IJASRM

International Journal of Advanced Scientific Research and Management, Volume 4 Issue 4, April 2019

www.ijasrm.com

ISSN 2455-6378

Antibacterial Activity of *Rubia Tinctorum*, *Rosa Damascene* and *Eclipta Prostrate* for Textile Application

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Abstract

In textile and clothing industry, the functional finishes have been increasing rapidly in textile market because of competition and gaining added values and increasing market share. This study is based on the development of herbal antibacterial textile. Bamboo fabric naturally has some antibacterial activity, so it can intake the application easily. Herbs were used to reduce the growth of bacterial on textile. Medicinal plant parts of *Rubia Tinctorum* (roots), *Rosa Damascene* (flowers) and *Eclipta Prostrate* (leaves) has selected for the study. Herbal extraction was prepared along with the ethanol and it is tested under Agar well diffusion method and the extracts were assessed for the antibacterial activity against the selected tests. And the best one is applied on bamboo knitted fabric by Pad-Dry-Cure method. All the tests carried under this study have obtained a good result.

Key words:*Antibacterial, Bamboo fabric, Rubia Tinctorum, Rosa Damascene and Eclipta Prostrate.*

1. Introduction

The highly competitive atmosphere has ensured that the prime concern of the textile processor is quality and environment. Again, the guideline of the processes thus in turn, makes it essential for innovation and changes in the processes.

Clothing and textile materials are not only the carriers of microorganisms such as pathogenic bacteria, odour generating bacteria and mould fungi, but also good media for the growth of the microorganisms [(7)]. Textiles for outdoor use are constantly exposed to the influence of microbes and bacteria. Textile goods, especially those made from natural fibres, provide an excellent environment for microorganisms to grow, because of their large surface area and ability to retain moisture [(2)]. Most textile materials currently used in hospitals and hotels are conductive to cross infection or transmission of diseases caused by microorganisms. Bacteria are not as damaging to fibers, but can produce some fiber damage, unpleasant odors and a slick, slimy feel. Often, fungi and bacteria are both present on the fabric in a symbiotic relationship [(5)].

Bamboo is 100% natural and biodegradable fiber. It is an extremely resilient and durable fiber[(4)]. At the same time it can feel beautifully soft and pleasant to the touch. The present work is therefore aimed at studying the antibacterial activity of 100% bamboo knitted fabric treated with selected medicinal plants and the result were analyzed[(8)].

2. Materials and methods

2.1 selection of fabric

The 100 percent bamboo knitted fabric was selected for this study. The selected bamboo fabric were desized and bleached for the removal of impurities and natural coloring matters present in the fabric.

2.2 Selection of herbs

(*Rubia Tinctorum* (roots), *Rosa Damascene* (flowers) and *Eclipta Prostrate* (leaves) has been selected for the study. These medicinal plants are already used in Indian traditional medicine and most frequently used in Ayurveda and also used in cosmetic skin care.

***Rubia Tinctorum* (roots)**

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The medicinal part of Ruby tinctorum is the dehydrated root. *Rubia Tinctorum,* the common madder or dyer's madder, is a herbaceous perennial plant species belonging to the bedstraw and coffee family Rubiaceae. The root of *Rubia Tinctorum* has high medicinal values[(8)].The roots of *Rubia Tinctorum* (madder) are the source of a natural dye. The root is aperient, asperient, cholagogue, diuretic and emmenagogue. They are peeled and then dried for use. When taken internally the root impacts a red colour to the milk, urine and bones and it is used in osteopathic.

***Rosa Damascene* (flowers)**

Roses have been grown for garden plants and cut flowers for decor and a source of natural fragrances and flavourings and beautifying homes. In history roses have been used in medicine, food, perfume and health. They have essential oils for perfumes, so it is widely used in cosmetic[(2)]. They are expected to synthesise a variety of secondary metabolites capable of providing them protection against the infectious agents. Thus likewise roses have potential against microbial activities[(1)]. *Rosa Damascena* attempted to prove that the ethno botanical use of rose petals can be a cure of diarrhoea as an enlarged tonsils, commonly caused by *Escherichia coli*.

