



EFFECT OF MEDICINAL HERB EXTRACTS TREATED ON COTTON DENIM FABRIC

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ABSTRACT

An attempt has been made through this research work to developed medicinal herb extracts treated fabric. In this work, medicinal herbs such as Ricinus Communis (leaves and seeds), Datura metel (leaves with fruits), Aloe Vera (flower),Abutilon indicum (leaves), Solanum surattense (Leaves), Coccinia grandis (Fruits and leaves),Aloe vera (leaves), Cardio spermum halicacabum (Leave), have been selected for finishing hundred percent cotton denim fabric using dip method .The finished fabrics have been tested for its antimicrobial activity using standard test method ENISO 20645 and it is concluded that datura metel (leaves with fruits) have good antibacterial activity on the selected denim fabrics when compared to other herbs enhanced the wearing capacity of the denim fabric for an extended period without any skin/dermal irritations/infections and bad odor.

Keywords: Antimicrobial activity, Cotton, Denim fabric, ENISO 20645 and Medicinal herb

INTRODUCTION

The use of plants and plant products could be traced as far back as the beginning of human civilization. Medicinal plants are a source of great economic value all over the world. Nature has bestowed on us a very rich botanical wealth, a large number of diverse types of plants grow in different parts of the country [1]. The Indian Ayurvedic system of medicine is known as the richest, and the foremost among the other branches of medicinal knowledge that is available elsewhere on the globe [2].

A major factor that has stimulated interest in antimicrobial finishes using natural sources has been the current vogue that promotes natural and eco-friendly lifestyle. In addition, the consumers are now much more aware of the deleterious effects that microorganisms may have upon textiles and human hygiene [3].An innovative approach to make the cloth microbial resistant, is to apply the plant extracts containing active substances [4].

There are many ways in which the surface properties of a fabric can be manipulated and enhanced, by implementing appropriate surface finishing and coatings [5].Hence the present study "Effect of medicinal herb extracts treated on cotton denim fabric" is taken up with the following objectives. To elicit information from the market and the consumer to find out the availability and utility of denim fabric, To screen for functional properties such as Antibacterial from selected herbs, To optimize the effective herbal of the functional property of the selected finishes, To finish the herbal on the hundred percent cotton denim fabrics using dip method and to compare the activity of the best herbs.

MATERIALS AND METHODS

PRETREATMENT

Desizing

Desizing is a process employed to remove the sizing materials present in the gray cloth to make it suitable for further processing. Typical denim wet finishing includes desizing to soften the fabric [6].The following recipe was used for desizing the selected D denim materials.

Recipe

Denim material	-	20 meters
M: L ratio	-	1meter: 15 liters
Sodium hydroxide	-	40 grams
Temperature	-	40 -60°C

PH	-	7
Time	-	30 minutes

The Desizing was done using the above ingredients, in selected hundred percent cotton denim fabric samples D individually for pretreatment. stainless steel vessel was used, In this vessel, 150 liters of soft water was poured and 40 grams of sodium hydroxide was added and made it dissolved in water and 20 meters of denim material was immersed and boiled for 30 minutes at boiling temperature the ph was maintained at 7and stirred continuously The material was removed from the vessel and washed thoroughly with soft water and desized material was dried.

Selection of herbs

The selected herbs botanical names are mentioned as follows. Live and healthy herbal plant parts of *Ricinus Communis (leaves and seeds)*, *Datura metel (leaves with fruits)*,*AloeVera (flower)*,*Abutilon indicum (leaves)*, *Solanum surattense (Leaves)*, *Coccinia grandis (Fruits and leaves)*,*Aloe vera (leaves)*, *Cardio spermum halicacabum (Leaves)*, were used for the selected finishes.

Extraction process of herbs

The separated herbal parts were shadow dried and powdered by using dry grinding machine. The herbal powders were stored in a dry container for further studies. The herbal products today symbolize safety in contrast to the synthetics that are regarded as unsafe to human and environment. Although herbs had been priced for their medicinal, flavorings and aromatic qualities for centuries, the parts of the plant used for medicinal purposes are leaves, root, stem, fruits, the complete aerial parts, the whole plant, barks (root and stem) and flowers. However, leaves were found most frequently used part [7]. The above herbs were selected after thorough study from the related books.

The extraction process was done in three stages, such as drying, grinding and extraction. Two types of extraction method were followed such as methanol and aqueous extraction was done for all the selected twenty herbs and the following procedure was followed.

Drying of herbs

The collected plants were dried at the room temperature in the open air .It cannot be stored without drying to avoid breakdown of important compounds and also it will be contaminated by microorganisms. The dried herbs were kept in a dark room so that the breakdown of important components by sunlight will be prevented. After drying, those selected portions of the plant to be used and other parts of the plants were separated from dirt and

other extraneous matter manually.

