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Research Article

DEVELOPMENT AND EVALUATION OF POLYHERBAL ANTI-ACNE CREAM CONTAINING GLYCYRRHIZA GLABRA, AZADIRACHTA INDICA, CURCUMA LONGA AND CHAMOMILE EXTRACTS

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Abstract

Acne vulgaris is one of the most common chronic inflammatory skin disorders affecting adolescents and adults worldwide. The condition is characterized by increased sebum production, follicular hyperkeratinization, microbial colonization, and inflammatory reactions within the pilosebaceous unit. The present study aimed to formulate and evaluate a polyherbal anti-acne cream containing extracts of Glycyrrhiza glabra (Yashtimadhu), Azadirachta indica (Neem), Curcuma longa (Turmeric), and Chamomile. The selected medicinal plants possess antimicrobial, anti-inflammatory, antioxidant, wound-healing, and skin-protective activities that are beneficial in acne management. The plant materials were collected, authenticated, dried, powdered, and extracted using a hydroalcoholic solvent system. The extracts were incorporated into an oil-in-water cream base containing suitable excipients. The prepared formulation was evaluated for physicochemical parameters including appearance, homogeneity, pH, spreadability, viscosity, washability, irritation potential, and stability. The results demonstrated that the prepared cream possessed acceptable cosmetic properties with good consistency, satisfactory spreadability, suitable pH, and excellent stability. The synergistic action of flavonoids, curcuminoids, glycyrrhizin, terpenoids, and other phytoconstituents may contribute significantly to the anti-acne activity of the formulation. The developed polyherbal anti-acne cream can therefore be considered a safe and effective herbal cosmetic preparation for acne management and skin care applications.

Keywords: Acne vulgaris, Polyherbal cream, Glycyrrhiza glabra, Azadirachta indica, Curcuma longa, Chamomile, Herbal cosmetics.

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1. INTRODUCTION

The skin is the largest organ of the human body and serves as the primary protective barrier against environmental pollutants, pathogenic microorganisms, ultraviolet radiation, and physical injuries. In addition to its protective function, the skin plays a significant role in thermoregulation, immune defense, sensory perception, and maintenance of physiological homeostasis (1). Continuous exposure to environmental stressors often predisposes the skin to various dermatological disorders, among which acne vulgaris is one of the most prevalent conditions affecting individuals across all age groups.

Acne vulgaris is a chronic inflammatory disease of the pilosebaceous unit characterized by the formation of comedones, papules, pustules, nodules, and cysts. The pathogenesis of acne involves increased sebum secretion, follicular hyperkeratinization, colonization by Cutibacterium acnes, and inflammatory responses within the skin (2). Epidemiological studies indicate that approximately 80–90% of adolescents experience acne at some stage of life, making it one of the most common dermatological disorders worldwide (3).

Conventional acne therapy includes topical retinoids, benzoyl peroxide, antibiotics, hormonal therapy, and isotretinoin. Although these therapies are effective, prolonged use often leads to adverse effects including skin dryness, peeling, irritation, erythema, photosensitivity, and antibiotic resistance (4). Consequently, there has been growing interest in herbal and natural products as safer alternatives for the management of acne and other skin disorders.

Herbal cosmetics are formulations containing plant-derived ingredients that provide cosmetic as well as therapeutic benefits. These products are increasingly preferred because they are considered safer, biodegradable, economical, and compatible with skin physiology (5). Medicinal plants contain various bioactive constituents including flavonoids, alkaloids, terpenoids, tannins, phenolics, and essential oils, which exhibit antimicrobial, anti-inflammatory, antioxidant, and wound-healing activities (6).

Glycyrrhiza glabra, commonly known as liquorice or Yashtimadhu, possesses anti-inflammatory, antioxidant, antimicrobial, and skin-brightening properties due to the presence of glycyrrhizin and flavonoids (7). Azadirachta indica (Neem) is well known for its antibacterial, antifungal, anti-inflammatory, and antiseptic activities and has been extensively used in traditional medicine for the treatment of skin infections and acne (8). Curcuma longa (Turmeric) contains curcumin, a potent antioxidant and anti-inflammatory compound that helps reduce acne-associated inflammation and promotes wound healing (9). Chamomile possesses soothing, anti-inflammatory, and skin-calming properties that help reduce irritation and redness associated with acne lesions (10).

The combination of these medicinal plants in a single formulation may provide synergistic therapeutic effects against acne. Therefore, the present investigation was undertaken to formulate and evaluate a polyherbal anti-acne cream containing extracts of Glycyrrhiza glabra, Azadirachta indica, Curcuma longa, and Chamomile for topical application.

