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RESEARCH ARTICLE

DEVELOPMENT OF MEDICATED BAMBOO INSOLE INFUSED WITH IPOMOEA STAPHYLINA

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ABSTRACT

Foot-related ailments, such as microbial infections and discomfort due to prolonged use of footwear, have necessitated the development of functional insoles with therapeutic properties. This study focuses on the development of a **medicated bamboo insole** infused with **Ipomoea staphylina extract**, known for its potent antimicrobial and anti-inflammatory properties. Bamboo fiber was selected as the base material due to its breathability, moisture-wicking ability, and eco-friendliness. The insole was evaluated for **antimicrobial activity, comfort, durability, and moisture absorption properties**. Microbial inhibition tests confirmed significant antibacterial and antifungal activity, particularly against ***Staphylococcus aureus***and***Candida albicans***. Additionally, wear trials indicated improved user comfort, reduced odor, and enhanced foot hygiene. The results suggest that this **herbal-infused bamboo insole** can serve as an innovative, sustainable, and effective solution for foot health, particularly for individuals prone to infections and excessive sweating.

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INTRODUCTION

Bamboo is a fast-growing, renewable plant from the Poaceae family, widely used in construction, furniture, and paper production. It has a high strength-to-weight ratio, with tensile strength comparable to steel and excellent compression resistance. Its hollow cylindrical structure provides stability and flexibility. Chemically, bamboo contains cellulose, lignin, and silica, enhancing its durability and pest resistance. Environmentally, it absorbs more CO_2 than hardwood trees and decomposes naturally. Due to these properties, bamboo is an eco-friendly and sustainable material.[1] Ipomoea staphylina, a medicinal plant, exhibits notable antibacterial, anti-inflammatory, antioxidant, and hepatoprotective properties. Ethanol extracts of this plant have demonstrated significant antibacterial activity against various bacterial pathogens, including Helicobacter pylori, and have shown dose-dependent anti-inflammatory and antioxidant effects.[2]Phytochemical analyses reveal the presence of bioactive compounds such as phenolics and flavonoids, contributing to its medicinal efficacy.[3]Ipomoeastaphylina possesses hepatoprotective properties, offering protection against liver toxicity induced by agents like carbon tetrachloride.[4] Tapping is a machining process used to create internal threads in a hole using a tool called a tap. It is widely used in manufacturing and metalworking to enable fastening with screws or bolts. The properties of tapping include precision, efficiency, material compatibility, tool durability, chip evacuation, lubrication requirements, and the ability to produce both through and blind holes. Proper selection of taps and cutting parameters ensures optimal performance and thread quality.[5] Aninsole is the inner part of a shoe that provides comfort, support, and protection to the foot. Insoles can be made from materials like foam, gel, or leather and are designed to improve cushioning, arch support, and shock absorption. They help in reducing foot fatigue, preventing injuries, and enhancing shoe fit. Specialized insoles, such as orthopedic or sports insoles, cater to specific needs like posture correction or impact resistance. Proper insoles can alleviate foot conditions like plantar fasciitis and flat feet. Studies show that quality insoles improve overall foot health and comfort.[6] Cracked feet result from dryness, excessive pressure, and lack of moisture, leading to fissures that can cause pain, bleeding, and infection if untreated. Common causes include prolonged standing, obesity, and skin conditions like eczema or psoriasis. Regular moisturizing and exfoliation help prevent and treat cracked heels, while nutrients such as Vitamin E and Omega-3 fatty acids promote overall foot health. In severe cases, medical attention may be necessary to prevent complications. Using

foot balms containing urea and lactic acid can aid in healing, while maintaining proper hydration and a consistent foot care routine helps reduce recurrence.[7]

METHODOLOGY

Stage 1: Selection and Preparation of Materials: Bamboo fabric are chosen for their breathability, durability, and natural antimicrobial properties. The fabric is cut into the shape of an insole. Fresh Ipomoea staphylina stems are collected, cleaned.

Fig. 1. Tapping extraction

Fig. 2. Dip and dry

Fig. 3. Before finishing

Fig. 4. After Finising

Stage 2: Extraction Using Tapping Method: The Ipomoea staphylina extract is obtained using the tapping method, The milk from the stems of ipomoea staphylina stem is collectedand placed in a container, periodically tapped or agitated to maximize extraction efficiency. After a set duration, the extract is filtered and concentrated for further application.

Stage 3: Infusion Using Dip and Dry Method: The bamboo insole material is immersed in the prepared Ipomoea staphylina extract using the dip and dry method. The insoles are soaked for a specific duration to ensure even absorption of the extract. After dipping, the insoles are air-dried or oven-dried at controlled temperatures to retain the bioactive properties while ensuring durability and comfort. This process may be repeated for enhanced infusion.

