November 2010

Published by WTiN

International Dyer

Est. 1881 www.internationaldyer.com

Antimicrobial Finish on Textiles Using Kuppivaeni for Skin Diseases

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Abstract

The awareness of health and hygiene for consumers has increased the demand for antimicrobial textiles. Whilst in the past it was predominantly technical textiles that had antimicrobial finishes, in particular to protect against bacteria and fungi, nowadays textiles worn close to the body have been developed for a variety of different applications in the field of medicine and hygiene. An antimicrobial finish on fabrics can minimise the transfer of microorganisms on to the wearer by creating a physical barrier. It prevents skin diseases caused by the microorganisms.

Various medicinal plants found in nature exhibit excellent antimicrobial properties. A new approach is made to make textile material antimicrobial using natural extracts on cotton fabrics to cure skin allergies. The 'miracle plant', Indian Acalypha (Kuppivaeni), which is a commonly available plant in Tamil Nadu, was chosen for the study, which involved the applications of Kuppivaeni-leaf extracts on to cotton fabric by optimising the process conditions and then treating the fabrics with different concentrations.

The treated samples were tested for activity as per AATCC 147, AATCC 100 and AATCC 30 agar diffusion test methods. 100% treated fabric was found to be much softer and its washing fastness was found to be better than all the other treated samples. An attempt was also made to assess the healing activity of the Kuppivaeni-treated shirt on skin allergies and rashes. This eco-friendly antimicrobial finish has significant potential in curing skin diseases and offers excellent scope in forthcoming years.

KEY WORDS

Antimicrobial finish, Kuppivaeni, Microbes, Mycelia, Skin allergies.

Introduction

Over the past century, much focus has been placed on the sustainability of the earth's environment. This concern has been accompanied by a recent boom in interest in healthy living and consumers are very conscious of textiles that are hygienic.

Clothing and textile materials are not only the carriers of microorganisms such as pathogenic bacteria, odour-generating bacteria and mould fungi, but also excellent media for the growth of the microorganisms. The inherent properties of the textile fibres provide room for the growth of microorganisms.

In addition, the structure of the substrates and the chemical processes may induce the growth of microbes. Humid and warm environments still aggravate the problem. Infestation by microbes causes cross infection by pathogens and the development odour where the fabric is worn next to skin. In addition, staining and loss of the performance properties of textile substrates are often the results of microbial attack.

Antimicrobial finishes are applied to textile materials with a view to protecting the wearer and the textile substrate itself. Though the use of antimicrobials has been known for the decades, it is only in recent years that several attempts have been made to finish textiles with antimicrobial compounds. Consumers are now increasingly aware of a hygienic lifestyle and there is a necessity for and expectation of a wide range of textile products finished with antimicrobial properties.

A wide palette of antimicrobial compounds is now in use but products differ in their mode of action. Many commercial antimicrobial agents are effective but are not compatible with skin and the environment. Therefore, natural herbal products can be used for antimicrobial finishes, since there is a tremendous source of medicinal plants with an antimicrobial composition that may be effective candidates for the production of herbal textiles.

The present research work aimed at developing an eco-friendly natural antimicrobial finished from the natural herb Indian Acalypha, for textile application. The herb has the remarkable properties of curing skin diseases such as syphilitic ulcers, bedsores, maggot-infested sores and wounds, rashes and rheumatism. The Indian Acalypha extract (50%, 75% and 100% respectively) were applied on cotton fabric by the pad-dry-cure method. An attempt was also made to assess the healing activity of an Indian Acalypha-treated shirt on skin allergies and rashes. An extensive study was conducted to assess the antimicrobial effectiveness of the herb by employing standard test methods, and findings are discussed in this paper.

Materials and Methods

Materials

Fabric

Cotton fabric with a count of 2 x 40's and plain weave was selected for the study. The fabric was desized, scoured and bleached prior to the application of finish.

