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Formulation and Evaluation of Aloe Vera Gel–Based Multipurpose Herbal Cream

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ABSTRACT

The present study focuses on the formulation and evaluation of a multipurpose herbal cream using Aloe vera gel extracted from fresh Aloe Vera leaves. Aloe Vera is widely recognized for its therapeutic, moisturizing, anti-inflammatory, and skin healing properties. In the current work, Aloe Vera gel was extracted and incorporated into an oil-in-water cream base using standard excipients. The prepared formulation was evaluated for physicochemical parameters including pH, viscosity, spreadability, homogeneity, washability, and stability. The results indicated that the formulated cream exhibited satisfactory consistency, smooth texture, acceptable pH suitable for skin application, and good stability under accelerated conditions. The formulation demonstrated non-greasy nature and good Spreadability, making it suitable for multipurpose dermatological use. Hence, the developed Aloe Vera-based herbal cream may serve as a safe, effective, and economical cosmetic formulation with potential skin benefits.

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1. INTRODUCTION:

Herbal cosmetics have gained significant importance in recent years due to their perceived safety, biocompatibility, and minimal side effects compared to synthetic formulations. The growing awareness among consumers regarding skin health and the adverse effects associated with chemical-based cosmetic products has led to an increased demand for plant-derived skincare formulations. Herbal creams, in particular, are widely used for moisturizing, soothing, and protecting the skin, making them an essential part of modern dermatological and cosmetic applications.

Aloe vera, scientifically known as *Aloe barbadensis* Miller, is one of the most extensively studied medicinal plants belonging to the family Liliaceae. It has been traditionally used for various therapeutic purposes, especially in skin-related disorders. The plant gel obtained from its fleshy leaves is rich in biologically active constituents such as polysaccharides (acemannan), vitamins (A, C, and

E), enzymes, amino acids, minerals, and phenolic compounds. These constituents are responsible for its wide range of pharmacological activities, including anti-inflammatory, antimicrobial, antioxidant, wound healing, and moisturizing effects.

The gel of Aloe vera is well known for its ability to penetrate the skin effectively, providing hydration and promoting tissue repair. It also forms a protective barrier on the skin surface, which helps in preventing moisture loss and enhances skin softness. Due to these properties, Aloe vera has been widely incorporated into various cosmetic and dermatological formulations such as creams, gels, lotions, and ointments.

Topical creams are semisolid emulsions intended for application on the skin for therapeutic or cosmetic purposes. They are generally formulated as oil-in-water (O/W) or water-in-oil (W/O) emulsions, depending on the desired consistency and drug release characteristics. The incorporation of herbal extracts into cream formulations enhances their functional properties and provides added benefits without causing irritation or toxicity commonly associated with synthetic ingredients.

Despite the availability of several commercial skincare products, many of them contain synthetic preservatives, fragrances, and emulsifying agents that may lead to allergic reactions or skin sensitivity in some individuals. Therefore, the development of herbal-based multipurpose creams using natural ingredients like Aloe vera gel is gaining attention as a safer and more effective alternative.

In the present study, an attempt has been made to formulate and evaluate a multipurpose herbal cream using Aloe vera gel extracted from fresh Aloe vera leaves. The formulated cream was assessed for various physicochemical parameters such as pH, viscosity, spreadability, homogeneity, washability, and stability to ensure its suitability for topical application. The aim of this study is to develop a stable, effective, and skin-friendly herbal formulation that can serve as a natural alternative to synthetic cosmetic creams.

MATERIALS AND METHODS:

3.1 Materials:

Fresh leaves of *Aloe vera* (*Aloe barbadensis* Miller) were collected from a healthy plant source and authenticated locally. The following ingredients were used for formulation of herbal cream:

- Stearic acid (emulsifying agent)
- Cetyl alcohol (stiffening agent)
- Liquid paraffin (emollient)
- Glycerin (humectant)

- Triethanolamine (emulsifier/neutralizing agent)
- Methyl paraben and propyl paraben (preservatives)
- Distilled water (aqueous phase)
- Fresh Aloe vera gel (active herbal ingredient)
- Perfume (optional)
- All chemicals used were of analytical or cosmetic grade.

