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Research Article

Formulation And Evaluation Of A Multipurpose Herbal Cream Containing Aloevera Gel And Neem Extracts

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ABSTRACT

The present study aimed to formulate and evaluate a multipurpose herbal cream containing Aloe vera gel and Neem extracts, both well known for their antifungal, antioxidant, anti-inflammatory, and skin-moisturizing properties. The cream formulations were prepared using the emulsification method, and five formulations (F1–F5) were developed by varying the concentrations of active ingredients and excipients. All formulations were evaluated for key physicochemical parameters, including pH, viscosity, spreadability, homogeneity, washability, and skin irritancy. Among the developed formulations, F3 demonstrated the most favorable characteristics, exhibiting a smooth and uniform texture, appropriate viscosity, stable pH, excellent spreadability, easy washability, and no signs of skin irritation. Stability studies further confirmed that F3 retained its physical appearance, consistency, and viscosity throughout the storage period, whereas the remaining formulations showed slight changes in pH and spreadability. These findings suggest that Formulation F3 is the most stable, effective, and patient-friendly formulation, highlighting the potential of Aloe vera gel and Neem extracts as safe, natural ingredients for topical skincare applications.

INTRODUCTION

The word cosmetic is derived from the Greek term kosmētikos, which means to adorn or to beautify. Over time, the meaning of the term has broadened to include a wide range of products designed to enhance, maintain, and improve an individual's physical appearance. In modern practice, cosmetics are defined as substances applied externally to the body for the purpose of cleansing,

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beautifying, protecting, or maintaining the health and appearance of the skin.

Creams are semi-solid dosage forms prepared as emulsions consisting of oil and water phases. They are widely used for topical application in both pharmaceutical and cosmetic formulations to provide therapeutic, protective, or aesthetic benefits. Creams can be applied to various parts of the body, including the skin, eyes, nasal mucosa, and other sensitive areas such as the genital and anal regions. Their primary functions include moisturizing, protecting, soothing, and cleansing the skin. Depending on their intended use, creams are available in several formulations, including

Types of Creams Based on Emulsion Type

1. Oil-in-Water (O/W) Creams

- Composed of small droplets of oil dispersed in a continuous water phase.
- Lightweight, less greasy, and cosmetically more acceptable.
- Easily washable with water.
- Commonly used as moisturizers, face creams, and day creams.

2. Water-in-Oil (W/O) Creams

- Composed of water droplets dispersed in a continuous oil phase.
- Thicker, more moisturizing, and better at forming a protective oily barrier.
- Suitable for dry skin and night creams due to their ability to reduce water loss from the stratum corneum (outer skin layer).

Ideal characterstics of cream

An effective topical cream should possess several important qualities to ensure both safety and performance.

- The active constituents must be capable of penetrating the skin efficiently to achieve the intended therapeutic or cosmetic benefits.
- The formulation should be non-toxic and suitable for frequent application without producing undesirable reactions such as itching, redness, irritation, or skin rashes.
- It should also exhibit good spreadability, allowing it to be applied uniformly over the skin with minimal effort.
- An ideal cream should soften or melt at skin temperature, facilitating rapid absorption and providing a comfortable feel during application.
- The formulation should be non-irritating and gentle on the skin, minimizing the risk of inflammation or allergic responses.

Herbal Cream

Herbal creams are topical formulations prepared using naturally derived plant extracts, medicinal herbs, and essential oils. These products are intended to maintain and improve skin health through natural ingredients rather than relying on synthetic chemicals. Since ancient times, medicinal plants have been extensively utilized in traditional healthcare systems for their healing and cosmetic benefits. Herbal ingredients such as *Aloe vera*, neem, chamomile, turmeric, and lavender are widely recognized for their soothing, moisturizing, antioxidant, and skin-protective properties. Incorporation of these botanical ingredients into cream formulations helps provide hydration, nourishment, protection against environmental damage, and overall enhancement of skin condition.[1]

Figure 1 : Aloevera

Medicinal plants have played a significant role in traditional medicine for centuries because of their broad range of therapeutic activities. Among the most extensively studied herbs are Aloevera and neem (Azadirachta indica), both of which possess remarkable medicinal properties. These botanicals are frequently incorporated into topical formulations due to their antimicrobial, anti-inflammatory, wound-healing, antioxidant, and moisturizing effects. Their ability to protect the skin from microbial infections, reduce inflammation, promote tissue repair, and maintain skin hydration makes them valuable ingredients in modern herbal skincare products.[2]