Stage 4: Testing and Performance Evaluation: The infused insoles undergo antimicrobial testing using agar diffusion assays and structural analysis for durability and comfort. Wearability studies are conducted where participants assess the insole's effectiveness in reducing foot odor, moisture control, and therapeutic benefits. Based on feedback, adjustments are made to optimize performance before large-scale production and commercialization

RESULTS

The bamboo fabric is developed into insole with ipomoea staphylina finish and its antimicrobial test has been studied. The conclusion drawn from this that the research and development of a insole for cracked foot utilizing herbal extract,particularly clustered morning glory has shown significant promise in providing relief to cracked foot. Ipomoea staphylina,also known as clustered morning glory has been traditionally used in various cultures for its medicinal properties,including its potential to alleviate cracked foot. Studies have indicated that clustered morning glory possess anti-inflammatory,antibacterial properties which could be beneficial in recovering cracked foot. The active compounds found in the clustered morning glory have been reported to have pain –releiving effects.By this projectwe have gained knowledge about the herbal extracts and the antimicrobial test were conducted in the fabric and the results were included in

this project report.By the test results we here by conclude that the use of insole for cracked foot is effective.

THE SOUTH INDIA TEXTILE RESEARCH ASSOCIATION

CENTRE OF EXCELLENCE FOR MEDICAL TEXTILES

Mechanical, Chemical & Biological Testing Laboratories

Test Report No : M2400643 ULR: TC694425790002644F Report Date : 20-02-2025

Nift Tea College Knitwear Fashion Institute Ref : Letter Dt.17.02.2025

Test Name : Antibacterial Evaluation (Qualitative) - AATCC 147 Antibacterial Activity Assessment of textile materials: Parallel streak Method

Test Condition:

Test Organisms Used : *Staphylococcus aureus*AATCC 6538, *Klebsiella pneumoniae*ATCC 4352

Sample size : Swatch of 25 x 50 mm for each bacteria

Media used : Nutrient agar

Incubation conditions : 37°C for 24 h

Observation :

Test Organisms used	M2400643-1 Described by the customer : Fabric: Bamboo Fabric	
	Bacteriostatic activity (mm)	Growth under fabric
Staphylococcus aureus ATCC 6538	0	Present
Klebsiella pneumoniae ATCC 4352	0	Present

Result : : The sample showed absence of antibacterial activity against *Staphylococcus aureus* ATCC 6358 and *Klebsiella pneumoniae* ATCC4352 when tested according to AATCC 147 2016 Method.

- End of Report -

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Fig. 5. Test report

FINDINGS AND SUMMARY

The effectiveness of the insole is tested through the survey method and anti-microbial test .The survey method concludes that the use of insole for cracked foot is very useful and the ipomoea staphylina finish in the insole is very effective and the aroma in the fabric is pleasant to use.

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The test is performed under AATCC 147 standard. Under this standard,the test is performed with staphylococcus aureusAATCC 6358, Klebsiellapneumonia AATCC 4352 organisms with a sample size of 25*50mm of each bacteria in nutrient agar medium at 37degree celcius for 24hrs.The sample showed the absence of antimicrobial activity against staphyloccusaureus AATCC 6358 and klebsiellapneumonie AATCC 4352 when tested according to AATCC 147 2016 Method.

REFERENCES

Liese, 1998; Janssen, 2000; Scurlock *et al*., 2000.

Kokila, G., &Jeevan, P. (2021). Antibacterial, Anti-inflammatory and Antioxidant Potential of Ethanol Extract of Ipomoea staphylinaRoem. &Schult. *Journal of Pharmaceutical Research International, 33*(53B), 97–106.

Kokila, G., &Jeevan, P. (2021). Phytochemical and Pharmaceutical Importance of Ipomoea staphylinaRoem. andSchult: A Medicinal Review. *Asian Journal of Biological and Life Sciences, 10*(1), 57–61.

Bag, A. K., &Mumtaz, S. M. F. (2013). Hepatoprotective and nephroprotective activity of hydroalcoholic extract of Ipomoea staphylina leaves. *Bangladesh Journal of Pharmacology, 8*(3), 263–268.

Kalpakjian, S., &Schmid, S. R. (2013). *Manufacturing Engineering and Technology* (7th ed.). Pearson.

Nigg, B. M. (2010). Biomechanics of Sports Shoes. Calgary, AB: University of Calgary Press.