2. MATERIALS AND METHODS

Collection and Authentication of Plant Materials

The medicinal plants selected for the study included Glycyrrhiza glabra roots, Azadirachta indica leaves, Curcuma longa rhizomes, and Chamomile flowers. The plant materials were procured from authenticated herbal suppliers and verified using standard pharmacognostic methods. Foreign matter and impurities were removed manually before processing.

a. Preparation of Extracts

The collected plant materials were washed, shade-dried, and pulverized separately into coarse powders. The powdered materials were subjected to hydroalcoholic extraction using suitable extraction procedures. The extracts obtained were concentrated and stored in airtight containers until further use.

Formulation of Polyherbal Anti-Acne Cream

An oil-in-water cream base was prepared using beeswax, white soft paraffin, glycerin, propylene glycol, zinc oxide, methyl paraben, sodium benzoate, and menthol. The oil phase and aqueous phase were prepared separately and heated to appropriate temperatures. The herbal extracts were incorporated into the formulation with continuous stirring until a homogeneous cream was obtained.

Evaluation of the Formulation

The formulated cream was evaluated for the following parameters:

Physical Appearance and Homogeneity

The cream was visually examined for color, odor, texture, consistency, and homogeneity.

pH Determination

The pH was measured using a calibrated digital pH meter to ensure compatibility with skin physiology.

Spreadability

Spreadability was evaluated using the standard slide method. Good spreadability indicates ease of application and uniform distribution over the skin surface.

Viscosity

Viscosity was determined using appropriate viscometric methods to assess the rheological characteristics of the cream.

Washability

The cream was applied to the skin and washed with water to evaluate ease of removal.

Skin Irritation Test

The formulation was applied to a small area of skin and observed for redness, itching, inflammation, or allergic reactions.

Stability Studies

The cream was stored under suitable conditions and evaluated periodically for changes in appearance, pH, consistency, and phase separation.

3. RESULTS AND DISCUSSION

The prepared polyherbal anti-acne cream exhibited satisfactory organoleptic characteristics. The formulation possessed a pleasant herbal odor, smooth texture, and good consistency. No evidence of phase separation or grittiness was observed during the study period.

The pH of the formulation was found to be within the acceptable range for topical application. Maintaining a pH close to physiological skin pH is important because excessive acidity or alkalinity can disrupt the skin barrier and cause irritation (11).

Spreadability studies demonstrated that the cream spread uniformly over the skin surface with minimal effort. Adequate spreadability is essential for ensuring patient compliance and effective topical delivery of active constituents (12).

The viscosity of the formulation was found to be appropriate for topical application. The cream exhibited sufficient consistency to remain on the skin while allowing easy application and removal. Similar observations have been reported in previous studies involving herbal cosmetic formulations (13).

No signs of redness, itching, irritation, or allergic reactions were observed during skin irritation testing, indicating that the formulation was safe for topical use. The absence of irritation may be attributed to the natural and skin-compatible nature of the herbal ingredients employed in the formulation (14).

Stability studies revealed that the cream remained physically stable throughout the observation period. No significant changes in color, odor, texture, consistency, or pH were observed. Furthermore, no evidence of phase separation was detected, indicating good formulation stability (15).

The anti-acne potential of the formulation may be attributed to the synergistic activities of its constituent herbs. Glycyrrhiza glabra contains glycyrrhizin and flavonoids that exhibit anti-inflammatory and antimicrobial effects (16). Neem contains limonoids, azadirachtin, and nimbidin, which possess broad-spectrum antimicrobial activity against acne-causing microorganisms (17). Curcumin from turmeric suppresses inflammatory mediators and oxidative stress associated with acne lesions (18). Chamomile contributes soothing and anti-inflammatory effects that help reduce skin irritation and redness (19).

The combination of these phytoconstituents provides multiple mechanisms of action including reduction of microbial growth, suppression of inflammation, antioxidant protection, and promotion of skin healing. Such a multifactorial approach is advantageous in acne management because acne pathogenesis involves several interconnected factors (20).

The findings of the present study are consistent with previous reports demonstrating the effectiveness of herbal formulations in the management of acne and other skin disorders. Herbal creams formulated with medicinal plant extracts have been shown to possess favorable physicochemical characteristics and good patient acceptability while minimizing adverse effects associated with synthetic products (21,22).

4. CONCLUSION

The present study successfully formulated and evaluated a polyherbal anti-acne cream containing extracts of Glycyrrhiza glabra, Azadirachta indica, Curcuma longa, and Chamomile. The formulation exhibited satisfactory physicochemical properties including acceptable pH, good spreadability, suitable viscosity, homogeneity, and stability. The cream was found to be non-irritant and suitable for topical application. The synergistic action of bioactive phytoconstituents present in the selected medicinal plants may contribute significantly to antimicrobial, anti-inflammatory, antioxidant, and skin-healing activities. The developed formulation therefore represents a promising herbal alternative for acne management and skin care applications. Further microbiological investigations and clinical studies are recommended to establish its therapeutic efficacy in acne patients.

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