

Formulation and Evaluation of Herbal Anti-Fungal Soap

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Research Article

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Abstract

The global burden of fungal infections is increasing, with a corresponding rise in anti-fungal resistance. This research aimed to develop and evaluate a herbal anti-fungal soap using extracts from traditionally recognized medicinal plants including *Azadirachta indica* (Neem), *Ocimum sanctum* (Tulsi), *Curcuma longa* (Turmeric), *Aloe barbadensis* (Aloe vera), and *Melaleuca alternifolia* (Tea tree). The formulation was carried out using a glycerin soap base. Evaluation included physicochemical analysis, anti-fungal efficacy using agar well diffusion method against *Candida albicans* and *Aspergillus niger*, and skin irritation studies. Results demonstrated significant anti-fungal activity, desirable cosmetic properties, and no skin irritation, suggesting the formulation is a potential alternative to synthetic anti-fungal soaps.

INTRODUCTION

Fungal infections affect millions globally and include dermatophytosis, candidiasis, and aspergillosis. Topical anti-fungals are first-line treatments but are often associated with side effects and resistance. Herbal medicine offers a promising alternative. Historically, herbs like neem, tulsi, turmeric, and tea tree have been used in Ayurveda for skin ailments. The objective of this study was to formulate a herbal soap with anti-fungal potential and evaluate its efficacy. The use of natural plant-derived components is gaining popularity due to their biocompatibility and broad-spectrum antimicrobial properties. Several studies have documented the anti-fungal properties of plant extracts ^[1-3]. Thus, this study aims to integrate these traditional remedies into a modern soap formulation for improved patient compliance and effectiveness.

Furthermore, market trends show a growing demand for herbal and organic personal care products. The global herbal soap market is expected to grow steadily, driven by consumer awareness and preference for chemical-free products. Therefore, developing scientifically validated herbal soaps has commercial as well as therapeutic relevance. This study seeks to bridge the gap between traditional knowledge and modern formulation science by offering a practical and evidence-based herbal anti-fungal soap. The herbal medicinal plants used for soap formulation shows in Fig. 1

MATERIALS AND METHODS

Plant Materials

Dried and authenticated specimens of neem, tulsi, turmeric, aloe vera, and tea tree were procured and identified based on pharmacognostic standards.

Soap Formulation

The soap was prepared using the hot melt method. A glycerin base was melted and mixed with specified amounts of each herbal extract. Sodium hydroxide was used for saponification. Essential oils and

preservatives were added, and the mixture poured into molds and cured. The process of herbal soap formulation is illustrated in Fig. 2.

Table I. Composition of the Herbal Anti-fungal Soap Formulation

Ingredients	Quantity (% w/w)
Neem Extract	5%
Tulsi Extract	5%
Turmeric Extract	2%
Aloe Vera Extract	3%
Tea Tree Oil	1%
Glycerin Base	83%
Sodium Hydroxide	1%

Physicochemical Evaluation:

Organoleptic Properties

Color, odor, appearance

pH Measurement

Digital pH meter

Foam Stability

Cylinder shake method

Hardness

Penetrometer

Moisture Content

Gravimetric method

anti-fungal Activity

The agar well diffusion method was used. Zones of inhibition were measured for *Candida albicans* and *Aspergillus niger*. The test was performed in triplicate and mean zone diameters were recorded for accuracy. Standard anti-fungal agents like ketoconazole and fluconazole were used as positive controls to compare efficacy.

Skin Irritation Test: Conducted on a small number of healthy adult volunteers using the patch test method under basic dermatological supervision. Informed consent was verbally obtained from each participant. Although formal Institutional Ethics Committee approval was not sought, the study strictly followed routine safety standards and posed minimal risk to participants.