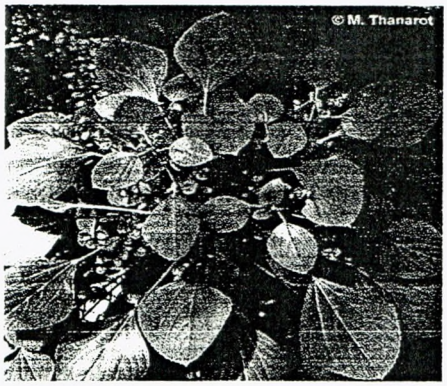


Fig. 1 Kuppivaeni plant

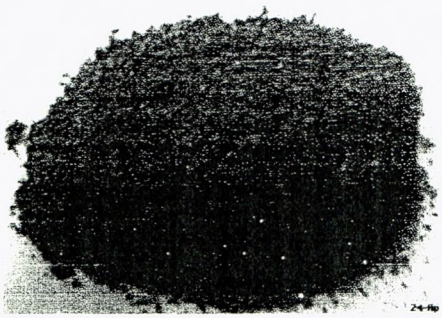


Fig. 2 Kuppivaeni powder

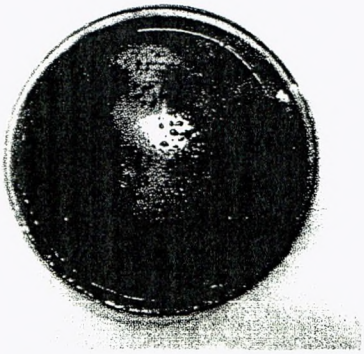


Fig. 3 Kuppivaeni ethanol extraction

Antimicrobial Herb

Indian Acalypha (Kuppivaeni) was the plant species chosen for the study. Fresh leaves of Acalypha were shadow dried and made into a fine powder (Figures 1-3).

Methods

Finish Application

Ethanolic extracts of herb were applied to cotton fabric by dipping in bath at M:L ratio 1:10. The fabric was then dried at 80°C for 10 minutes to remove the moisture. Finally the fabric samples were tested for antimicrobial activity as per the standard test methods.

Standard Quantitative Test Methods

1. Antibacterial Activity

AATCC-100-1998 (USA): Quantitative Assessment of Antibacterial finishes on textiles – measures the degree of antibacterial activity - Agar diffusion test

The 2in x 2in samples were prepared from the Indian Acalypha samples (untreated, 50%, 75% and 100% treated). 500ml Elenmeyer conical flasks containing 50ml of nutrients broth were prepared and sterilised at 121°C for 15 minutes. It was then allowed to cool. The fabric samples were then transferred aseptically into the conical flasks respectively. These were incubated at 37°C for 24 hours in shaker at 121rpm. After incubation their absorbance were measured at 600nm.

AATCC-147-1998 (USA): Qualitative Antibacterial Assessment of diffusible antibacterial agents ('quick method') - Agar diffusion test

50ml of nutrient agar was prepared and sterilised at 121°C for 15 minutes. Petri plates were autoclaved in a hot-air oven at121°C for 30 minutes. 20ml of nutrient agar was poured into each of these plates and allowed to solidify.

A series of 8 test tubes containing 4.5ml of sterile water was taken. 0.5ml of culture from nutrient broth containing the 100% treated samples was transferred aseptically into the first test tube. Serial dilution was carried out until its reduced dilution was 10^ (-8).

100 microlitres of 10 (-8) diluted culture was taken aseptically and poured on to the Petri plates. This was spread by using L rod. The plates were incubated at 37°C for 16-18 hours. A similar procedure was carried out for untreated sample; samples were treated with 50% and 75% and 100% concentrations (Figure 4).

2. Antifungal Activity

AATCC 30-1993: Antifungal activity, Assessment of textile material: mildew and rot resistance of textile material - Agar diffusion test

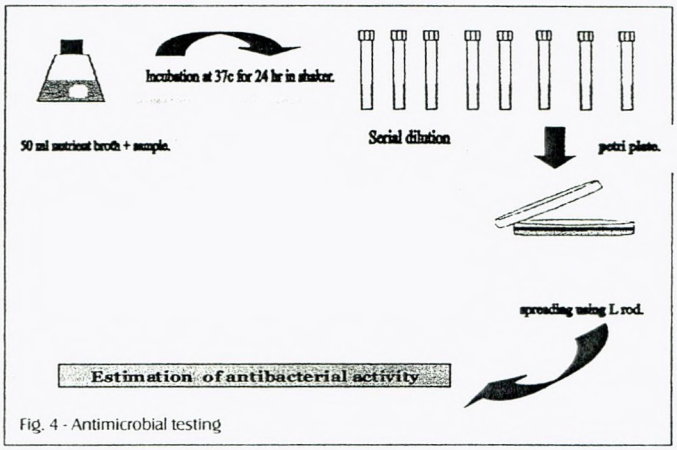


Fig. 4 - Antimicrobial testing

Table 1 - Absorbance tests at 600nm

Sample	Indian Acalypha
Untreated sample	1.109
50% treated sample	0.93
75 % treated sample	0.87
100 % gel treated sample	0.82

A 500ml Elenmeyer conical flask containing 50ml of PD broth was prepared and sterilised at 121°C for 15 minutes. It was then allowed to cool. The fabric samples were transferred aseptically into the conical flasks respectively. These were kept at room temperature for 3 days. Then the growth of fungi in the conical flask was observed after 3 days.

