

Functional Modification on Adhesive Bandage Using Natural Herbs

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Abstract

A Bandage is a standard of biomaterial used on wound to protect from infections and also to cure the wound. An adhesive bandage, also called a sticking plaster (and also known by genericized trademarks Band-aid or Elastoplasts) is a small dressing used for injuries not serious enough to require a full-size bandage. The adhesive bandage protects the cut from friction, bacteria, damage and dirt. In this present study of 50%:50% Bamboo Cotton web was selected for the construction of bandage functional part. In functional part of web was finished with eco-friendly natural leaves of *Galinsoga parviflora* and *Azadirachta indica*. For the finished web the antibacterial assessment EN ISO 20645 and anti-allergy assessment of the finished fabric contact allergy test (in house method) was carried out. From the test, it was concluded as 50%:50% Bamboo cotton finished with *Galinsoga parviflora* and *Azadirachta indica* has excellent wound curing property when compared to 50%:50% Bamboo cotton finished with *Galinsoga parviflora*. This study used to prevent the skin allergy, protect from the Bacteria and also to cure the skin diseases.

Keywords: Adhesive bandage; Anti-allergy; Antibacterial; *Azadirachta indica*; *Galinsoga parviflora*

Introduction

Textiles are an integral part of everyone's life associated with him from cradle to grave. It is used to cover human body, thus encompassing and protecting it from dust, sunlight, wind and other foreign matter present in the external environment that may be harmful to him. Textiles in apparel have retained an important place in human life, starting now into developing of newer high technology and interdisciplinary products describes [1].

Technical textiles are one of the fastest growing sectors of the global textile industry, reveals [2]. The term technical textiles was coined in the 1980s to describe the growing variety of product and manufacturing techniques being developed primarily for their technical properties and performance rather their appearance or other as aesthetic characteristics, remark [3]. Medical textiles constitute one of the most dynamic research field's characteristic of technical textiles and its range of applications suggested by [4].

Adhesive bandage, also known as sticking plaster, is a wound care dressing product that is utilized as small dressing. Adhesive bandages are applied on the patients who have not undergone serious accident but have minor abrasion (scratches) and cut on their body describe [5].

Consumers' attitude towards hygiene and active lifestyle has created a rapidly increasing market for antimicrobial textiles suggested [6]. The term antibacterial finishes indicates controlling or limiting the growth of bacterial colonies and their extinction, defines [7]. The antibacterial finish protects wearers of the textile product for against bacterial, dermatophytic fungi, yeasts, viruses and other deleterious microorganisms, states [8]. Antibacterial control, destroy or suppress the growth of microorganisms and their negative effects of odour, staining and deterioration.

Nature has been a source of medicinal agents since times immemorial. The importance of herbs in the management of human ailments cannot be over emphasized. It is clear that the plant kingdom harbors an inexhaustible source of active ingredients invaluable in the management of many intractable diseases. Ayurveda is ancient health care system and is practiced widely in India, Srilanka and other country expresses [9] Ayurveda system of medicine use plants to cure the

ailments and diseases. Despite the availability of different approaches to that of its isolated and pure active components denoted [10].

Galinsoga parviflora Cav., comes from the Andes region. The chemical composition, activity and use are similar for both species. *Galinsoga* species are used in folk medicine as anti-inflammatory agents and accelerators for wound healing describe [11].

Azadirachta indica have been known to possess a wide range of pharmacological properties, especially as antibacterial, antifungal, antiulcer, antifeedant, repellent, pesticide, inhibitor and sterilant and is thus commercially exploitable, and hence, traditionally used to treat large number of diseases. The internal medicinal uses of Neem include malaria, tuberculosis, rheumatism, arthritis, jaundice and intestinal worms as well as skin says [12].

Cotton fibres are particularly suitable for manufacturing textiles for sports, non-implantable medical products, and health care/hygienic product. However the ability of cotton fibres to absorb large amount of moisture makes them more prone to microbial attack under certain conditions of humidity and temperature. Cotton may acts as a nutrient, becoming suitable medium for bacterial and fungal growth. Therefore, cotton fibres are treated with numerous chemicals to get better antimicrobial cotton textiles. Among the various antimicrobial agents, silver nanoparticles (AgNPs) have shown strong inhibitory and antibacterial effect says [13].

Bamboo fibre is a cellulose fibre extracted or fabricated from natural bamboo, and possibly other additives, and is made from (or in the case of material fabrication, is) the pulp of bamboo plants. It is

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usually not made from the fibres of the plant, but is a synthetic viscose made from bamboo cellulose presented by [14].