Formulation Table:

Table 1: Composition of Aloe Vera Gel-Based Herbal Cream Formulations (F1–F3)

Ingredients	F1 (%)	F2 (%)	F3 (%)
Aloe vera gel	5	10	15
Stearic acid	8	8	8
Cetyl alcohol	2	2	2
Liquid paraffin	5	5	5
Glycerin	4	4	4
Triethanolamine	1	1	1
Methyl paraben	0.1	0.1	0.1
Propyl paraben	0.05	0.05	0.05
Distilled water	q.s. to 100	q.s. to 100	q.s. to 100

3.2 Extraction of Aloe Vera Gel:

Fresh Aloe Vera leaves were washed thoroughly with running water to remove dirt and surface impurities. The outer green rind was carefully removed using a sterile knife, and the inner transparent mucilaginous gel was collected.

The extracted gel was homogenized using a mechanical blender to obtain a uniform consistency. The homogenized gel was filtered through muslin cloth to remove fibrous particles and obtain a smooth, clear gel. The prepared Aloe vera gel was stored in a refrigerator at 4–8°C until further use to prevent microbial contamination and degradation.

3.3 Formulation of Aloe Vera Gel-Based Herbal Cream:

The herbal cream was prepared by the conventional emulsification method (oil-in-water type emulsion).

3.3.1 Preparation of Oil Phase:

The oil phase was prepared by accurately weighing and melting stearic acid, cetyl alcohol, and liquid paraffin. These ingredients were heated in a water bath at approximately $70 \pm 2^\circ\text{C}$ until a clear homogeneous mixture was obtained.

3.3.2 Preparation of Aqueous Phase:

The aqueous phase was prepared by dissolving glycerin, methyl paraben, and propyl paraben in distilled water. This phase was also heated separately to the same temperature ($70 \pm 2^\circ\text{C}$) as the oil phase to maintain uniformity during emulsification.

3.3.3 Emulsification Process:

The hot aqueous phase was slowly added to the hot

oil phase with continuous stirring using a mechanical stirrer at a constant speed. The mixture was stirred continuously until a uniform emulsion was formed.

3.3.4 Incorporation of Aloe Vera Gel:

After the emulsion was cooled to approximately 40°C, freshly prepared Aloe vera gel was incorporated gradually with continuous stirring to ensure uniform distribution.

Perfume was added in small quantity at the final stage to improve acceptability. The prepared cream was then allowed to cool to room temperature and filled into sterile containers for further evaluation.



Figure No. 01

3.4 Evaluation of Herbal Cream:

The formulated Aloe Vera gel-based cream was evaluated for various physicochemical and stability parameters.

3.4.1 Physical Evaluation:

The prepared cream was visually examined for:

- Color
- Odor
- Texture
- Appearance

The formulation was checked for smoothness and presence of any lumps or phase separation.

3.4.2 PH Determination:

The pH of the cream was determined using a calibrated digital pH meter. Approximately 1 g of cream was dispersed in 10 mL of distilled water, and the electrode was immersed into the dispersion. The pH was recorded at room temperature. The pH was maintained within the skin-compatible range (5.0–7.0).

3.4.4 Spreadability Test:

Spreadability was determined using the slide glass method. A fixed quantity of cream was placed between two glass slides. A known weight was applied on the upper slide, and the time required for the slides to separate was recorded.

Spreadability was calculated using the formula:

$$S = \frac{M \times L}{T}$$

Where:

S = Spreadability

M = Weight tied to upper slide

L = Length of glass slide

T = Time taken to separate slides

3.4.5 Homogeneity Test:

The prepared cream was checked manually by pressing between the fingers and visually inspecting for uniformity, absence of lumps, and consistency.