Mycelia Growth Test

50ml of PD agar was prepared and sterilised at 121°C for 15 minutes. 20ml of agar was poured. Then the 1x1 inch fabric was placed on the agar. Then the mycelia growth on the fabric was measured.

Wash Durability Test

The antimicrobial activity of the finished samples was evaluated for fastness to washing after different wash cycles. The finished samples were washed using the standard detergent (1% owf) and sodium carbonate (1% owf) at 40°C. The antimicrobial activity was assessed after 10, 15, 20 and 25 washes by challenge test.

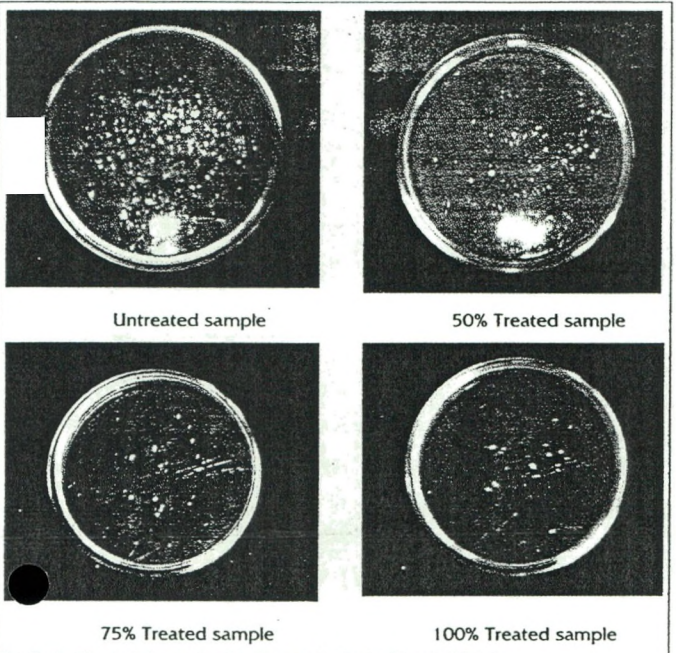


Fig. 5 - Antibacterial activity of Indian Acalypha leaf treated fabric

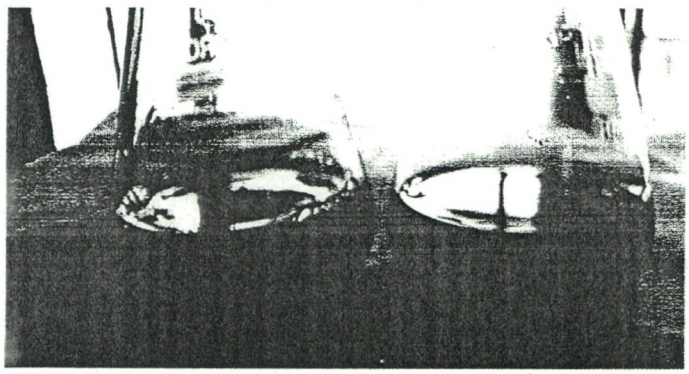


Fig. 6 - AATCC 30 tests of Indian Acalypha

Results and Discussion

CC-100-1998 (USA): Quantitative Assessment of Antibacterial finishes on textiles - measures the degree of antibacterial activity- Agar diffusion test

Absorbance of the sample is directly proportional to the concentration of the cells in the sample. The absorbance values of all five samples were compared. It was found that the sample treated with 100% concentration gave low absorbance value. This indicates that the 100% treated samples do not significantly support the growth of bacteria, in comparison with the others. The samples taken from the fabric treated with 75% concentration also gave low absorbance value when compared to untreated samples.

AATCC-147-1998 (USA): Qualitative Antibacterial Assessment of diffusible antibacterial agents ('quick method') - Agar diffusion test

After incubation, the plates were observed for bacterial growth. Then the numbers of colonies were counted for each plate. This showed that 100% treated samples had fewer colonies than other samples.

Samples treated with 75% concentration also had fewer colonies when compared to the untreated sample.

