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## **POLY HERBAL ANTIMICROBIAL FINISH ON TEXTILE MATERIAL USED IN DEVELOPING MEDICATE PRODUCTS**

**S. Archanaa Preetha<sup>1</sup>, Dr. G. Bagyalakshmi<sup>2</sup>**

<sup>1</sup> PhD Scholar <sup>2</sup> Assistant Professor (Senior Scale)

Department of Textiles and Clothing Faculty of  
Home science, Avinashilingam Institute for Home  
Science and Higher Education for Women, Coimbatore

### **ABSTRACT**

The aim of the study were to identify phytochemical content and antimicrobial property of the plants *Abutilon Indicum*, *Cassia Auriculata*, *Tridax Procumbence* and *Cassia Fistula* and finishing the cotton fabric using the poly herbal extract of the plants using three different methods such as Dip and drying, Micro encapsulation and Nano encapsulation. The finished fabric is tested for the antimicrobial activity against the pathogens such as *Candida albicans*, *Pseudomonas aeruginosa*, *Escherichia coli*, *Staphylococcus saprophyticus*, *Aeromonas hydrophilla*

**Key words:** phytochemical, antimicrobial, poly herbal

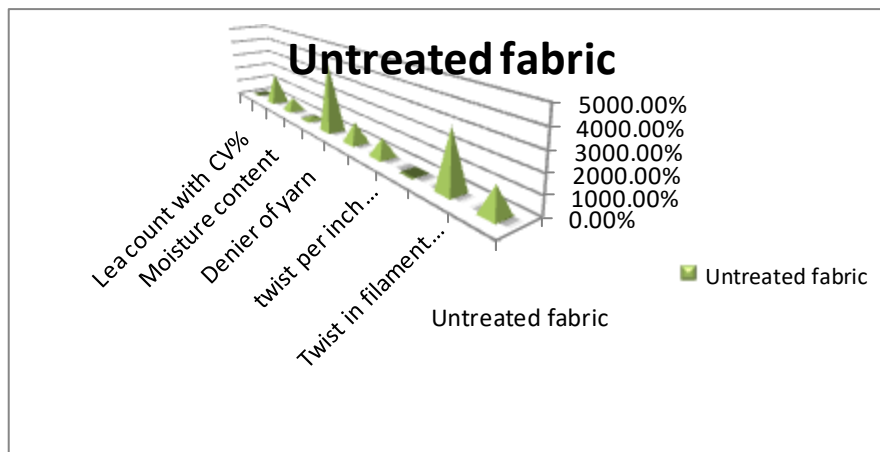
### **INTRODUCTION**

Infectious microbial diseases are becoming serious threat in developing countries, where people are not aware of their primary healthcare. Due to their lack of proper treatment, indiscriminate use of antibiotic and also ignorance are the major problems to control such bacterial disease. Now-a-days, it is a common phenomenon that micro organisms are developing their resistance to many commercial antibiotics that is the major cause of failure to treat various infectious diseases (Islam et al, 2010). Several chemical sources are widely obtained as commercial in the market, more than this; naturally obtained antimicrobial sources are spread all over the world. They are obtained from the herbs, minerals, animal shell, insects and so on. They are more eco friendly, and are also effective against the microbes. Beyond being eco friendly and effective against the microbes, they also remain skin friendly to the user. An environmental friendly antimicrobial agents based on natural products for textile application is going worldwide interest. There are many natural products and antimicrobial agents; the study on their use in textile is very limited and not well documented. The relatively lower incident of adverse reaction of herbal products as compared to modern scientific pharmaceuticals, coupled with their reduced cost, can be exploited as an attractive ecofriendly alternative to synthetic antimicrobial agent for textile application. Recent development on plant based bioactive agents has opened up new avenues in the area of research. Among all the natural antimicrobial agents the plants products comprise the major segment. Healing power of some of the plant materials has been used since ancient times. Hippocrates (in the last 4<sup>th</sup> century BC) reported 300 -400 medicinal plants which have an almost limitless ability to synthesize aromatic substances which are phenol or their oxygen-substituted and derivatives of secondary metabolites which are at least 12,000 have been isolated (less than 10% of the total) in many cases. These substances serve as plant defence mechanism against predation by microorganisms, insects and herbivores. Some compounds such as terpenoids give plants their odours; others (quinines and tannins) are responsible for plants pigmentation. Many compounds responsible for plant flavour (e.g. flavonoids and the capsaicin for chilli peppers) (M Joshi, 2009). The antimicrobial property may be due to the presence of flavonoids and phenolic compounds present in the plants as the secondary metabolic (Hosamani et al, 2011). And this study deals with the identification, extraction of phenolic compounds present in the herbs such as *Abutilon indicum*, *Tridaxprocumbenz*, *Cassia fistula*, *Cassia auriculata* for and identification of antimicrobial property of the extract and finishing it on the on the textile materials use for treatments small cut and wound.

