to respond to each statement: often, sometimes, rarely, and never. The higher the score, the better the psychological status; the lower the score, the poorer the psychological status among pregnant women. The maximum score for the tool was 160, and the minimum score was 40. The tool was subjected to Cronbach's alpha tests, and the value was 0.71.

At the time of intervention, the samples were divided into control and experimental group. The assessments were performed at baseline, after the sixth and eighth months of pregnancy.

Data collection and intervention

The psychological status of the pregnant women was assessed before, during, and after the intervention. The intervention was carried out offline among sixty pregnant women. Based on the initial assessment, respondents' willingness and persons not involved in other therapy sessions were selected and divided into the control (30) and experimental group (30). The control group was kept as such without being given any intervention package. The experimental group was assigned music intervention with a planned schedule. During the initial period, a face-to-face meeting was conducted for both groups where a detailed description of the intervention protocol and minimum term of participation were explained to them. The intervention was started in the second trimester (the fourth month) of pregnancy.

Pre-recorded music was selected for the intervention programme after reviewing related articles and consulting experts from the respective fields. The music intervention included nature music, instrumental, and folk music of Assam, Garbha Mantra, classic Hindi Instrumental Music, and lullabies. The pre-recorded music CD was given to the expert. Based on the expert's suggestions, the CD was refined and finalized.

Implementation of Music Intervention

Music intervention was carried out online initially due to COVID, convenience and affordability, less time consuming, a good choice for remote areas, ease of access for people with physical constraints, etc. A WhatsApp group was created for the intervention group, and daily 15-20 minutes of pre-recorded music were uploaded till eight months of pregnancy. In-between offline intervention was also given as per the convenience of pregnant women. The experimental group was asked to listen to the music at any time. They played it as background music whenever they cooked, cleaned, or worked.

For each week, the theme of music was varied. Every 15 days, an online session was carried out through google meet for 30-45 mins to monitor their progress. The respondents were given music CDs for easy access. They were asked to follow up; hence, a sign-off sheet was provided to record daily intervention sessions. Also, simple interactive activities were given along with routine sessions. The psychological well-being was assessed for the control and experimental group in each trimester through Pregnancy Psychological Status Scale.

Statistical analysis

Data were analysed using IBM SPSS 21 version. All the data were normally distributed. Descriptive and inferential statistics were applied. In inferential statistics, ANOVA, independent, and paired t-tests were performed to assess the psychological status before, during, and after the intervention.

RESULTS AND DISCUSSION

Demographic profile of the respondents

The 300 participants were categorized under different variables like age and number of pregnancy. Regarding age, 50.30% were 18-24 years of age, whereas 49.70% were between 25-40 years of age group.

With regard to number of pregnancy, the majority of the respondents, i.e. 60% belonged to 1st pregnancy, whereas 33.70% were 2nd pregnancy, and the least respondents, i.e., only 6.30%, were planning for their 3rd pregnancy.

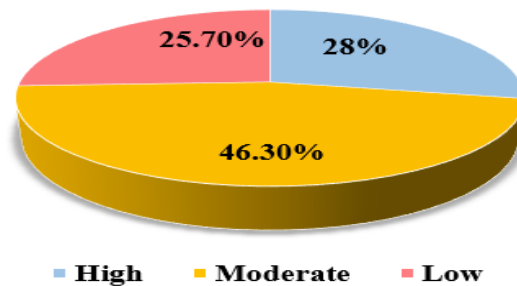


Fig.-1

Psychological status of pregnant women

In the given Pie graph (Figure-1), it was noticed that most of the total respondents, i.e., 46.30% had moderate psychological status, and the remaining 28% and 25.70% belonged to high and low psychological status.