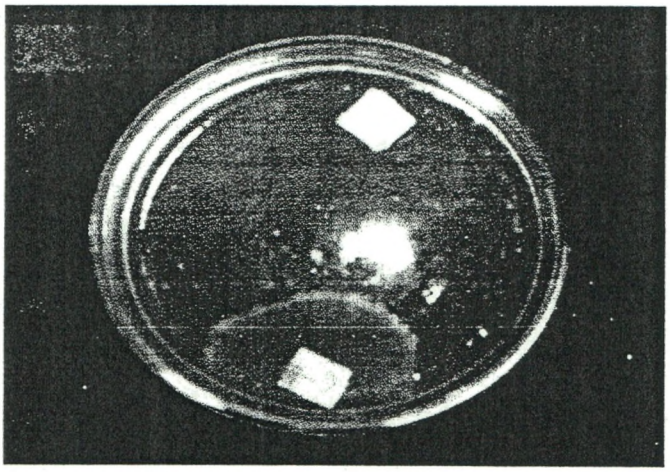
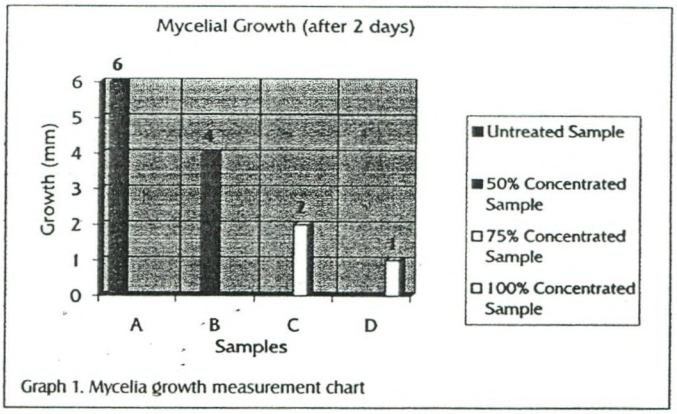


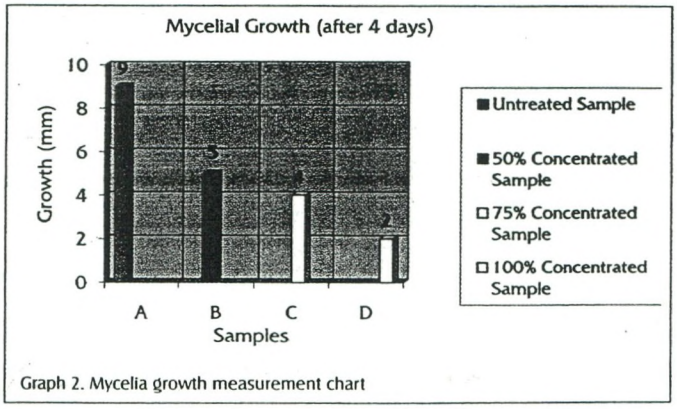
Fig. 7 – Mycelia growth test (Acalypha)

Table 2 Mycelia growth measurement

Sample	Indian Acalypha	
	2 days	4 days
Untreated sample	6 mm	9 mm
50% treated sample	4 mm	5 mm
75% treated sample	2 mm	4 mm
100% treated sample	1 mm	2 mm



Graph 1. Mycelia growth measurement chart



Graph 2. Mycelia growth measurement chart

The results indicate that 100% treated sample do not significantly support bacterial growth, whereas 50% and 75% treated samples support bacterial growth to a smaller extent than the untreated sample.

AATCC 30-1993: Antifungal activity, Assessment of textile material: mildew and rot resistance of textile material - Agar diffusion test

It was found that there was no growth of fungi in the conical

flask containing 100% treated Acalypha fabric. This indicates that 100% treated fabric gives good antifungal finishing. There was some growth of fungi in the conical flasks containing 50% and 75% treated Acalypha fabric when compared to 100% treated fabric. But there was less growth when compared to untreated fabric. This indicates that other treated fabric also has better antifungal activity.

Fig. 8 – Indian Acalypha treated product – man's shirt

Mycelia Growth Test

There was a reduction in the growth of mycelia in all the treated samples when compared to untreated fabric samples. The 100% treated sample showed maximum antifungal activity, as shown in Graphs 1 and 2.

Wear Sample Study

A man's shirt was especially developed for controlling skin rashes and itching, and ringworm in body parts such as neck, arms and elbows. As per the questionnaires filled by the wearer and the comments stated by them, it was understood that the garment did not cause any rashes, irritations or allergies to the body. They stated that the handle of the garment was very soft and was also curing and reducing skin rashes and itching day by day.

Wash Durability of Finishes

The antimicrobial activity of the finished samples was evaluated for fastness to washing after different wash cycles. The antimicrobial activity was assessed after 10, 15, 20 and 25 washes by challenge test. The washing fastness tests carried out revealed that 50% concentration of all the samples lasted for 15 washes, 75% concentration samples lasted for 20 washes and 100% concentration of all the treated samples stood for about 25 washes. It was observed that the activity diminished gradually as the number of washes increased (Table 3).