3.4.6 Washability Test:

A small amount of cream was applied on the skin surface and washed with water to evaluate ease of removal and non-greasy nature.

3.4.7 Stability Studies:

The prepared formulation was subjected to stability studies under different storage conditions:

- Room temperature ($25 \pm 2^\circ\text{C}$)
- Elevated temperature ($40 \pm 2^\circ\text{C}$)

3.4.8 Skin Irritation Test:

A small quantity of cream was applied on a limited area of skin of healthy volunteers and observed for 24 hours for any signs of redness, itching, or irritation. The formulation was found to be non-irritant.

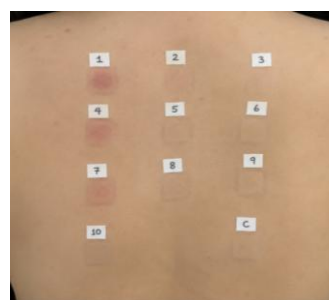


Figure No. 02

5. RESULTS AND DISCUSSION:

5.1 Physical Evaluation:

Table 2. Physical Characteristics of Aloe Vera Herbal Cream Formulations:

Parameter	F1 (5% Aloe Vera)	F2 (10% Aloe Vera)	F3 (15% Aloe Vera)
Colour	Off-white	Light greenish-white	Light green
Odour	Pleasant	Pleasant	Pleasant
Texture	Smooth	Smooth	Smooth
Appearance	Homogeneous	Homogeneous	Homogeneous
Phase Separation	Absent	Absent	Absent

5.2 pH Determination:

Table 3. pH of Aloe Vera Herbal Cream Formulations

Formulation	pH (Mean $\pm$ SD, n=3)
F1	5.42 $\pm$ 0.03
F2	5.68 $\pm$ 0.04
F3	5.91 $\pm$ 0.02

5.3 Spreadability Study:

Table 4. Spreadability of Aloe vera Herbal Cream Formulations

Formulation	Spreadability (g·cm/sec)
F1	14.8 $\pm$ 0.21
F2	16.5 $\pm$ 0.18
F3	17.2 $\pm$ 0.15

5.4 Homogeneity and Washability:

Table 5. Homogeneity and Washability

Formulation	Homogeneity	Washability
F1	Excellent	Easily washable
F2	Excellent	Easily washable
F3	Excellent	Easily washable

5.5 Stability Study:

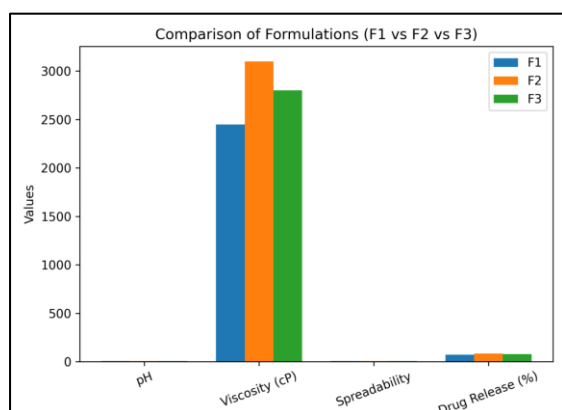
Table 6. Stability Study Results (30 Days)

Formulation	Storage Condition	Change in Colour	Phase Separation	pH Change
F1	25 $\pm$ 2°C	No change	Absent	Negligible
F2	25 $\pm$ 2°C	No change	Absent	Negligible
F3	25 $\pm$ 2°C	No change	Absent	Negligible
F1	40 $\pm$ 2°C	No change	Absent	Negligible
F2	40 $\pm$ 2°C	No change	Absent	Negligible
F3	40 $\pm$ 2°C	No change	Absent	Negligible

5.6 Skin Irritation Study:

Table 7. Skin Irritation Assessment

Parameter	Observation
Redness	Absent
Itching	Absent
Burning sensation	Absent
Swelling	Absent



The Aloe Vera gel-based multipurpose herbal cream was successfully prepared by the oil-in-water emulsification method. All formulations (F1, F2, and F3) were evaluated for their physicochemical properties and stability.