Grinding process

Dry Grinding of the selected herbal portion was done in grinder mixers. After that, the powder was sieved with seiver to remove the dirt and unkind particles. The fine powder obtained was used for extraction. The extraction was done by two methods such as methanol and aqueous extraction.

Methanol extraction

The following **recipe** was used for the Methanol extraction of selected 20 herbs individually.

Recipe

Herbal powder	-	6grams
Methanol	-	80 ml
Aqueous (distilled Water)	-	20 ml
Temperature	-	Room temperature
Time for incubation	-	24 hours
Filter paper	-	Whatmann no.1 filter paper

Procedure for methanol extraction

The above selected recipe was used for extraction. Six grams of the herbal powder was mixed thoroughly with methanol and water and it was kept in airtight conical flask. The conical flask was incubated for 24 hours in the room temperature. The supernatant was filtered using a Whatmann no.1 filter paper and the filtrate was dried and the methanol was evaporated at room temperature. When exposed to the air. The filtrate was collected and kept in an air tight container for further study. The same method was used to collect filtrates of herbal powder of selected twenty herbal samples. This procedure was followed with the reference of the article [8].

The following **recipe** was used for the aqueous extraction of selected 20 herbs.

Recipe

Herbal powder	-	6grams
Aqueous (distilled water)	-	100 ml
Temperature	-	Room temperature
Time for incubation	-	24 hours
Filter paper	-	Whatmann no.1 filter paper

Procedure for aqueous extraction

Six grams of dried herbal powder was mixed in 100ml of water slowly and mixed thoroughly in an air tight conical flask by shaking the flask for thorough mixing of herbal powder. The powder was allowed to dissolve in the water homogenously. Then the extract solution was filtered with Whatmann no.1 filter paper. The sediment/filtrate extract was allowed to dry in the room temperature. The filtrate/extract was collected and kept in an air tight container for further study. The same procedure was followed for selected twenty herbs.

Preparation of fabric

The desized 100% cotton and its blended denim material was cut in to 10 cm X 10 cm .This sample was sterilized with UV rays in a laminar air flow chamber for 30 minutes and this was kept in a sterile place for further study.

Finishing of fabric

The following recipe was used to finish the selected fabric by dip method using the extracted herbs.

Recipe

Denim Samples	-	2.5cm ± 0.1cm diameter
Solvent	-	The above extracted methanol and aqueous Solvents
Time	-	20 minutes

Sterilization	-	UV rays by Laminar air flow chamber
Temperature	-	Room temperature

For finishing the fabric by dip method, the desized sterile samples was cut with circular disc of diameter 2.5cm ± 0.1cm .The extracted solvent was added in a beaker .The denim samples were immersed in the solvent for twenty minutes and then the sample were removed from the solvent and dried in the air without washing. The finished denim samples were sterilized by UV rays in the laminar air flow chamber to avoid microbial growth on the surface of the fabric. The same procedure was followed for the aqueous extract method of finish also. The sterile finished fabric sample was kept in a sterile container.

Preliminary Analysis of Qualitative Antibacterial activity ENISO 20645 method

The finished samples (both methanol and aqueous) were qualitatively assessed for the antimicrobial activity. The following microbes were selected for this study according to the ENISO 20645 standard.

Test organisms	-	<i>Escherichia coli</i> ATCC 11229 and
	-	<i>Staphylococcus aureus</i> ATCC 6538

Preparation of Inoculums

The lyophilized sample of the above two strains of bacteria were inoculated in to a sterile peptone broth in a conical flask. The two conical flasks containing the bacterial samples were incubated at 37 °C for 24 hours. The inoculums were ready for bacterial culture.

Preparation of culture medium

The cultural medium used for the qualitative study the bacteriostasis nutrient agar was prepared using the following ingredients.

Recipe

Peptone	-	0.5 grams
Yeast extrac	-	0.3 grams
Sodium chloride	-	2 grams
Agar –agar	-	2.25 grams
Distilled Water	-	100 ml

The culture medium was autoclaved at 120 °C for 15 minutes at a pressure of 15 lb. The Agar- agar medium was transferred into sterile Petri plates and allowed to solidify. This product was thus called as nutrient agar. This was used as subtract for the growth of the selected bacteria.

Procedure for qualitative antimicrobial inhibition

The inoculum of the test bacterial sample in the conical flask was inoculated. The cotton swabs dipped in the inoculums were swabbed on the Nutrient Agar surface uniformly.

The sterile fabric samples were immersed in the herbal extract for 30 minutes and dried in sterile condition. Then this was placed in the nutrient agar surface using a sterile spatula and forceps. After placing the samples all the Nutrient Agar Petri dishes were incubated at 37 °C for 18 to 24 hours.