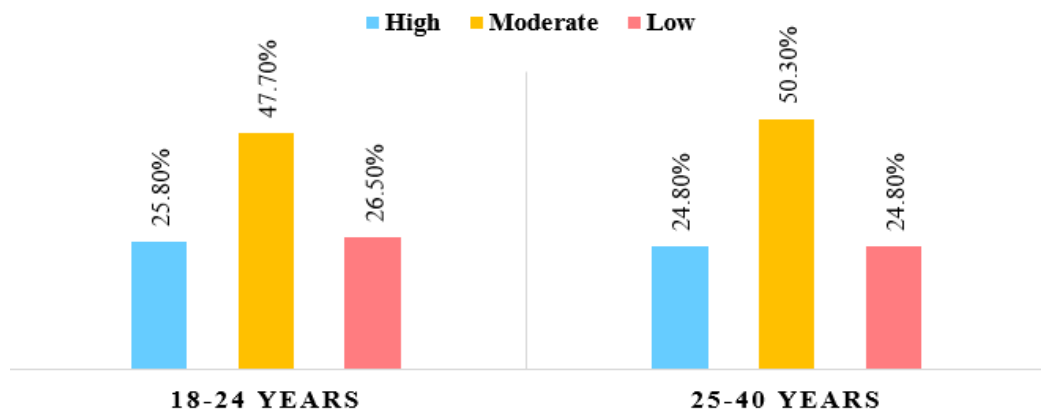


Fig.-2 Psychological status among pregnant women based on age

Figure 2 shows that among 18-24 years of age group, the majority of respondents i.e. 47.70% had moderate psychological status. In comparison, an almost equal percentage of respondents i.e. 25.80% and 26.50%, had high and low psychological status, respectively.

In case of 25-40 years, 50.30% percent of respondents showed moderate psychological status, whereas 24.80% of pregnant women were found to have high and low psychological status simultaneously.

Figure2 depicts that among age groups, respondents of 24-40 years had good psychological status as compared to 18-24 years of age group.

Table-1 Dimension-wise psychological status of pregnant women based on age

Dimensions of Psychological Status	Age				t value	p-value
	18-24 years		25-40 years			
	Mean	SD	Mean	SD		
Overall psychological status	103.13	10.382	108.10	10.748	4.08	.001**
Happiness	11.67	1.628	12.06	1.737	2.02	.045*
Stress	22.88	4.322	23.56	3.840	1.45	.149
Anxiety	15.62	2.754	17.25	2.975	4.91	.001**
Family Relationship	14.52	2.169	15.35	1.841	3.55	.001**
Socialization	11.34	2.358	12.12	2.365	2.87	.004**
Physical Health	15.66	3.090	15.63	3.083	0.07	.945
Body Image	11.44	2.340	12.13	2.744	2.35	.020*

**Significant at 1% level *Significant at 5% level

Table 1 depicts the overall psychological status of pregnant women, which was found to be better among 25-40 years age group than 18-24 years with a significant difference. However, 24-40 years of age group women predicted less anxiety, happier, good in family relationships and socialization. They felt happy about their body image since the obtained mean value was higher. At the same time, other dimensions did not show significant differences. Hence, hypothesis-1 could be rejected.

The result is supported by a study that examined pregnant women’s psychological status during the COVID-19 outbreak and found a positive relationship ($p < 0.05$) between psychological impact and factors such as pregnancy age, conception, religion, occupation, area, and history of abortion (Jelly et al., 2021).

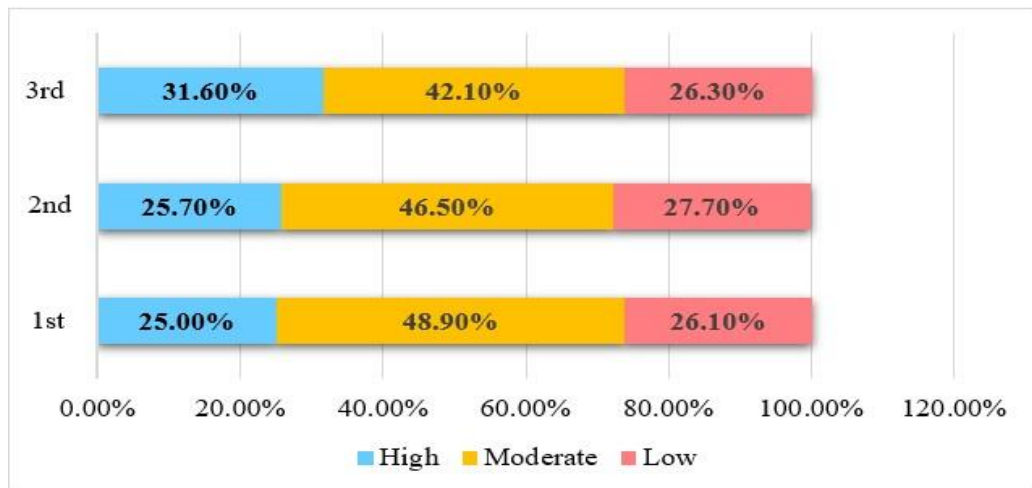


Fig. -3 Level of psychological status among pregnant women based on number of pregnancy.

In Figure 3, regarding the first pregnancy, 48.90% had moderate psychological status, 25.00% and 26.10% were under the high and low psychological level, respectively.

Regarding second pregnancies, 25.70% had high psychological status, most respondents (46.50%) reported moderate psychological status, and 27.70% had low psychological status.

Regarding 3rd pregnancy, 31.60% had high psychological status, while most respondents (42.10%) had moderate psychological status, and only 26.30% had low psychological status.