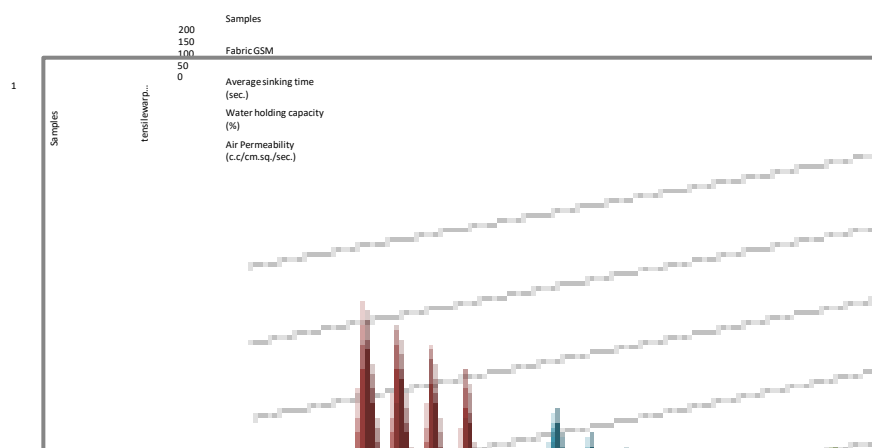
## MATERIALS AND METHODS

Cotton is selected for the processes. Yarn of 10's and 30's count had been purchased from Textile Committee in Coimbatore and woven in SITRA physical properties of yarns and fabric had been tested and the fabric was pre-treated. *Abutilon indicum*, *Tridax procumbenz*, *Cassia fistula*, *Cassia Auriculata* had been collected from the local area of the Madurai, shadow dried and crushed coarsely. The extraction process of herbs were performed with three different solvent namely hexane, ethyl acetate and methanol. Screening of solvent based on analysis of phytochemicals present in the herbs were done. Determination of MIC against five organisms namely *Pseudomonas aeruginosa* (ATCC27853), *E.coli* (ATCC 25922) and *Candida albicans* (ATCC 10231), *Aeromonas hydrophila* (MTCC 1739) and *Staphylococcus saprophyticus* (MTCC 6155) is done. Antibacterial activity of the selected MIC value, polyherbal formulation, and antibacterial activity of polyherbs by well diffusion and Wound scratch assay of selected polyherbal formulation was determined. The polyherbal extract was finished directly to fabrics by dip and dry method. Further the preparation of microcapsules and nanocapsules are prepared and finished onto fabrics. The antibacterial activity of dip and dry, microencapsulated and nanoencapsulated fabric were evaluated by AATCC 147 method in fourth phase. The finished fabric was tested for its physical properties and was finally subjected to product development.