Conclusion

This research work has given a new idea in finishing of cotton with herbs for antimicrobial activity (Indian Acalypha). From the studies conducted, Indian Acalypha was found to contain active antimicrobial substances that can control the growth of microbes and also cure skin rashes and itching. 100% treated samples exhibited maximum antimicrobial activity in all the tests. The treated fabric was found to be very hygienic, with less fungi and bacteria, as well as making the cloth much softer than before.

The finish is cost-effective and eco-friendly. It will also lay the foundation for medical textiles, where researches can be carried out on the applications of Indian Acalypha-finished cotton for remedies of various skin diseases. In addition, the study will surely enhance the export quality of cotton fabrics, especially when Indian exporters face tough competition after globalisation. In a nutshell, this study has opened doors for producing better, eco-friendly, medically treated cotton fabrics. ID

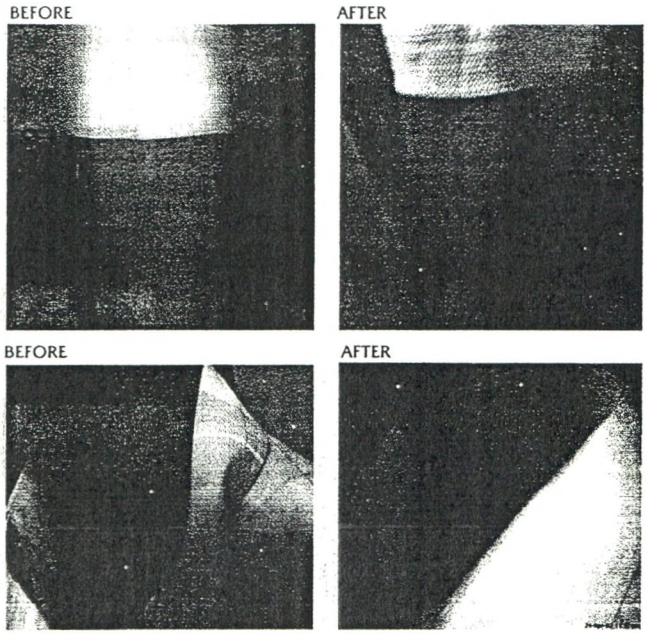


Fig. 9 – Skin allergies – wear test study - results

Table 3. Wash durability test

Sample	After 10 Washes	After 20 Washes	After 30 Washes
	Indian Acalypha	Indian Acalypha	Indian Acalypha
Untreated	16	23	
50% Conc.	7	10	13
75% Conc.	5	8	11
100% Conc.	1	5	7

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ISSN : 2231-2374

RESEARCH HIGHLIGHTS

Journal of

AVINASHILINGAM DEEMED UNIVERSITY FOR WOMEN

COIMBATORE - 641 043, TAMIL NADU, INDIA

Vol. 21, No.3 * Quarterly * July 2011

Res. High, JADU., (2011) 21, 144

CONSUMER PREFERENCE FOR GARMENT STYLES – A SURVEY

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** AMSAMANI, R.

Introduction

The world's two largest developing nations, China and India, demonstrate the benefits of globalization and the textile in clothing industry presently has one of the most extensive of all worldwide production networks, avers Catherine (2008). Garment arena in India has been witnessing several changes in character and complexity in the last few years. These changes include a higher reach of mass media, particularly due to an increased penetration of satellite channels, availability of a greater assortment of garments and services, a higher level of consumers spending on items other than basic necessities, a more clear indication of consumer preference for better value in garments and services. The garment industry is very much concerned for its customer, who is ultimately the king and the interests of the industry lie in the well being and satisfaction of the consumer. It is clear that the economy is referred to as a customer driven one, with firms allowing consumers to dictate specification and quality standards and also working out corporate strategies that revolves around the consumer.

Fashion plays a vital role in the world in shaping relationship between people. To quote Prakash (2004), fashion designers anticipate or predict fashion trends and design clothes for particular needs. It is evident that consumer demand is the driving force in the apparel industry. According to Suzanne (2005) high-end designer fashion is struggling to find its identity and the amount spent on fashion is declining. The industrial expression, "You can make only that sells" clarifies the concept of consumer-driven market. Thus the success of any apparel or textile company depends on the needs and wants of the consumer. Elaine (2007) reiterates the fact that fashion once considered as art form was controlled by designers, but it is decided by the consumers who accept and reject the styles offered.

The discovery and information processing inherent in consumers action before, during and after they buy keeps marketers on toes, opine Patricia,et,al (2008). The study of consumer preference for basic garment styles is highly beneficial because this will form the basis of product design and development. The data collected is bound to help fashion designers in fashion forecasting. Carefully created, sampled and studied preferences are of immense value for manufacturers in planning the volume of production. Cost reduction in managing and maintaining of stock of garments is possible with consumer studies.

