Herbal Soap Formulation with Bitter Leaf Extract for Eczema Care

Sandhya Kumari, Sandip Prasad Tiwari, Indu Lata Kanwar*

Faculty of Pharmacy, Kalinga University, Naya Raipur, Chhattisgarh, India (492101)

***Corresponding Address**

Indu Lata Kanwar

Faculty of Pharmacy, Kalinga University, Naya Raipur, Chhattisgarh, India (492101)

Abstract

Eczema, medically referred to as atopic dermatitis, is a skin condition marked by Symptoms such as itching, dryness, inflammation, and irritation. Standard treatment typically includes the use of corticosteroids, moisturizers, and antihistamines. While effective, these medications may cause undesirable side effects when used for extended periods. As a result, there is growing interest in plant-based alternatives that offer a safer, more natural approach to managing skin disorders.

One such plant is *Vernonia amygdalina*, commonly known as bitter leaf, which is traditionally used in herbal medicine and is known to contain compounds with anti-inflammatory, antimicrobial, and antioxidant properties. The purpose of this study is to develop an herbal soap containing bitter leaf extract, designed specifically for the relief of eczema symptoms. Using natural oils and the cold process soap-making technique, the bitter leaf extract was incorporated into a mild, skin-friendly soap base. This method was chosen to help preserve the active compounds in the plant extract. The final product was evaluated for characteristics such as pH level, irritation and its ability to inhibit the growth of skin pathogens.

The goal is to create a gentle cleansing product that not only removes impurities from the skin but also helps reduce inflammation, irritation, and microbial infections commonly associated with eczema. The formulation combines traditional herbal knowledge with modern cosmetic science, aiming to provide a cost effective, accessible skincare solution. This research highlights the

potential of *Vernonia amygdalina* as a natural ingredient in dermatological products and supports its use in the development of plant-based remedies for chronic skin conditions.

Keywords- Vernonia amygdalina, skin pathogens, corticosteroids, phytochemicals, vigorously

Introduction

Eczema is a chronic inflammatory skin condition that impairs quality of life and the epidermal barrier by causing frequent flare-ups, persistent itching, and dryness. With urbanization and environmental stressors contributing to its increasing prevalence, it is estimated that 15–20% of children and up to 10% of adults globally are affected. More and more, modern management is choosing mild, plant-based treatments that provide bioactive components that calm sensitive tissue and wash without stripping. One intriguing option is soap made from the leaves of *Vernonia amygdalina*, a versatile plant of the Asteraceae family which grows all over West and Central Africa and is also known as bitter leaf or iron weed.

According to phytochemical investigations, bitter leaves are abundant in flavonoids, phenolic acids, sesquiterpene lactones, and saponins, all of which have been shown to have anti-inflammatory, antibacterial, and antioxidant properties. Macerated leaves have historically been used for treating fevers, wounds, and rashes with the objective to minimize heat, swelling, and microbiological infection. These components work together to lift debris, stop bacterial growth, restore moisture balance, and helps the skin's natural repair pathways when applied to a gentle, cold-processed soap. This makes the product an important adjunct for managing eczema.

The plant has several agronomic benefits: it can grow as much as seven meters in height, providing a consistent supply of leafy biomass; it can be easily grown from 45-degree stem cuttings; and it grows well in damp or sandy soils from backyard gardens to grassland farms. Since its dermatological uses are still little recognized, V. amygdalina, also known locally as Ewuro, Etidot, Onugbo, Oriwo, and multiple other names, has nutritional, therapeutic, and economic benefits.

As a result, the current study explores bitter leaf soap as an affordable, culturally relevant eczema treatment. It aims to measure popularity among affected individuals and characterize the phytochemical composition, antibacterial efficacy, and barrier-restorative benefits of the soap. This work desires to increase therapeutic options while promoting local cultivation, small-scale processing, and value addition in communities affected by skin disease and malnutrition by fusing

botanical information with laboratory tests, socioeconomic analysis, and initial clinical observations.