**Chat 1: Physical Testing of cotton yarn**



**Chat II: physical testing of fabrics**



**Table I: MIC values of herbal extract**

S. No	Methanolic extraction	MIC values ( $\mu\text{g/ml}$ ) of herbal extract				
		1	2	3	4	5
1	<i>Abutilon indicum</i>	250	125	250	250	1000
2	<i>Tridax procumbens</i>	500	125	500	250	500
3	<i>Cassia fistula</i>	250	250	250	500	500
4	<i>Cassia auriculata</i>	62.5	125	250	250	62.5

1. *Candida albicans*, 2. *Pseudomonas aeruginosa*, 3. *Escherichia coli*, 4. *Staphylococcus saprophyticus*, 5. *Aeromonas hydrophilla*

**Table: II Antimicrobial activity of herbal extract by well diffusion method**

S. No	Sample	Zone of inhibition (mm)				
		1	2	3	4	5
1	Negative control	-	-	-	-	-
2	Positive control	22	25	30	28	31
3	<i>Tridax procumbens</i> (500 $\mu\text{g/ml}$ )	13	14	13	12	13
4	<i>Abutilon indicum</i> (250 $\mu\text{g/ml}$ )	16	15	20	23	15
5	<i>Cassia fistula</i> (250 $\mu\text{g/ml}$ )	15	18	16	17	19
6	<i>Cassia auriculata</i> (250 $\mu\text{g/ml}$ )	19	20	22	25	26

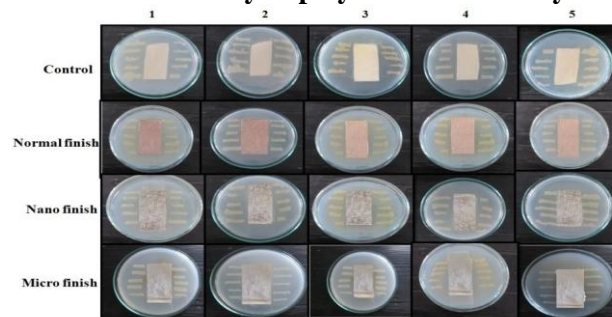
**Table: III Antimicrobial activity of polyherbal extract by well diffusion method**

S.No	Sample	Zone of inhibition (mm)					
		1	2	3	4	5	
1	Negative control	-	-	-	-	-	
2	Positive control	25	31	28	20	22	
3	Polyherbal extract	50 $\mu\text{l}$	14	12	11	15	10
		100 $\mu\text{l}$	18	15	17	19	15
		150 $\mu\text{l}$	20	17	20	21	18
		200 $\mu\text{l}$	22	20	22	23	20

1. *Candida albicans* 2. *Pseudomonas aeruginosa* 3. *Escherichia coli* 4. *Staphylococcus saprophyticus* 5. *Aeromonas hydrophilla*

Wound scratch assay testing was performed for the antimicrobial tested polyherbal solution and applied on the fabric using three different method such as dip and drying, micro encapsulation and nano encapsulation. antiallergy testing was performed on the finished fabric and Observations were made up to 24 hours for the symptoms such as Skin rashes, redness and irritations (Erythema & Edema). The time of observation may be extended for another 24 hours to confirm the effect. The fabric finished by three different methods was subjected to antibacterial activity by AATCC147 method. SEM and FTIR tests were performed to verify the efficiency of the finished fabrics.

**Picture: I Antimicrobial activity of polyherbal extract by well diffusion method**



\*1 - *Escherichia coli*; 2- *Pseudomonas aeruginosa*; 3 - *Candida albicans*;  
4 - *Aeromonas hydrophila* ; 5 - *Staphylococcus saprophyticus*

#### Result:

The study shows the phytochemical present in the plants shows best results as antimicrobials against the pathogenic microbes, which plays an important role in causing the small cut and wounds in to chronicle wounds infection which lead to major problems can be treated easily in the advance stage. The poly herbal treated fabric used in treating small cuts and wounds are converted into small self adhesive Band-Aids for further uses.

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