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This study focuses mainly on the consumer preference and the objectives of the study were: To

- know the consumer preferences for basic garment styles
- find out the preference of garments for various occasions – formal, informal and casual wears and
- identify the preference of garments for three groups of people – men, women and children

Methodology

Descriptive research includes surveys and fact finding enquiries. Here the preferences of the consumer for styles were studied. The pattern of descriptive research was followed in this study.

The population under study covered four states of South India namely Tamil Nadu, Kerala, Karnataka and Andhra Pradesh. Area sampling and deliberate sampling were used. Under area sampling, the total area is divided into a number of non-overlapping areas, generally called geographical clusters. In this study South India is divided into its geographical clusters – Tamil Nadu, Kerala, Karnataka and Andhra Pradesh. Deliberate sampling, also known as purposive or non-probability sampling method was employed in the clusters. Two to three colleges from each of the cluster were selected.

College going students set the trend for the fashion and they adopt and follow styles quicker than any other group of people. One thousand college going boys and girls with equal representation from each state were chosen as sample for the study.

In fashion industry, when a style becomes popular, many different designs or versions of that style maybe produced. According to Evelyn (2006), pretesting styles with consumer can aid in early identification of 'winners' and 'losers' and the styles with consumer interest can be eliminated from further development. In this study three groups of people were covered under the study – men, women and children and in all the categories, preference for basic styles in the formal, informal / casual and party wear were studied. The basic garment style comprise of styles that is prevalent in India. The categories are summarized below.

1. Men's garments – formal wear

   Shirt and pants; shirt, pants and tie; coat, suit and tie; coat and suit; safari

2. Men's garments informal / casual wear

   Shirt and pants; T-shirt and pants; T-shirt and shorts; T-shirt and bermudas; shirt and shorts; shirt and bermudas; kurta and pants; kurta and pyjama

3. Men's garments – party wear

   Sherwani; shirt and pants; coat and suit; coat, suit and tie; kurta and pyjama; kurta and pants, safari

4. Women's garments – formal wear

   Salwar kameez; saree and blouse; middi and tops; pants and tops; princess line dress

5. Women's garments – informal / casual wear

   Salwar kameez; middi and tops; pants and tops; saree and blouse; jeans and tops; frocks; princess line dress; full skirt and tops; half saree; pinnafore

6. Women's garments – party wear

   Full skirt and tops; saree and blouse; salwar kameez; middi and tops; princess line dress; maxi / full gown; half saree

7. Girl child - party wear

   Frock; middi and tops; T-shirt and tops; baba suit; romper; salwar kameez; maxi / full gown

8. Girl child – casual wear

   Frock; middi and tops; T-shirt and tops; baba suit; romper; salwar kameez

9. Boy child – party wear

   Shirt and pants; shirt and shorts; shirt and bermudas; T-shirt and pants; T-shirt and shorts; T- shirt and bermudas; baba suit

10. Boy child – casual wear

    Shirt and shorts; shirt and pants; shirt and bermudas; T-shirt and shorts; T-shirt and pants; T-shirt and bermudas; baba suit; romper

In this descriptive research, the survey method was employed and the data was collected through questionnaires. The questionnaire consisted of list of garments and the occasions for which they were meant. The respondents had to rank the garments according to his/her preference. A pilot study was conducted for testing the validity of the questionnaire. Pilot survey is in fact the replica and rehearsal of the main survey sent to the persons concerned with a request to answer the questions and return the questionnaire same.

Technically speaking, processing implies editing, coding, classification and tabulation of collected data so that they are amenable to analysis. Analysis of data in a general way involves a number of closely related operations which are performed with the purpose of summarizing the collected data and organizing these in such a manner that they answer the research questions. Editing is done to assure that the data are accurate, consistent with other facts gathered, uniformly entered, as completed as possible and have been well arranged to facilitate coding and tabulation.

Computers are used increasingly in all the field of fashion designing state, Amsamani and Sanjana (2005). The ranking given by students were entered in Ms Excel program and imported to SPSS (v.7.5) for analysis. The sums of the ranks provided for each garment were calculated and the preference was studied. The lower the rank, higher was the preference. Preference scores were compared between male and female students using Wilcoxon Signed Rank Test. P values were computed and a p value less than 0.05 was considered statistically significant at one percent level.

Results and discussion

Men's garments – formal wear

The results obtained in the category of men's formal wear are listed in Table 1.