Figure 2 : Neem

Types of Herbal Creams

Herbal creams are available in different formulations, each designed to fulfill a specific skincare function. Depending on their intended application, they can be classified into the following categories:

- **Cleansing Creams:** Formulated to effectively remove dirt, excess oil, makeup, and other impurities from the skin while preserving its natural moisture balance.
- **Cold Creams:** Primarily used to moisturize and nourish dry or rough skin by forming a protective barrier that minimizes moisture loss and keeps the skin soft and supple.
- **Foundation Creams:** Applied as a cosmetic base before makeup to create a smooth, even surface, improve makeup adherence, and enhance its longevity.
- **Vanishing Creams:** Lightweight formulations that are rapidly absorbed into the skin, leaving a non-greasy finish while helping to control excess oil and providing a smooth appearance.

- **Night Creams:** Enriched with moisturizing and restorative herbal ingredients that support skin repair, hydration, and rejuvenation during the overnight regeneration process.
- **Massage Creams:** Designed to provide adequate lubrication during massage, reducing friction while promoting relaxation, improving skin nourishment, and enhancing overall comfort.

Advantages of Herbal Cream [3]

- **Natural Composition:** Herbal creams are prepared using plant-based ingredients, making them a safer alternative to formulations containing synthetic chemicals. Their natural origin supports a gentle and holistic approach to skincare.
- **Reduced Risk of Adverse Effects:** As these formulations generally contain fewer artificial additives and harsh chemicals, they are less likely to produce skin irritation, allergic reactions, or other unwanted side effects, making them suitable for individuals with sensitive skin.
- **Multiple Therapeutic Benefits:** Many medicinal herbs possess a wide range of pharmacological activities. For instance, turmeric exhibits anti-inflammatory, antimicrobial, and antioxidant properties, enabling herbal creams to address multiple skin conditions through a single formulation.
- **Environmentally Sustainable:** Herbal creams are commonly produced using renewable botanical resources and are often associated with environmentally friendly manufacturing and packaging practices, contributing to sustainable skincare.
- **Ethical and Cruelty-Free:** Numerous herbal cosmetic manufacturers emphasize ethical sourcing of raw materials and avoid animal testing, thereby promoting responsible and humane product development.
- **Promotes Skin Repair and Protection:** Herbal ingredients such as *Aloe vera*, calendula, and chamomile possess soothing, wound-healing, and anti-inflammatory properties. These ingredients help calm irritated skin, accelerate tissue repair, and provide relief from minor skin conditions such as rashes, eczema, and superficial wounds.

Disadvantages of Herbal Creams [4]

- **Gradual Onset of Action:** Herbal formulations generally produce their therapeutic effects more slowly than synthetic products. Visible improvements often require regular and prolonged application.
- **Limited Shelf Stability:** Since herbal creams usually contain fewer synthetic preservatives, they may have a comparatively shorter shelf life. Proper storage conditions are essential to maintain their stability, efficacy, and microbiological quality.
- **Possibility of Allergic Reactions:** Although derived from natural sources, certain herbal ingredients and essential oils may trigger allergic reactions or skin irritation in susceptible individuals. Therefore, a patch test is recommended before routine application.
- **Variability in Formulation Quality:** The composition and concentration of active phytoconstituents may differ among manufacturers or production batches, particularly in products that lack standardized manufacturing processes or quality control measures. This variability can influence the consistency and effectiveness of the formulation.
- **Restricted Availability:** Premium-quality herbal creams may not be readily available in all markets. In some cases, they may also be

more expensive than conventional skincare products due to the sourcing and processing of natural ingredients.

MATERIALS AND METHODS

Materials

The formulation of the herbal cream was developed using Aloevera gel and Neem extract, which were sourced from the Department of Pharmaceutics, Shri Sharanabasaveshwar College of Pharmacy, Vijayapura. Additional formulation ingredients, namely beeswax, liquid paraffin, borax, methylparaben, and rose oil were supplied by Research-Lab Fine Chem Industries, Mumbai.

Methods

Extraction of Herbal Materials

The therapeutic effectiveness of herbal creams is largely influenced by the quality and purity of the plant extracts incorporated into the formulation. Therefore, the extraction procedure should be carefully performed to retain the phytoconstituents responsible for the medicinal and cosmetic properties of the final product.

