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Herbal finishing for anti-bacterial property with *Chromolaena odorata* herb

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Abstract

Herbs play a considerable part in pharmaceutical industries as being save a human life. It's give for the innovation of new antimicrobial Product with diversified action of the novel mechanisms in medical textile. In this study, *Chromolaena odorata* leaves were investigated through the extract of aqueous and methanol for anti-microbial activity. Cotton fabrics are finished with two extracts by Dip and Dry method. Finished fabrics are assessed the effectiveness of the anti-microbial property through disc diffusion method which against the microorganisms of staphylococcus aureus and Escherichia coli. The herbal extract treated fabric shows the Good anti-microbial activity.

Keywords: *Chromolaena odorata*, Dip & Dry method, Anti-microbial Assessment.

1. Introduction

Over the years, India has the wonderful resource of plants as a healing medicine. Plant materials continue to play a major role in primary health care as therapeutic remedies in many developing countries^[1]. Recently, an awareness of general sanitation, contact disease transmission, and personal protection has led to the development of antibacterial fibers to protect wearers against the spread of bacteria and diseases rather than to protect the quality and durability of the textiles^[2]. Medicinal plants have been used as traditional treatments for numerous human diseases for thousands of years. Medicinal plants are valuable natural resources and regarded as potentially safe drugs and have been tested for biological, antimicrobial and hypoglycemic activity also play an important role in the modern medicine^[3]. Antimicrobials from plant have enormous therapeutic potentials which have been established a long time ago. The leaves of *Chromolaena odorata* (commonly called Siam weed), which is an ancient remedy for the treatment of wounds and many ailments was tested for its antimicrobial activities^[4]. *Chromolaena odorata* King and Rob. (Syn. *Eupatorium odoratum* Linn.) Plants are used by traditional medicine practitioners for treatment of burns, wound healing, skin infections, post-natal wounds, and antimalarial^[5]. *Chromolaena odorata* is being used traditionally for its many medicinal properties, especially for external uses as in wounds, skin infections, inflammation etc. Studies have demonstrated that the leaf extract has antioxidant, antinflammatory, analgesic, anti-microbial, cytoprotective and many other medicinally significant properties. The ability of wound healing is attributed to the antioxidant property of the drug which helps in conserving the fibroblast and keratinocyte proliferation on the site^[6]. *Chromolaena odorata* is locally used for its medicinal properties in Vietnam for wound healing traditionally, the aqueous extract and decoction from the leaves of this plant have been used for the treatment of soft-tissue wounds, burns, and skin infections^[7]. The present study was undertaken to investigate the anti-microbial activity of aqueous and methanolic extract of *Chromolaena odorata* leaves on cotton fabric.

2. Materials and Methods

The *Chromolaena odorata* plant material collected from local areas of Coimbatore, Tamil nadu. Small young leaves were collected from healthy plants of *Chromolaena odorata*. They were washed under continuous flashing of running tap water for 30 minutes and then with distilled water three times, shaded, dried and then powdered with the help of blender. The powdered material was kept in airtight bottles until further use.

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2.1. Preparation of plant extracts

2.1.1. Procedure for methanol extraction

10 grams of the herbal powder was mixed thoroughly with 100 ml of 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.

2.1.2 Procedure for Aqueous Extraction

10 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 homogeneously. Then the extract solution was filtered with Whatmann no.1 filter paper. The sediment/filtrate extract was allowed to dry in the room temperature.

2.2 Fabric Selection

Cotton fabric was selected for the application anti-microbial extract of *Chromolaena odorata*.

2.3 Method of Finishing

For finishing the fabric by dip method, the desired samples were cut with 10 x10cm. The extracted solvent was added in a beaker. The 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 same procedure was followed for the aqueous extract method of finish also.

3. Antibacterial Activity by Well Diffusion Method

3.1 Test Bacteria

Staphylococcus aureus (ATCC 6538) and *Escherichia coli* (ATCC 11230) were used as standard Gram positive and Gram-negative organisms respectively. After incubation, a clear area of growth inhibition indicated antibacterial activity of the specimen.

3.2 Culture Medium

AATCC bacteriostasis broth/agar medium were used as growth medium for evaluation.

3.3 Composition

Peptone	:	10 g
Beef extract	:	5 g
Sodium chloride	:	5 g
Agar	:	1.5%
Distilled water	:	1000 ml

Heating to boiling was done to dispense ingredients. A pH of 7.0–7.2 was adjusted by 1 N sodium hydroxide solution. A quantity of 10.0±0.5 ml of the bacteriostasis broth was dispensed in conventional bacteriological culture tubes (125 x 17 mm) and sterilized at 103 K Pa (15 psi) for 15 minutes.

3.4 Maintenance of Culture of Test Organisms

Using a 4 mm inoculating loop, the culture was transferred daily in nutrient / bacteriostasis broth for not more than two weeks. At the conclusion of two weeks, a fresh transplant was made from stock culture. The culture was incubated at 37±2 °C (99±3 °F). The stock cultures maintained on nutrient agar slants was stored at 5±1 °C (41±2 °F) and was transferred once a month to fresh agar. The purity of the culture was checked by making streak plates periodically and observed for single species – characteristic type of colonies.

3.5. Procedure

The antibacterial activity of the different plant extracts was evaluated by Agar well diffusion method. Sterile nutrient plates were prepared. The plates were allowed to solidify for 5 minutes and wells of 6 mm were punctured using a well borer. 0.1% inoculums suspension of *Staphylococcus aureus* and *Escherichia coli* were swabbed uniformly over the surface of the agar. The finished fabric was loaded into the well and the plates were kept for incubation at 37 °C for 24 hours. The antibacterial activity was evaluated in terms of zone of inhibition, measured and recorded in millimeters.

4. Results and Discussion

The results of antimicrobial activity of the extracts of *Chromolaena odorata* are summarized in Table-1. Both methanol and aqueous extracts have showed good antimicrobial activity against *Staphylococcus aureus* and *Escherichia coli*. Methanol extracts were more active than the aqueous extracts.

Table 1: Antimicrobial Activity of *Chromolaena odorata*

Name of the micro organism	Mode of Extract	Diameter of the Zone of incubation
Staphylococcus aureus	Methanol	14 mm
	Aqueous	8 mm
Escherichia coli	Methanol	16 mm
	Aqueous	9 mm

5. Conclusion

This study was investigated the antimicrobial activity of *Chromolaena odorata* through the textile fabric. The result showed therapeutic potential of selected herb in medical textile. This study may provide the idea about the application of these herbal extracts in the finished fabric for the treatment of microbial infections.

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