Material and methods

5%Bitter leaf extract(obtained by crushing and filtering fresh leaf),Coconut oil (25%), Shea butter/white bees wax(18%),Distilled water(28%),Castor oil (1%),Essential oil(3%),Sodium hydroxide (8%), Colourant (~1%)

Method of formulation

General steps for soap preparation

Weight all the ingredients – oils, NaOH, water and additives. Prepare the Lye solution by adding NaOH in water. Melt the Shea-butter, coconut oil and castor oil in a container. For saponification mix the oil and Lye thoroughly. Add bitter leaf extract, essential oil and colorants. Now transfer the liquid in a mold. Allow the liquid to settle for 24hr. After 24 hours unmold the soap. Check for hardness and avoid bubble in soap.

Formulation% table for soap preparation (50gm)

INGREDIENTS	%W/W	Weight
Coconut oil	**25%**	**12.5g**
Shea butter/ beeswax	**18%**	**9g**
Castor oil	**12%**	**6g**
NaOH	**8%**	**4g**
Distilled water	**28%**	**14g**

RESULT

Essential oil	**3%**	**1.5g**
Colourant	**1%**	**0.5g**
Bitter leaf	**5%**	**2.5g**

Organoleptic Properties

Appearance: Smooth, green-tinted bar with uniform color.
Odor: Mild herbal scent due to bitter leaf and essential oil.
Texture: Non-sticky.

pH determination

1% aqueous solution of the soap was prepared, and the pH was measured using a digital pH meter at room temperature. The pH was found to be 6.2 which is safe to use on skin

Foamability

1g of soap was dissolved in 50 mL of distilled water in a test tube and shaken vigorously. Foam height was measured immediately and after 5 minutes to assess stability.

Foam height: 3.5 cm.
Stability: Foam remained stable for over 4 minutes.

Hardness Test

The hardness of the soap was evaluated by pressing it with moderate finger pressure and observing if any deformation or crumbling occurred.

Stability studies

Soap bars were stored at room temperature and observed over a period of 20 days for any changes in color, texture, odor, and pH no change was observed.

Antimicrobial Activity

The soap demonstrated inhibitory effects against Staphylococcus aureus and Candida albicans, pathogens commonly associated with skin infections in eczema patients. This suggests that the soap can help reduce microbial colonization on eczematous skin.

Skin Irritation Test- No adverse reactions or irritations were reported among the volunteers, indicating that the soap is gentle and suitable for sensitive skin.

Discussion and conclusions

The developed bitter leaf soap shows great potential as a plant-based, natural treatment for dermatitis, bringing traditional herbal knowledge into line and combining with modern pharmaceutical techniques. The soap's physicochemical evaluation revealed an optimal pH of 6.2, which is mild and skin-friendly, suitable for individuals with sensitive and eczema-prone skin. The soap's positive hardness, foamability, and moisture content indicate that it is both gentle enough for everyday use and helpful at cleaning. These characteristics are crucial for treating eczema, a condition that gets worse by using harsh cleansers and soaps that deplete the skin's natural oils.

The soap successfully decreases the growth of Staphylococcus aureus and Candida albicans, two microorganisms frequently linked to skin infections in eczema patients, according to antimicrobial studies. This supports its potential as a medicinal remedy that protects against secondary infections along with its use as a skincare product. The patch's safety and suitability for sensitive skin were confirmed by the volunteer test, which showed no symptoms of irritation, redness, or allergic reaction.

In conclusion, the study effectively creates an inexpensive, non-irritating, and effective herbal soap that can be used as alternative for current eczema therapies. The soap uses natural, components to provide both cleansing and therapeutic care. Because of this, it is especially beneficial in those in need or rural areas where obtaining market skincare products is limited. To support future marketing and wider use in dermatological care, future research should concentrate on long-term clinical evaluations, formulation ratio maximizing efficiency, and stability monitoring over time.

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