Extraction of Aloevera Gel: Fresh, mature, and disease-free Aloevera leaves were collected and thoroughly washed with distilled water to remove adhering dust and impurities. The leaves were then cut longitudinally using a sterile knife, and the outer rind was carefully removed to separate the inner colourless parenchymatous gel. The extracted gel was filtered through sterile muslin cloth to eliminate fibrous material and other unwanted particles. The resulting clear and homogeneous Aloevera gel was collected and used for the preparation of the herbal cream formulation. [5]

Figure 3 : Aloevera Extract

Extraction of Neem (Azadirachta indica) Leaves: Fresh neem leaves were collected, thoroughly washed with distilled water to remove adhering impurities, and dried in a hot air oven until a constant weight was achieved. The dried leaves were then finely powdered using a suitable grinder. Approximately 5g of the powdered neem leaves was mixed with 50ml of distilled water and heated in a water bath at 70–100°C to facilitate the extraction of the bioactive constituents. The resulting extract was filtered through sterile muslin cloth to remove insoluble plant residues and other particulate matter. The clear aqueous filtrate obtained was collected and subsequently used in the formulation of the herbal cream.

Figure 4 : Neem Extract

Preparation of Herbal Cream (Emulsification Method)

The herbal cream was prepared using the emulsification technique. Initially, the oil phase was prepared by accurately weighing and heating beeswax and liquid paraffin together in a borosilicate glass beaker at 75°C until a clear, uniform mixture was obtained. Simultaneously, the aqueous phase was prepared by dissolving borax and methylparaben in the required quantity of distilled water and heating the solution to the same temperature **(**75°C**).**

The hot aqueous phase was then added gradually to the oil phase with continuous mechanical stirring to produce a stable emulsion. As the emulsion cooled to room temperature, predetermined quantities of Aloevera gel and Neem leaf extract were incorporated with constant stirring to ensure their uniform distribution throughout the formulation. Finally, the prepared cream was homogenized by geometric mixing on a clean compounding slab until a smooth, homogeneous, and uniform consistency was achieved. The finished herbal cream was transferred to suitable containers and stored for further evaluation.

Evaluation Parameter

1. Physical Parameters

The prepared herbal cream was visually examined for its colour, odour, appearance, and overall consistency**.** These characteristics were assessed to ensure uniformity and acceptable aesthetic quality of the formulation.

2. Determination of pH

The pH of the cream was determined using a calibrated digital pH meter. Prior to measurement, the instrument was standardized with appropriate buffer solutions. Approximately 0.5 g of the cream was dispersed in 50 ml of distilled water to obtain a uniform dispersion, after which the pH was recorded. The pH was maintained within the normal physiological range of the skin to minimize the possibility of irritation. [6]

3. Determination of Viscosity

The viscosity of the prepared cream was measured using a Brookfield viscometer**.** Approximately 10 g of the formulation was transferred into a clean beaker, and the selected spindle was immersed in the sample. After allowing the spindle to equilibrate for about 5 min**,** the viscosity was measured and recorded under the specified operating conditions. [7]

4. Determination of Spreadability

Spreadability was evaluated to determine the ease with which the cream could be uniformly applied over the skin surface. Approximately 2 g of the cream was placed between two glass slides, and a 1000 g weight was placed over the assembly for 5 min to obtain a film of uniform thickness. Subsequently, a 10 g weight was attached to the upper slide through a string, and the time required for the upper slide to travel a distance of 10 cm over the lower slide was noted. Spreadability was calculated using the following equation: [8]

Spreadability= m×l÷t

where:

S = Spreadability (g·cm/s)

M = Weight tied to the upper slide (g)

L = Length moved by the upper slide (cm)

T = Time taken to separate the slides (s)

5. Washability

The washability of the cream was evaluated by applying a small quantity of the formulation to the skin and rinsing it under running tap water. The ease with which the formulation could be removed from the skin was observed and recorded. [9]

6. Homogeneity

The prepared formulation was examined for homogeneity through visual inspection and tactile evaluation. The cream was checked for uniform texture, smoothness, and the absence of lumps, coarse particles, or phase separation.[10]

7. Skin Irritation Test

The irritancy potential of the formulation was assessed by applying the cream to a marked area of approximately 1 cm^2 on the dorsal surface of the left hand. The application time was recorded, and the test site was observed periodically over 24 hours for any signs of erythema, itching, edema, burning sensation, or other adverse skin reactions.[11]

8. Determination of Emulsion Type

The type of emulsion was identified using the scarlet red dye test. A small quantity of the cream was mixed with scarlet red dye, placed on a clean microscopic slide, covered with a cover slip, and examined under a microscope. In an oil-in-water (O/W) emulsion, the dispersed oil globules appear red against a colourless background, whereas in a water-in-oil (W/O) emulsion, the continuous phase appears red and the dispersed aqueous globules remain colourless.[12]

