Artemisia Vulgaris -Infused Socks: A Natural Approach to Antimicrobial, Deodorizing, And Wellness Textile Finishes

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***Abstract*—The increasing prevalence of foot-related infections and unpleasant odors resulting from bacterial and fungal proliferation in socks highlights the need for innovative textile solutions. Artemisia vulgaris, recognized for its antimicrobial and deodorizing characteristics, offers a natural substitute for chemical textile treatments. This study seeks to create socks infused with Artemisia vulgaris that exhibit improved antimicrobial properties, effective odor management, and possible wellness advantages. The research methodology includes the extraction of bioactive compounds from Artemisia vulgaris, the integration of this extract into sock fabric through environmentally friendly finishing techniques, and the evaluation of antimicrobial effectiveness using established microbiological methods. Furthermore, the deodorizing capabilities are assessed. This investigation aims to advance the development of sustainable and non-toxic textile treatments, providing a viable alternative to synthetic antimicrobial substances.**

***Index Terms*—Antimicrobial textiles, deodorizing socks, herbal textile finishes, eco-friendly antimicrobial agents, wellness textiles, sustainable fabric treatment.**

1.INTRODUCTION

Artemisia vulgaris, extensively honored as mugwort, is a imperishable condiment that belongs to the Asteraceae family. This factory is indigenous to Europe, Asia, and North America and has been considerably employed in traditional drug, culinary operations, and spiritual practices. Renowned for its medicinal, sweet, and antimicrobial attributes, Artemisia vulgaris serves as a significant resource in herbal drug

In recent years, there has been an increasing focus on the creation of natural and sustainable textile products that provide enhanced functionality beyond mere wearability. As the demand for eco-friendly and health-oriented innovations rises, socks infused with Artemisia vulgaris have emerged as a promising option for antimicrobial, deodorizing, and wellness-enhancing textile applications. Commonly known as mugwort, Artemisia vulgaris has been valued in traditional medicine for its therapeutic properties, which include antimicrobial, antifungal, anti-inflammatory, and aromatic benefits. The incorporation of this potent herb into textile fibers represents a novel strategy for enhancing hygiene, comfort, and overall well-being for consumers while reducing dependence on synthetic chemicals.

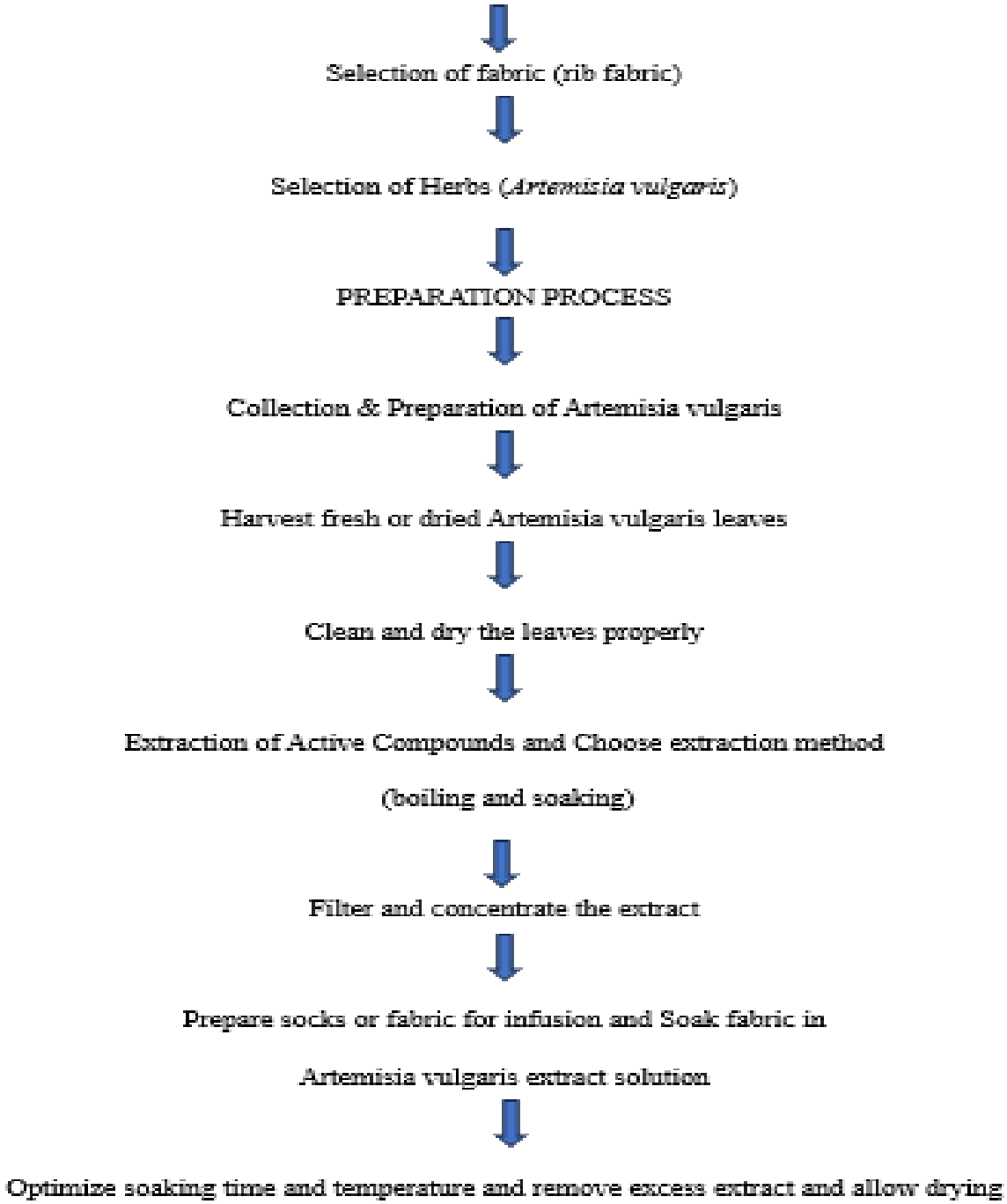
The use of natural compounds in textiles is a burgeoning field that aligns with the global trend towards sustainability and wellness-focused consumer products. Today's consumers are increasingly aware of the materials utilized in their clothing and footwear, actively seeking alternatives that offer health benefits while minimizing environmental impact.