Hence, an attempt finished adhesive bandage has been made to prevent skin allergy and skin diseases by using eco-friendly herbs.

Methodology

Selection of fibre

50% bamboo and 50% cotton,

Bamboo and cotton fiber has good absorbency and more over bamboo has anti-bacterial character in nature.

Selection of herbs

The particulars of the medicinal herbs and natural materials used for the development of health care product are furnished in Table 1.

Galinsoga parviflora, *Azadirachta indica* were herbs which has got it is antibacterial character in nature which are abundantly available and hence it has been chosen for the study.

Collection of herbs: *Galinsoga parviflora*, *Azadirachta indica* were collected around the area of Erode Figures 1 and 2.

Sample No	Common name for the medicinal herbs used	Botanical name for the medicinal herbs used	Parts used
1.	Galinsoga	<i>Galinsoga parviflora</i>	leaves
2.	Neem, nimdi, miracle	<i>Azadirachta indica</i>	leaves

Table 1: Herb particulars used for the development of health care product.



Figure 1: *Galinsoga parviflora*.



Figure 2: *Azadirachta indica*.

Selection of fibre web formation

Fibre taken – Cotton, Bamboo,

Blending – Cotton and Bamboo,

Cotton – 50%.

Sample-1: Cotton+Bamboo fibre weight - 42 grams,

Final web weight - 38 grams,

Opening of the fibre was done manually and taken for the carding process. Carding was done with computerized carding machine in Kumarguru College of technology, Coimbatore.

Application of antibacterial finish on samples

Extraction and coating of natural herb: Solvent extraction of collected herbs

- Leaves were collected in a selected medical plants and it was dried into shadow dry method. Then it was converted into powder format.

- Extraction was carried out by dissolving 6 grams of the powder in 100 ml of 80% methanol.

- The mixture was kept overnight under shaking condition. The extract was filtered using Whatmann no.1 filter paper.

- The filtrate was collected and evaporated at room temperature. The concentrated extract was stored at 4°C and used for further studies by Prashith kekuda (2014) was shown in Figures 3-8.

Evaluation of antibacterial finish

The antibacterial activity of the finished fabrics was tested according to EN ISO 20645 against *Staphylococcus aureus* and *Escherichia coli*. Nutrient agar plates were prepared and 0.1% inoculum was swabbed uniformly and allowed to dry for 5 minutes. The finished fabric with the diameter of 2.0 ± 0.1 cm was placed on the surface of medium and



Figure 3: *Galinsoga parviflora* powder.



Figure 4: *Azadirachta indica* powder.



Figure 5: Methanol+aqua+herb powder.



Figure 6: Mixed herbal solution.



Figure 7: In testing condition.

the plates were kept for incubation at 37°C for 24 hours. At the end of incubation, the zone of inhibition formed around the fabric was measured in millimetres and recorded.

Evaluation of anti-allergy finish on treated samples: Antiallergy assessment of the finished fabric contact allergy test (in house method)

Procedure: The fabrics patched on the normal skin were observed for the specified period of time for the development of the symptoms related to contact dermatitis allergy. Non hairy part of the skin of the

subjects was selected. The surface of the skin was cleaned with moistened sterile cotton swabs. The patches of the fabrics sample were made and plastered on the surface of the cleaned skin. The site of patching was observed for any immediate allergic response. Observations were made up to 24 hours for the symptoms such as Skin rashes, redness and irritations. (Erythema and edema). The time of observation may be extended for another 24 hours to confirm the effect.

Evaluation: After the contact time, the fabric patches were removed and observed for the following reactions:

- (NIR) - No irritant reaction,
- (IR) - Irritant reaction.

Mechanical testing

Fibre strength: Strength factor is identified using “Stelo meter” instrument.

Fibre fineness: Fineness properties is identified using “Sheffield Micronaire” instrument.

Development of adhesive bandages

Hence the product (ADHESIVE BANDAGES) is developed using bamboo and cotton web formation

Nomenclature

The Nomenclature of the control web sample, finished web sample were finished with antibacterial herbs are given below Table 2.

Result

Evaluation of anti bacterial finish (bamboo cotton)

The antibacterial test result of the developed both bamboo cotton samples are given below in the Table 3.

In that result:

- <25 – result failed (negative),
- >25 – possitive result.



Figure 8: After filtered solution.

Sample No	Samples	Samples abbreviations
1	CWS	Control Web Sample
2	FWS1	Finished Web Sample [<i>Galinsoga parviflora</i> (12 grams)]
3	FWS2	Finished Web Sample [<i>Galinsoga parviflora</i> (6grams), <i>Azadirachta indica</i> (6 grams)]

Table 2: Nomenclature.