RESULTS AND DISCUSSION

Physicochemical Parameters:

Color: Light brown

Odor: Pleasant herbal

pH: 6.2

Foam stability: >5 minutes

Hardness: Moderate

Moisture content: 9.3%

The soap met standard cosmetic criteria for acceptable pH, foaming capacity, and moisture content. These physical properties contribute to consumer acceptability and shelf stability. The pleasant odor and appearance enhance aesthetic value, while moderate hardness ensures ease of application.

anti-fungal Activity:

Candida albicans: Zone of inhibition: 18 mm

Aspergillus niger: Zone of inhibition: 15 mm

The results demonstrate the effectiveness of herbal components in inhibiting common fungal pathogens. Neem and tea tree oil are known for their azadirachtin and terpinen-4-ol content, respectively, which contribute significantly to anti-fungal activity ^[2,4]. Tulsi and turmeric add synergistic antimicrobial and anti-inflammatory properties ^[3,5]. The observed zones of inhibition are comparable to those reported for commercial anti-fungal formulations ^[6].

Skin Irritation Test: No signs of irritation, redness, or inflammation observed in any subjects.

The study confirmed the anti-fungal potential of the herbal extracts. Neem and tea tree oil contributed significantly due to their rich content of azadirachtin and terpinen-4-ol respectively. Turmeric provided anti-inflammatory and additional antimicrobial activity. The formulation process yielded a soap with stable physical properties and good user acceptability. The zone of inhibition results were comparable to commercial anti-fungal soaps.

The herbal soap shows equivalent anti-fungal efficacy while providing the added benefit of being natural and irritation-free. Similar formulations using neem and tea tree oil have been reported with strong anti-fungal profiles ^[1,4,6]. In comparison to commercial soaps that may contain synthetic detergents or preservatives, herbal formulations minimize the risk of allergic reactions or long-term skin damage.

LIMITATIONS AND FUTURE SCOPE

This study was limited to in vitro evaluation and basic human safety testing. Further in vivo studies and dermatological trials are needed to validate long-term efficacy and safety. Additionally, scale-up formulations, preservative stability studies, and consumer acceptance surveys can enhance future product development.

CONCLUSION

A herbal anti-fungal soap was successfully formulated and evaluated. The soap demonstrated excellent anti-fungal activity, acceptable physical properties, and was non-irritant. It provides a safe, effective, and natural alternative for the treatment and prevention of fungal infections.