It is revealed that first-pregnancy women are somewhat better in their psychological status than 2nd and 3rd pregnancies, as shown in figure 3.

Table-2 Dimension wise psychological status of pregnant women based on number of pregnancy

Dimensions of Psychological Status	No. of Pregnancy				Sum of square	ANOVA		
	1 st (180)	2 nd (101)	3 rd (19)	Total (300)		Mean square	F value	p-value
	Mean	Mean	Mean	Mean				
Happiness	11.72 (1.715)	12.08 (1.501)	12.11 (2.283)	11.86 (1.691)	9.691	4.845	1.70	.184 ^{NS}
Stress	23.09 (4.260)	23.29 (3.793)	24.11 (4.175)	23.22 (4.097)	18.439	9.220	0.55	.579 ^{NS}
Anxiety	16.22 (3.160)	16.84 (2.603)	16.21 (2.936)	16.43 (2.975)	25.796	12.898	1.46	.233 ^{NS}
Family Relationship	14.73 (2.166)	15.21 (1.829)	15.42 (1.895)	14.93 (2.052)	19.740	9.870	2.37	.096 ^{NS}
Socialization	11.60 (2.442)	11.99 (2.274)	11.53 (2.503)	11.73 (2.390)	10.660	5.330	0.93	.395 ^{NS}
Physical Health	15.79 (3.196)	15.35 (2.920)	15.84 (2.834)	15.64 (3.081)	13.461	6.731	0.71	.494 ^{NS}
Body Image	11.48 (2.423)	12.24 (2.736)	12.21 (2.699)	11.78 (2.568)	41.114	20.557	3.16	.044*
Overall psychological status	104.62 (11.543)	106.99 (9.074)	107.42 (12.043)	105.60 (10.838)	430.26	215.132	1.84	.160 ^{NS}

*Significant at 5% level NS-Not Significant Note: The Value within the bracket refers to SD

From Table 2, it was found that the overall psychological status of the pregnant women did not show significance. However, there was a significant difference in number of pregnancies with respect to Body image. The observed mean value was higher during 2nd pregnancy than 1st and 3rd pregnancy, indicating that pregnant mothers who would have their second baby were more satisfied and happier with their body image as they might have experienced the situations during previous pregnancies. At the same time, other dimensions did not show a significant difference. Hence, hypothesis-2 could be accepted. In case of Body Image, hypothesis-2 is rejected.

A contradictory study on second-time pregnant women’s psychological status revealed that factors such as fetal sex expectations, young age, low education level, and low family income significantly influenced anxiety levels (p<0.05). These findings indicated varying stress, anxiety, and hopelessness during second pregnancies (Cai et al., 2022).

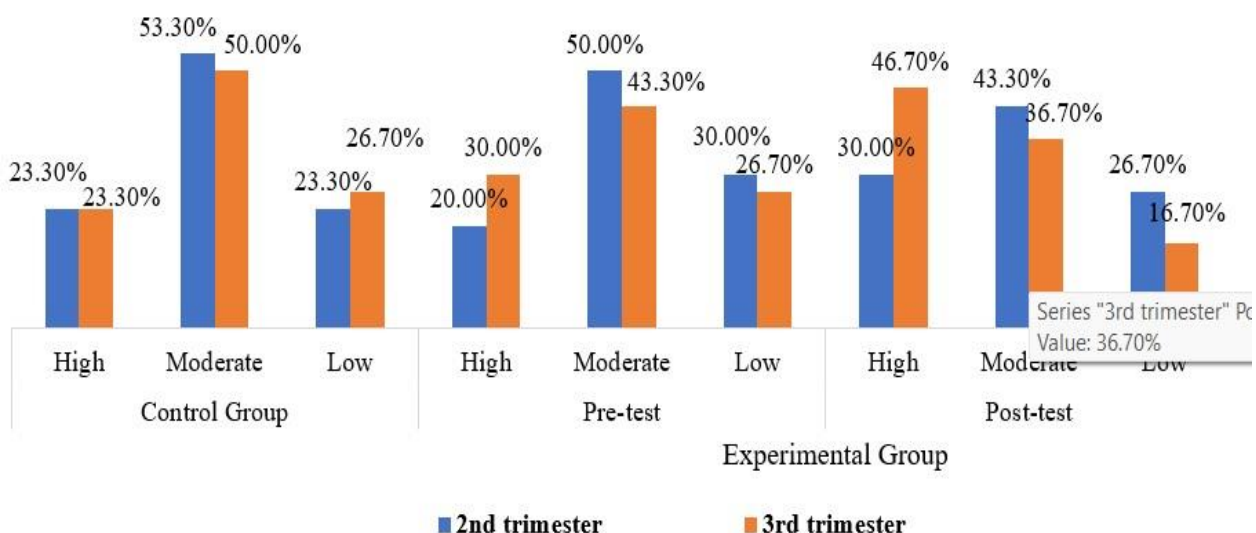


Fig.-4 Levels of the psychological status of the control and experimental group of music intervention.