From the Table 3 had shown FWS2 have good antibacterial capacity when compare to CWS and FWS1.

From the Figures 9-11 it has been proved the FWS1 and FWS2 has good antibacterial activity, and the CWS has zone inhibition. Also it is surrounded by colonies bacteria.

From the Figures 10 and 11 it has been proved FWS2 has good antibacterial activity when compare to FWS1.

The above tables and figures the Anti-bacterial activity by test for the bacteria's *Escherichia coli* and *Staphylococcus aureus*. From the

S.No	Sample No	Zone of Bacteriostasis (mm)	
		<i>Staphylococcus aureus</i>	<i>Escherichia coli</i>
1	CWS	0	0
2	FWS1	35	38
3	FWS2	40	39

Table 3: Evaluation of antibacterial finish.



Figure 9: Antibacterial assessment – *Staphylococcus aureus* and – *Escherichia coli* bacteria (CWS).



Figure 10: Antibacterial assessment – *Escherichia coli* bacteria (FWS1 & FWS2).



Figure 11: Antibacterial Assessments *Staphylococcus aureus* bacteria (FWS1 & FWS2).

test results, that is best comparative study against the bacterial attack. Hence the anti – bacterial finish on the both cotton finished material found to be effective compared to the other samples.

Evaluation of anti allergy finish

Galinsoga parviflora (12 grams) finished bamboo cotton web:

From the Table 4 had shown, 17, 22 and 24 years subjects have no irritant reaction.

Sample 2

Galinsoga parviflora (6 grams), *Azadirachta indica* (6 grams) finished bamboo cotton web:

From the Table 5 had shown, 17, 22 and 24 years subjects have no irritant reaction.

Skin-before and after testing (anti allergy) test shown in Figures 12-14.

Mechanical testing

Fibre strength

The bundle fibre strength of cotton in m Kg at 3 mm gauge length=3.86,

Sample No	Subject	Fabric sample (FWS1)
1	Subject 01 (Female/17 yrs)	No irritant reaction
2	Subject 02 (Male/22 yrs)	No irritant reaction
3	Subject 03 (Female/24 yrs)	No irritant reaction

Table 4: The anti-allergy test result of the developed FWS1 samples.

Sample. No	Subject	Fabric sample (FWS2)
1	Subject 01 (Female/17 yrs)	No irritant reaction
2	Subject 02 (Male/22 yrs)	No irritant reaction
3	Subject 03 (Female/24 yrs)	No irritant reaction

Table 5: The anti-allergy test result of the developed FWS2 samples.



Figure 12: Skin before and after testing (anti-allergy).

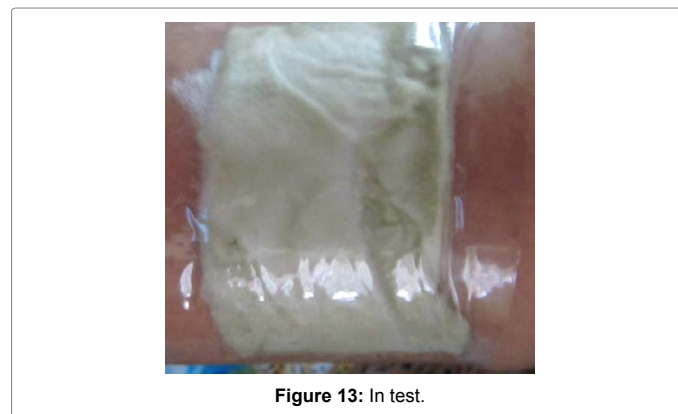


Figure 13: In test.



The bundle fibre strength of cotton in m Kg at 0 mm gauge length=2.5,

The bundle fibre strength of bamboo in m Kg at 3 mm gauge length=43.36%,

The bundle fibre strength of bamboo in m Kg at 0 mm gauge length=38.08%,

Cotton fibres Tenacity in grams/tex=0 mm=2.98,

3 mm=7.16,

Cotton fibres Elongation percentage=0 mm=15.4,

3 mm=8.2.

Fibre Fineness

Cotton fibre fineness=3.7 Micrograms/inch,

Bamboo fibre fineness=1632 nm.

Conclusion

The use of plant and plant products by the human beings are innumerable. Herbs are used very popular all over the world for medicinal purpose. The herbal extracts from these plants were applied on the bamboo cotton web and spun laid nonwoven material. The finished webs and spun laid nonwoven materials were subjected to antibacterial test, anti-allergy, mechanical test and wear ability to identify the best samples. After the evaluation it is concluded that the best finished sanitary napkin have all the expected character like comfort, size, color, cost and protection from skin diseases and itchiness.

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