Table 1. Students ranking of men's formal wear

Name of the style	Rank	Overall preference	Female preference	Male preference
Shirt and Pants	989	I	I	I
Shirt, Pants and Tie	1209	II	II	II
Coat, Suit and Tie	1339	III	III	
Coat and Suit	1387			III
Safari	1686			

It may be observed that shirt and pants was preferred the most to be worn for the formal occasions. The shirt and pants along with a tie was the second preference followed by coat, suit with a tie and coat suit. The least preferred style was safari.

There was statistically significant difference in the ranking pattern of the garments (p-0.043). Male and female students did not differ in the first and second ranking. However, male students preferred coat and suit without tie for the formal wear as their third option while female students preferred the same with tie.

Men's garments – informal / casual wear

Styles in the informal / casual wear of the men's garments ranked as followed by the sample are presented in Table 2.

Table 2. Students ranking of men's informal/casual wear

Name of the Style	Rank	Overall preference	Female preference	Male preference	p
Shirt and Pants	1333	I	I	I	0.018
T-Shirt and Pants	1474	II	II	II	
T-Shirt and Shorts	2061	III		III	
Shirt and Shorts	2153		III		
Kurta and Pants	2213				
Kurta and Pyjama	2272				
T-Shirt and Bermudas	2336				
Shirt and Bermudas	2442				

P(<0.0)

The highest ranking was won by the shirt and pants in the men's informal/casual. T-shirt with pants and T-shirt with shorts are ranked second and third. It may be noticed that shirt with shorts, kurta with pants and kurta with pyjama is not very popular. Bermudas with T-shirt or shirt was not very common.

There was statistically significant difference in the ranking pattern of the garments (p-0.008). Male and female students did differ in the third ranking. Male students preferred T-shirt and shorts as their third option while female students preferred the shirt and shorts.

Men's garments – party wear

The ranking of styles for the party wear for the men's garments is given below in Table 3.

Table 3. Students ranking of men's party wear

Name of the style	Rank	Overall preference	Female preference	Male preference	p
Sherwani	1418	I	I	II	0.018
Shirt and Pants	1503	II	III	I	
Coat and Suit	1607	III	II	III	
Coat, Suit and Tie	1694				
Kurta and Pyjama	1728				
Kurta and Pants	1801				
Safari	1961				

From the table, it may be noted that sherwani, a traditional Indian garment ranked first in the order of preference for a party wear. Shirt with pants, coat with suit was given the second and third priority respectively.

There was statistically significant difference in the ranking pattern of the garments. Male and female students did differ in the top three preferences. Male students preferred shirt and pants while female students preferred the sherwani as party wear.

Women's garments – formal wear

The formal wear of women's garments ranked by the students given in Table 4.

For the formal occasions like workplaces, salwar kameez gets the highest preference followed by saree with blouse and middi with tops. Pants and tops has won the fourth place followed by the princess line dress in the fifth place. This shows that Indian women still are comfortable with traditional Indian garments for the formal occasions.

Table 4. Student ranking of women's formal wear

Name of the style	Rank	Overall preference	Female preference	Male preference
Salwar Kameez	1028	I	I	I
Saree and Blouse	1163	II	II	II
Middi and Tops	1321	III	III	III
Pants and Tops	1430			
Princess line Dress	1628			

Male and female students did not differ in the preference in the first, second and third ranking.

Women's garments – informal / casual wear

The results obtained regarding the informal / casual wear preference for the women's garment is tabulated in Table 5.

Table 5. Student ranking of women's informal/casual wear

Name of the style	Rank	Overall preference	Female preference	Male preference	p
Salwar Kameez	1680	I	I	I	0.043
Middi and Tops	1762	II	II	II	
Pants and Tops	2190	III	III		
Saree and Blouse	2424			III	
Jeans and Tops	2481				
Frocks	2907				
Princess line Dress	3014				
Full Skirt and Tops	3028				
Half Saree	3395				
Pinnafore	3716				

Salwar kameez has won the hearts of the people whether it is formal or informal occasion. Middi with tops and pants with tops are preferred most as the informal / casual wear. Saree with blouse which was give second place for formal wear has come down to fourth place in the casual wear. Jeans with tops, frocks, princess line dress are considered better for full skirt with tops, half saree and pinafore.

There was statistically significant difference in the ranking pattern of the garments. Male and female students did differ in the preference in the third ranking. Male students preferred saree and blouse as informal/casual wear while female students preferred the pants and tops as informal/ casual wear.

Women's garments – party wear

The preferences for party wear as ranked by the respondents are given in Table 6.