Figure 4 shows that most selected respondents among the control group of the 2nd trimester (53.3%) reported moderate levels of psychological status. A similar percentage of respondents (23.3%) stated high and low psychological status. Whereas during the 3rd trimester majority i.e., 50% of respondents, stated moderate psychological status and 26.7% stated low psychological status, and only 23.3% were under high psychological status.

In the experimental group in Figure 4, in the pre-test (2nd trimester), before the intervention, most respondents (50%) encountered moderate psychological status, and 20% and 30% of respondents expressed high and low psychological status, respectively. However, in the post-test, at the end of the 2nd trimester, most respondents (43.30%) reported moderate psychological status, and 30% and 26.70% reported high and low status.

At the end of the 3rd trimester, 2nd-trimester pregnant women were placed in the pre-test level. In the post-test, most pregnant women (46.70%) reported high psychological status, and 36.70% and only 16.70% stated moderate and low psychological status.

Table-3 Results of psychological status in experimental and control groups based on music

Experimental group (30)		Mean	SD	t value	p-value
2 nd trimester	Pre-test	101.37	17.993	0.62	.541 ^{NS}
	During	104.43	18.801		
3 rd trimester	During	104.43	18.801	4.00	.001**
	Post-test	113.10	18.378		
Control group (30)					
Pair 1	1 st Trimester	103.77	16.872	1.36	.185 ^{NS}
	2 nd Trimester	98.30	15.777		
Pair 2	2 nd Trimester	98.30	15.777	1.36	.201 ^{NS}
	3 rd Trimester	95.07	18.268		

**Significant at 1% level NS-Not Significant

Table 3 demonstrates that the music intervention ($t=0.62$) was ineffective during the 2nd trimester. But the score of 3rd trimester ($t=4.00$, $P<0.001$) indicated that Music intervention effectively improved pregnant women's psychological status. Hence, hypothesis-3 could be rejected.

However, no significant difference was found during all trimesters regarding pregnancy psychological status among the control group. But the observed mean scores stated that the psychological status of pregnant women gradually scores lower during 3rd trimester as compared to 1st and 2nd trimesters.

The results of the pre and post-test of music intervention stated that after the music intervention, no effectiveness was observed at the end of the second trimester. Still, the mean value scores were better than the pre-test scores. Whereas, after the five months of music intervention, respondents showed better psychological status at the end of the 3rd-trimester than the 2nd trimester, and significant differences were observed at a 1% level.

The above results are supported by a study that investigated music and singing intervention during pregnancy which demonstrated that both interventions positively affected maternal psychological well-being and the bonding between mother and infant. The singing intervention group showed a higher stress reduction and more remarkable emotional state improvement than the music group, suggesting their potential for enhancing mood and supporting mother-infant bonding (Wulff et al., 2021).

Music intervention, a popular therapy, was employed in this study to alleviate stress and anxiety among pregnant women. Initially, no significant effects were observed, but after five months of continuous therapy, participants showed increased post-test scores, indicating the effectiveness of music intervention during pregnancy.

The study's limitations include conducting it during the second wave of Coronavirus disease 2019 (COVID-19), limited access to data focusing only on the first trimester of the 18-40 age group, and time constraints due to participants being available for only nine months. Additionally, the study's findings may not be generalized to all pregnant women in India due to geographical variations and a small sample size, as it was conducted in one district of Assam.

CONCLUSION

The present study proved that music intervention during pregnancy significantly improves coping with stress and anxiety, family relationships, socialization, and the pregnant women's physical health. This study can bring awareness to doctors, clinical practitioners, social workers, and family members as music intervention effectively reduces stress and anxiety and improves pregnant women's psychological status. Healthcare professionals should accept that every woman differs from others and educate them on maintaining good psychological status and lifestyle modification. Every health personnel should be involved in providing antenatal caretakers to work towards achieving this goal during the antenatal period to better the vulnerable group.

IMPLICATIONS

- The researcher will discuss with the gynaecologists, psychiatrists, and hospitals authority the results of the present study and bring their attention to the use of music as a non-pharmaceutical treatment to improve pregnant women's psychological status.
- This study will help to conduct music intervention or counselling sessions for pregnant women in hospitals.
- This study's results will help further generations/respondents to be aware of their health.

- This study would help to conduct workshops, conferences, and seminars to improve pregnant women's emotional and psychological health.
- An educational awareness programme can be organized to train the health workers about using music intervention during labour.

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