Socks infused with Artemisia vulgaris address this need by merging traditional herbal knowledge with contemporary textile innovations, thereby providing a functional and holistic solution for foot health. In contrast to standard socks that merely offer warmth and comfort, these specialized garments play an active role in promoting foot hygiene, effectively reducing microbial infections and unpleasant odours through natural means.

Footwear and hosiery frequently rank among the most prevalent textile products linked to bacterial and

fungal infections, primarily due to their extended exposure to perspiration and moisture. The damp conditions within shoes create an optimal environment for bacterial proliferation, resulting in issues such as athlete's foot, toenail fungus, and chronic foot odour. Conventional antimicrobial solutions typically depend on chemical substances like silver nanoparticles or triclosan, which, despite their efficacy, raise significant concerns regarding toxicity, environmental harm, and the potential for microbial resistance.

2. METHODOLOGY



3.SELECTION OF FABRIC

Rib fabric is a knitted textile distinguished by its prominent vertical ridges, formed through an alternating sequence of knit and purl stitches. This distinctive design imparts remarkable elasticity, stretch, and shape retention to rib fabric, making it a popular choice for various garments, particularly in cuffs, collars, waistbands, and socks. In contrast to plain knits, rib fabric possesses a thicker and more structured quality, enabling it to offer a snug yet comfortable fit while maintaining its shape over time. A significant benefit of rib fabric lies in its adaptability and longevity. The inherent elasticity allows garments to stretch without becoming loose or distorted, rendering it suitable for form-fitting clothing such as turtlenecks, leggings, and fitted tops.

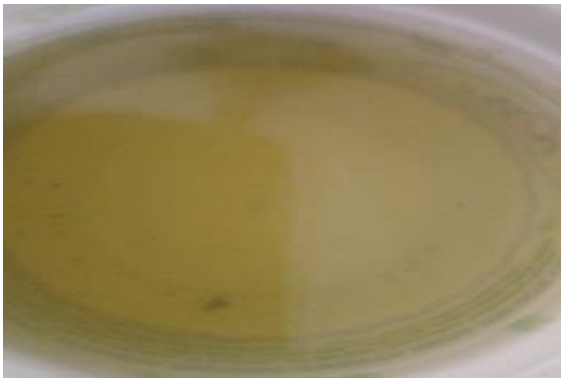
4.SELECTION OF HERBS

Artemisia vulgaris, commonly referred to as mugwort, is a perennial herb that belongs to the Asteraceae family. It is prevalent across Europe, Asia, and North America, flourishing in temperate regions along roadsides, riverbanks, and grasslands. This resilient plant is characterized by its green, serrated leaves featuring a silvery underside, as well as small flowers that are either yellowish or reddish in hue. For centuries, Artemisia vulgaris has been esteemed for its medicinal, cultural, and therapeutic attributes, establishing itself as a fundamental element in both traditional healing practices and contemporary applications. Renowned for its antimicrobial, antifungal, anti-inflammatory, and aromatic properties, this herb has been utilized in various contexts, from foot hygiene treatments to innovations in textiles.