The prepared creams exhibited smooth texture, uniform consistency, and pleasant odor. No signs of grittiness, lump formation, or phase separation were observed. The pH values of all formulations were found within the acceptable skin-compatible range of 5.0–6.5. The formulations showed satisfactory spreadability and were easily washable with water, indicating their non-greasy nature.

Homogeneity studies revealed uniform distribution of Aloe vera gel throughout the cream base. Stability

studies performed at room temperature (25 $\pm$ 2°C) and accelerated conditions (40 $\pm$ 2°C) showed no significant changes in color, odor, texture, pH, or consistency during the study period. Furthermore, no phase separation was observed in any formulation.

The skin irritation test indicated that the prepared cream was non-irritant, as no redness, itching, swelling, or discomfort was observed following topical application. Among the developed formulations, F2 exhibited the most desirable physicochemical characteristics and overall acceptability.

DISCUSSION:

The successful preparation of Aloe vera gel-based herbal cream demonstrated the compatibility of Aloe vera gel with the selected excipients used in the cream base. The absence of phase separation and the satisfactory physical appearance of the formulations indicated the formation of a stable oil-in-water emulsion system.

The pH values obtained were within the normal physiological range of human skin, suggesting that the formulations are unlikely to cause irritation upon topical application. Appropriate pH is an important factor influencing the safety and acceptability of dermatological preparations.

Good spreadability observed in all formulations can facilitate easy application and uniform distribution over the skin surface, thereby improving user compliance. The presence of Aloe vera gel contributed to the smooth texture and enhanced moisturizing characteristics of the cream due to its high polysaccharide and water content.

The excellent homogeneity and washability of the formulations indicate proper incorporation of ingredients and desirable cosmetic properties. Stability studies confirmed that the formulated cream remained physically stable under different storage conditions, suggesting adequate compatibility between Aloe vera gel and the formulation components.

The absence of skin irritation may be attributed to the natural soothing and anti-inflammatory properties of Aloe vera. Aloe Vera contains bioactive constituents such as acemannan, vitamins, amino acids, and phenolic compounds, which are known to promote skin hydration, protect against irritation, and support tissue repair.

The findings of the present study are consistent with previously reported investigations on Aloe vera-based topical formulations, which have demonstrated favorable moisturizing, soothing, and skin-protective effects. Therefore, the developed herbal cream may serve as a safe, effective, and economical alternative to synthetic cosmetic products for routine skin care applications.

CONCLUSION:

The present study successfully developed and evaluated an Aloe vera gel-based multipurpose herbal cream using a conventional oil-in-water emulsification technique. The formulated cream exhibited desirable physicochemical characteristics, including satisfactory appearance, smooth texture, good homogeneity, acceptable spreadability, and skin-compatible pH. Stability studies demonstrated that the formulation remained physically stable under different storage conditions without any evidence of phase separation or significant changes in its properties.

The skin irritation assessment confirmed the safety of the formulation for topical application, indicating its non-irritant nature. The incorporation of Aloe vera gel contributed significantly to the moisturizing, soothing, and skin-conditioning properties of the cream due to the presence of bioactive constituents such as polysaccharides, vitamins, amino acids, and antioxidants.

Among the developed formulations, F2 containing 10% Aloe vera gel exhibited the most balanced characteristics with respect to stability, consistency, spreadability, and overall acceptability. The findings of the present investigation suggest that Aloe vera gel can be effectively incorporated into topical cream formulations to produce a stable, safe, and effective herbal cosmetic product.

Therefore, the developed Aloe vera herbal cream has considerable potential as a natural alternative to synthetic skincare formulations and may be utilized for routine skin care and cosmetic applications. Further studies involving microbiological evaluation, antioxidant activity, and long-term clinical assessment may be conducted to establish its therapeutic efficacy and commercial applicability.

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