Table 6. Student ranking of women's party wear

Name of the style	Rank	Overall preference	Female preference	Male preference	p
Full Skirt and Tops	1391	I	I	II	0.018
Saree and Blouse	1392	II	II	I	
Salwar Kameez	1476	III	III	III	
Middi and Tops	1670				
Princess line Dress	1732				
Maxi // Full Gown	1807				
Half Saree	2198				

Full skirt and top, a traditional style has won the first rank for women's party wear. Even though the garment, saree and blouse is ranked second, it is almost equivalent to full skirt as the differences in rating is very marginal. It is clear that the preference of saree is excellent as far as the formal wear and party wear is concerned. It may be

observed that middi with tops, princess line dress, maxi/fullgown is less preferred by the respondents. Half saree, a traditional garment of south India was least preferred. There was statistically significant difference in the ranking pattern of the garments (p-0.001).

Girl child – party wear

The ranking for the party wear for a girl child is listed as follows in Table 7.

Table 7. Students ranking of girl child's party wear

Name of the style	Rank	Overall preference	Female preference	Male preference	p
Frock	900	I	I	I	0.018
Middi and Tops	1235	II	II	II	
T-Shirt and Pants	1594	III	III		
Baba Suit	1616			III	
Romper	1935				
Salwar Kameez	2158				
Maxi / Full Gown	2172				

From the Table, it is evident that the frock, middi with top and T-shirt with pants were highly preferred party wear of girl child. Baba suit, romper, salwar kameez and maxi/ full gown were not very popular girls party wear garments.

There was statistically significant difference in the ranking pattern of the garments (p-0.018). Male and female students did differ in the preference in the third ranking. Male students preferred baba suits while the female students preferred T shirt and pants for girl child's party wear.

Girl child – casual wear

The Basic styles of the garments of a girl child worn as a casual wear are ranked in Table 8. The ranking order of a girl child for party wear and casual wear is the same. Hence it may be stated that girls give more preference to the following styles - frock, middi with tops and T-shirt with pants. The richness in the styles may differ with the occasions, but the preferences for styles remain the same.

Table 8. Student ranking of girl child's casual wear

Name of the style	Rank	Overall preference	Female preference	Male preference	p
Frock	948	I	I	I	0.012
Middi and Tops	1181	II	II	II	
T-Shirt and Pants	1411	III	III	III	
Baba Suit	1569				
Romper	1849				
Salwar Kameez	1995				

There was statistically significant difference in the ranking pattern of the garments (p-0.028). The top three preference pattern of male and female students did not differ when it came to girl child's casual wear.

Boy child – party wear

The preference for party wear of a boy child is ranked as given below in Table 9.

Table 9. Student ranking of boy child's party wear

Name of the style	Rank	Overall preference	Female preference	Male preference	p
Shirt and Pants	1374	I	I	I	0.012
Shirt and Shorts	1459	II	II	II	
T-Shirt and Pants	1601	III	III	III	
T-Shirt and Shorts	1709				
Baba Suit	1924				
Shirt and Bermudas	2008				
T-Shirt and Bermudas	2144				
Romper	2401				

The above given table says that the boys like shirt with pants, shirt with shorts or T-shirt with pants for parties or special occasions. Baba suit, bermudas with shirt / T-shirt and romper are not much preferred for parties. There was statistically significant difference in the ranking pattern of the garments (p-0.012).

Boy child – casual wear

The casual wear garment styles of a boy child was ranked and tabulated as shown in Table 10.

Table 10. Student ranking of boy child's casual wear

Name of the style	Rank	Overall preference	Female preference	Male preference	p
Shirt and Shorts	1294	I	I	I	0.012
Shirt and Pants	1521	II	III	II	
T-Shirt and Shorts	1608	III	II		
Shirt and Bermudas	1706				
T-Shirt and Pants	1715			III	
T-Shirt and Bermudas	1763				
Baba Suit	2172				
Romper	2435				

The most preferred garment for a boy child's casual wear was shirt and shorts followed by shirt and pants and T-shirt and shorts. Baba suit and rompers were preferred the least as casual wear for boys.

There was statistically significant difference in the ranking pattern of the garments (p-0.012). Male student's top three order differed from the girl students in the II and III order. Shirt and pants and T shirts and pants were the second and third preference among male students while it was the T-shirt and shorts and shirts and pants that the female students preferred second and third.

Conclusion

For a formal and informal / casual occasion, shirt and pant was preferred by most of the respondents. Sherwani, traditional Indian garment was first preferred for a party. Salwar kameez was preferred most for the formal and informal / casual functions. For a party, full skirt and tops was the first choice. For a girl child, the preferential order for the party wear and casual / informal wear was the same. Frock has won the first place followed by the middi with tops and t-shirt with pants. Garment styles preferred for boy child for a casual wear was shirt with shorts. The garment preference for a party wear was shirt with pants.

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