Declarations

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Figures

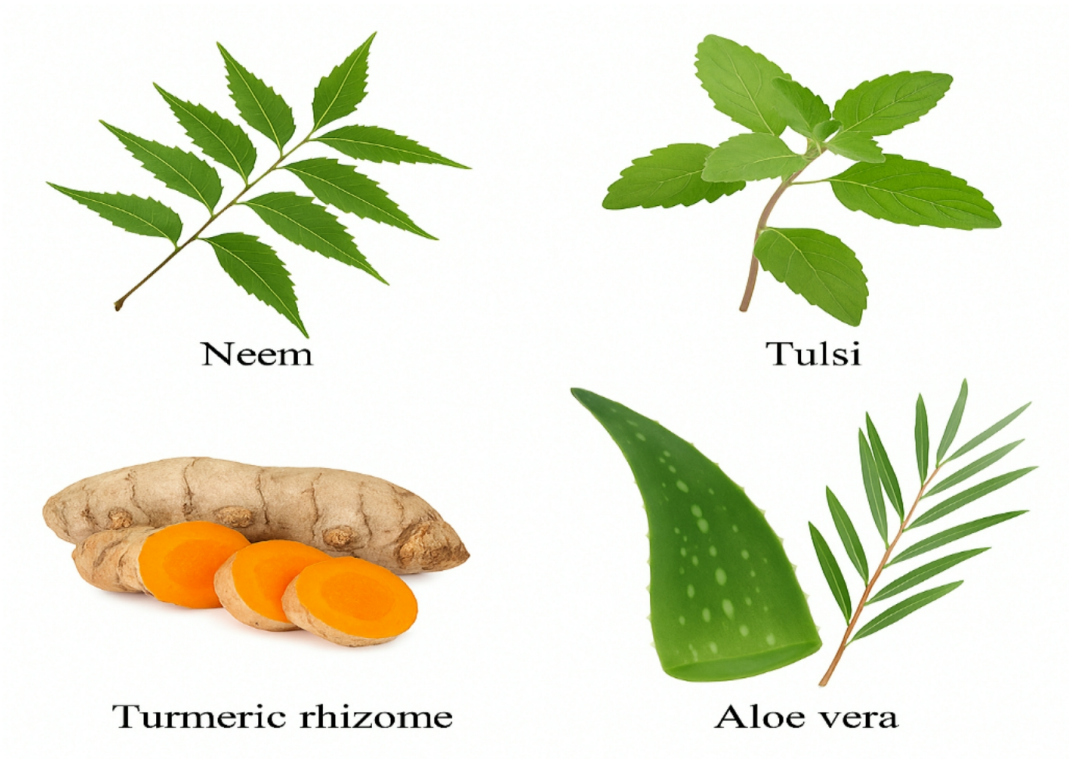


Figure 1

Crude herbal drugs used in formulation

SOAP FORMULATION PREPARATION PROCESS

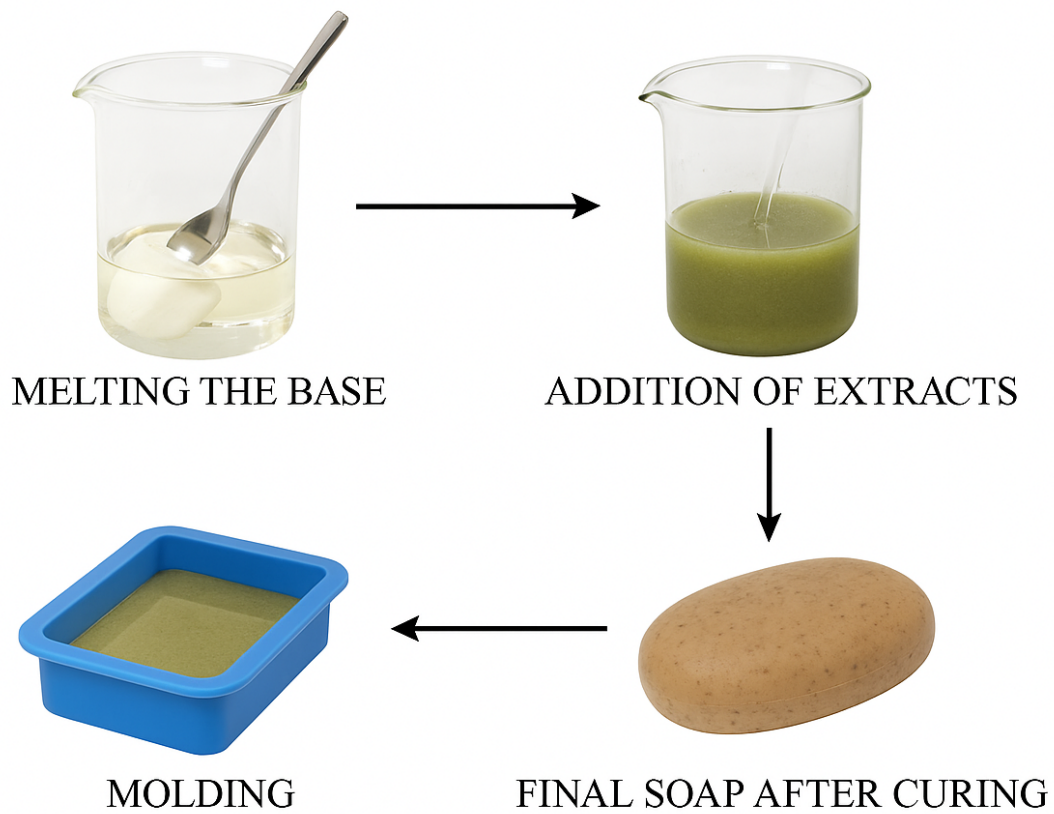


Figure 2

Soap Preparation Steps