***Eclipta Prostrate* (leaves)**

Eclipta Prostrata is also an effective medicine for skin diseases, cough, asthma, eye disorders and diseases related to any part of the head. It improves hair growth, prevents hair fall and treats premature greying of hair. It improves complexion and glow of the skin and prevents several skin diseases. It improves skin complexion (*varnya*). It is more beneficial in chronic skin diseases including pruritus (intense itching), chronic wounds, skin ulcers, atopic dermatitis (eczema) etc. *Eclipta Prostrata* increases the production of bile from the liver, improves liver functions, reduces constipation and corrects digestion and enhances metabolism[(3)].

2.3 Collection and Processing of selected herbs

The selected herbs were collected in and all around Coimbatore. The collected herbal parts were shade dried at room temperature to reduce the moisture content less than 14 % with proper drying. Then grinding process is done for dried herbal parts. In that the herbal parts are grind into very small units ranging from larger course fragments to fine powder. The fine powder obtained after grinding was used for extraction and the fine powered was stored under good condition to reduce the risk of the contamination.

2.4 Ethanolic Extraction of collected selected herb parts powered

Extract preparation, Distilled water and ethanol (99.7%) were used as solvents for extraction of antibacterial compounds. A known weight of the powdered sample was mixed individually with the solvent (500 mg extracted in 50 ml, as 3 individual replicates) and was shaken in an orbital shaker (Lab Companion, Model SI 600R Bench top shaker) at 160 rpm for 24 hours at room temperature. Extracts were filtered through Whatman filter paper (Whatman No. 41, UK). The filtrate were collected and transferred to screw-top glass bottles (with Teflon caps) and were covered with aluminium foil to avoid exposure to light.

2.5 Finishing by Pad-dry-cure method

The finishing of herbal extracts on to the bamboo knitted fabric was done through padding mangle. The finished fabric sample immersed in the prepared extract was passed through a padding mangle run at a speed of 30 rpm/min and a mangle pressure of 15 kgf/cm^2. The padded fabric was air dried and then cured for three minutes at 140℃. The finished fabric sample was subjected to further uses.

3. Results and discussion

3.1 Antibacterial Activity by AATCC 147

The antibacterial activity of the three different plant part extracts was evaluated by Agar well Diffusion method. The extracts were evaluated for Antibacterial activity by AATCC147 and Sterile nutrient plate were prepared. The plate were allowed to solidify for five minutes and extractions were placed on it. 0.1% inoculum suspension of *Staphylococcus aureus* (ATCC 6538) and *Escherichia*

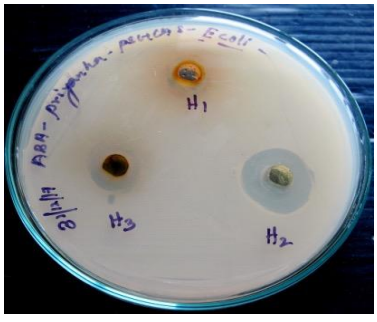
coli (ATCC 8739) were swabbed uniformly over the surface of the agar. The extractions were placed and kept in 37ºC for 24 hours. The Antibacterial activity was evaluated in terms of zone of inhibition, measured and recorded in millimetres. In that one best herbal extraction was selected and finished on the bamboo knitted fabric.

Table 1:- Antibacterial activity by AATCC 147

S.no	Fabric saples	Zone of inhibition(mm)	
		Staphylococcus aureus	***Escherichia coli***
1	*Rubia Tinctorum*(H1)	10	8
2	*Rosa Damascene*(H2)	21	22
3	*Eclipta Prostrate* (H3)	14	12

Antibacterial activity by well diffusion method against *Staphylococcus aureus* By AATC 6538

Antibacterial activity by well diffusion method against *Escherichia coli* By AATC 8739



From the table 1, it shows that the *Rosa Damascene* has a high value of 21mm in *Staphylococcus aureus* and 22mm in *Escherichia coli*. *Eclipta Prostrate* has the second highest value of 14mm in *Staphylococcus aureus* and 12mm in *Escherichia coli*. *Rubia Tinctorum* has the minimum value when compare with other two herbal extracts.

4. Conclusion

A selected herbal extracts of different plant parts shown good result on the *Staphylococcus aureus* and *Escherichia coli*. The three type of plant parts shows a three different values on antibacterial activity. While comparing with *Rubia Tinctorum*and *Eclipta Prostrate*, the*Rosa Damascene*shows a excellent characteristics on Antibacterial activity. This new plant extract source exhibiting, antibacterial property can be used for development of medical textiles as well as for daily use. This study helps to provide a new herbal Antibacterial finish on the 100% bamboo knitted fabric.

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