(mug wort leaves)
Fig:4.1

5. PREPARATION PROCESS

(a) Boiling the artemisia vulgaris leaves



(b) Extracting the bio compounds from the leaves

(c) socking the rib fabric in the extract.

(d) drying the socked rib fabric in the sunlight.

Selection and Harvesting – Fresh leaves and stems of Artemisia vulgaris are meticulously gathered at their optimal stage to guarantee a high level of natural anti-microbial compounds.

Sun Drying – The collected plant material is dried naturally in sunlight to maintain its bioactive properties without resorting to artificial drying techniques.

Water-Based Extraction – The dried leaves and stems are subjected to boiling in water to produce a concentrated herbal infusion, facilitating the release of natural anti-bacterial and deodorizing agents.

Filtration – The herbal extract undergoes filtration through a fine cloth or mesh to eliminate plant residues, resulting in a smooth and clear solution.

Soaking Method – The fabric is submerged in the Artemisia vulgaris solution for an extended duration to promote thorough absorption of the herbal compounds.

Air Drying – After soaking, the fabric is taken out of the solution and air-dried in a shaded, well-ventilated space to preserve the herbal properties.

Repetition for Durability – To improve the durability of the finish, the soaking and drying process may be repeated several times to enhance absorption and effectiveness.

Final Processing – Once dried, the fabric is utilized to manufacture socks, garments, or home textiles, ensuring a chemical-free, eco-friendly, and naturally anti-microbial finish

6.TESTING AND EVALUATION

6.1. Anti-microbial test

Anti-microbial testing is a crucial procedure within the textile sector that guarantees fabrics retain their capacity to resist bacterial and fungal proliferation over time. This testing is especially vital for functional textiles that directly interact with human skin, including medical textiles, activewear, socks, undergarments, and household textiles such as bed linens and towels. The presence of bacteria and fungi on textiles can result in unpleasant odors, degradation of the fabric, skin infections, and diminished durability, thus making it imperative to assess the effectiveness of antimicrobial treatments applied to these materials.

RESULT:

While testing the sample according to the standard report procedure, there is no activity of microorganism found in the sample.

TEST ORGANISM : ESCHERICIA COLIFORM (8099)
STAPHYLOCOCCUS AUREUS (AATCC 6538)

REQ MINIMUM : 99.9 %

TEST MICROORGANISM	REDUCTION OF BACTERIA(%)
ESCHERICHIA COLIFORM	99.9 %
STAPHYLOCOCCUS AUREUS	99.9 %

6.2. Anti-odor testing

Anti-odor testing in textile finishes is an essential procedure aimed at assessing the capacity of fabrics to neutralize or inhibit unpleasant odors that arise from microbial activity, perspiration, and environmental influences. The primary source of odor in textiles,

particularly in items such as socks and activewear, is the proliferation of bacteria and fungi that decompose sweat and organic materials, resulting in the release of volatile compounds responsible for odor. To verify the effectiveness of textiles in combating odors, a variety of standardized tests are performed to evaluate their capability to diminish, absorb, or neutralize odor molecules over time.

7. RESULT

While testing the sample according to the standard report procedure, there is no odour found in the sample. (Grade-4)

2. ANTI ODOUR : IHTM 205

PARTICULARS	REPORT VALUE
ANTI ODOUR	GRADE-4

8. SUMMARY

Artemisia vulgaris, commonly referred to as mugwort, is a medicinal herb recognized for its notable antimicrobial, antifungal, and deodorizing characteristics, positioning it as a viable natural alternative for textile uses. This research investigates the incorporation of Artemisia vulgaris extracts into socks to improve their functional attributes, offering an environmentally friendly and health-enhancing option for consumers.

9. CONCLUSION

This study investigates the antimicrobial, deodorizing, and wellness-promoting attributes of socks infused with Artemisia vulgaris, emphasizing their potential uses, advantages, and implications for the textile sector. The analysis will focus on the scientific foundations of the bioactive compounds found in Artemisia vulgaris, the techniques for integrating these properties into textile fibers, and the relative benefits of natural antimicrobial solutions compared to synthetic options.

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