After incubation the plates were examined for the zone of bacterial inhibition around the fabric samples. The size of the clear zone of bacterial growth inhibition around the finished samples was evaluated which was the inhibitory effect of the herbal extract.

The above Antimicrobial finished samples were analyzed by Qualitative and Quantative method. This method was followed with the reference [9].

RESULT AND DISCUSSION

Table1: Analysis Of Herbs For Antibacterial Activity By Eniso 20645

S. No.	Herb used	Solvents used for extraction	Antibacterial activity – zone of bacteriostasis (mm)	
			<i>Escherichia coli</i>	<i>Staphylococcus aureus</i>
			D	D
1	Ricinus communis – leaves	Aqueous	0	0
		Methanol	0	0
2	Ricinus communis – seeds	Aqueous	0	0
		Methanol	0	28
3	<i>Datura metel</i> - leaves + fruit	Aqueous	0	0
		Methanol	0	32
4	<i>Aloe vera</i> – flower	Aqueous	0	0
		Methanol	0	0*
5	<i>Abutilon indicum</i> – leaves	Aqueous	0	0
		Methanol	0	23
6	<i>Solanum surattense</i> –leaves	Aqueous	0	0
		Methanol	0	0
7	<i>Coccinia grandis</i> – fruit	Aqueous	0	0
		Methanol	0	0
8	<i>Coccinia grandis</i> – leaves	Aqueous	0	0
		Methanol	0	0
9	<i>Aloe vera</i> – leaves	Aqueous	0	0
		Methanol	0	28
10	<i>Cardiospermum halicacabum</i> – leaves	Aqueous	0	27
		Methanol	0	26

0* - No bacterial growth beneath the test fabric.

Table 1, Show the analysis of herbs for antimicrobial activity for selected herbs, From the study it was concluded that *Datura metel* (Leaves and fruit (figure 1) have more antibacterial activity 32 mm on the hundred percent cotton denim fabric when compared

to other herbs. The *Datura metel* characters enhanced the wearing capacity of the denim fabric for an extended period without any skin/dermal irritations/infections, without any bad odor.



Figure 1: *Datura metel* (Leaves and fruit)

CONCLUSION

After the procedure it was identified by the investigator that the finishing technique by the dip method in the hundred percent cotton denim fabric possessed good antimicrobial activity in *Datura metel* (Leaves + fruit) when compared to other herbs. In

turn the *Datura metel* herbs enhanced the wearing capacity of the denim fabric for an extended period without any skin/dermal irritations/infections, without any bad odor.

REFERENCES

1. Ripa, A., Laizuman Nahar, Abul Fazal and Hajera Khatun Ripa, Antibacterial and phytochemical evaluation of three medicinal plants of Bangladesh farhana, (research article) IJPSR, Vol. 3(3), (2012), Pp.788-792.
2. Rajeh, M.A.B., Zakaria Zuraini, Sreenivasan Sasidharan, Lachimanan Yoga Latha and Santhanam Amutha. Assessment of *Euphorbia hirta* L. Leaf, Flower, Stem and Root Extracts for Their Antibacterial and Antifungal Activity and Brine Shrimp Lethality, IJPLS, Vol.15(9), (2010), Pp.6008-6018.
3. Natarajan, V. Azadirachta indica in the treatment of dermatophytosis. *J Ecobiol*, Vol.14, (2002), Pp.201-204.
4. Ian, H., Durable freshness through antimicrobial finishes, textile magazine, Vol.30, Issue-4, (2002), Pp.13-16.
5. Sawhney, A.P.S., Condon, B., Singh, K.V., Pang, S.S., Li, G., Hui, D, Modern Applications of Nanotechnology in textiles, textile research journal, Vol.78(8), (2008), Pp. 732-733.
6. Yoon, M.Y., Denim Finishing With Enzymes, Dyer International, Vol 11, (2005), pp-16-19.
7. Sravanthi, C.K., Manthri, S., Srilakshmi, S., Ashajyothi, V., Wound Healing Herbs – A Review, International Journal Of Pharmacy & Technology, ISSN :0975-7668, Vol. 21, Issue No -41, (2010), Pp.603- 624
8. Thilagavathi, G., Krishna Bala, S., and Kannaian, T., Microencapsulation of herbal extracts for microbial resistance in healthcare textiles, Indian journal of fiber and textile research, Vol.32, (2007), September, p.352.
9. Erdem, K., Yurudu, A.S.N.O., The Evaluation of Antibacterial Activity of Fabrics Impregnated with Dimethyltetradecyl (3-(Trimethoxysilyl) Propyl) Ammonium Chloride, IUFS, Journal of Biology, Vol. 67(2), (2008) ,and Pp.115-122.