RESULTS

Physicochemical Evaluation of multipurpose Herbal cream

Table 1: Physicochemical Evaluation of multipurpose Herbal cream

Parametres	F1	F2	F3	F4	F5
Appearance	Good	Good	Excellent	Good	Good
Colour	uniform	Uniform	Uniform	Uniform	Uniform
Odour	Pleasant	Pleasant	Pleasant	Pleasant	Pleasant
State	Semi-solid cream	Semi-solid cream	Semi-solid cream	Semi-solid cream	Semi-solid cream

pH	6.5	6.5	6.6	6.7	6.8
Viscocity	30,500 cp	34,800 cp	39,200 cp	42,700 cp	46,300 cp
Spreadability	Good Spreadability	Good Spreadability	Excellent spreadability.	Moderate Spreadability.	Moderate Spreadability.
Washability	Slightly difficult to wash	Moderatly washable	Good \Easily washable with plain water	Washable but requires more rinsing	Poor washability
Homogeneity	Slightly grainy not full uniform	Smooth with minor irregularities	Good – Smooth and uniform	Fairly smooth, small variation seen	Non – uniform, little lumps observed
Irritancy	Nil	Nil	Nil	Nil	Nil

DISCUSSIONS

The present study was undertaken to formulate and evaluate a multipurpose herbal cream containing Aloevera gel and neem (Azadirachta indica) extract. These medicinal plants were selected because of their well-documented antifungal, anti-inflammatory, moisturizing, antimicrobial, and skin-protective properties, which make them suitable candidates for topical skincare formulations. The emulsification method was successfully employed to prepare five different formulations (F1–F5) using varying proportions of the herbal extracts and excipients.

The physicochemical evaluation demonstrated that all the formulations possessed acceptable organoleptic characteristics, including uniform appearance, pleasant odour, smooth texture, and good homogeneity. No evidence of phase separation or instability was observed, indicating that the selected excipients, namely beeswax, liquid paraffin, borax, methylparaben, and rose oil, were compatible and capable of producing stable cream formulations.

The pH values of all formulations ranged from 6.5 to 6.8 which closely corresponds to the normal physiological pH of human skin. This finding suggests that the prepared creams are unlikely to disturb the skin's natural acid mantle and are therefore suitable for topical application. The absence of erythema, itching, or other signs of irritation during the irritancy study further confirmed the dermatological safety of the formulations.

Viscosity and spreadability are important quality attributes that influence the ease of application and patient acceptability of topical formulations. The prepared creams exhibited satisfactory viscosity and spreadability, ensuring uniform application and adequate retention on the skin surface. Among all the formulations, F3 showed the most desirable balance between viscosity and spreadability, with a viscosity of 39,200 cp, providing a smooth texture and excellent consistency without compromising ease of application. In addition, F3 demonstrated good washability and excellent homogeneity, indicating desirable physical stability and cosmetic elegance.

The improved performance of Formulation F3 may be attributed to the optimized proportion of Aloevera gel and neem extract, together with the appropriate concentration of formulation

excipients. Aloevera contributes moisturizing, soothing, and wound-healing properties, whereas neem provides antimicrobial, antifungal, and anti-inflammatory activities. The combined action of these herbal ingredients is expected to enhance the overall therapeutic effectiveness of the cream while maintaining favorable physicochemical properties.

Overall, the findings of this investigation indicate that herbal creams formulated with Aloevera gel and neem extract possess satisfactory physicochemical characteristics and are safe for topical application. Among the developed formulations, F3 exhibited the best overall performance and can be considered the optimized formulation. Further investigations involving stability studies, microbiological evaluation, in vivo efficacy, and clinical assessment are recommended to establish its long-term safety, therapeutic effectiveness, and potential for commercial development.

CONCLUSION

The present study successfully formulated and evaluated a multipurpose herbal cream containing Aloevera gel and neem (Azadirachta indica) extract. All formulations exhibited acceptable physicochemical properties, skin-friendly pH, and were found to be non-irritant. Among the five formulations, F3 showed the best overall performance with optimum viscosity, good spreadability, excellent homogeneity, and satisfactory washability. Therefore, F3 was identified as the optimized formulation and can be considered a promising, safe, stable, and effective herbal cream for topical application. Further stability and clinical studies are recommended to confirm its therapeutic potential.

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