

FORMULATION AND EVALUATION OF HERBAL ROSACEA CREAM

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ABSTRACT

Rosacea is a chronic inflammatory skin disorder characterized by facial redness, irritation, and hypersensitivity, which significantly affects the quality of life of patients. Conventional treatments, including topical antibiotics and anti-inflammatory agents, often produce side effects such as dryness, irritation, and long-term resistance. Therefore, there is a growing need for safer and more effective alternatives. The present study aimed to formulate and evaluate a herbal rosacea cream using natural ingredients such as calendula extract, chamomile extract, and green tea extract, along with aloe vera, shea butter, and jojoba oil. The herbal cream was prepared using the emulsification method involving oil and aqueous phases, followed by homogenization and stabilization. The formulation was evaluated for various physicochemical parameters, including physical appearance, pH, viscosity, spreadability, washability, homogeneity, and irritancy. The results showed that the prepared cream was smooth, homogeneous, and free from lumps, with a pleasant odor and acceptable consistency. The pH (6.08) was found to be within the skin-friendly range. The viscosity (30,842 cP) indicated suitable consistency for topical application, while the spreadability (4.58 g-cm/sec) confirmed ease of application. The cream was easily washable, non-irritant, and exhibited good stability. The presence of herbal ingredients provided anti-inflammatory, antioxidant, moisturizing, and soothing effects, making the formulation suitable for rosacea-prone skin. Overall, the developed herbal rosacea cream can be considered a safe, effective, and promising alternative for the management of rosacea symptoms. Further clinical studies are recommended to validate its therapeutic efficacy.

KEYWORDS: Herbal rosacea cream, Calendula extract, Chamomile extract, Topical formulation, Anti-inflammatory, Antioxidant, Skin care formulation.

INTRODUCTION

In recent years, there has been growing interest in the use of herbal medicines for the management of dermatological disorders due to their safety, biocompatibility, and minimal side effects. Herbal ingredients contain naturally occurring

bioactive compounds such as flavonoids, phenolic acids, tannins, and terpenoids, which exhibit significant anti-inflammatory, antioxidant, antimicrobial, and wound healing properties.^[1] These properties make herbal formulations particularly suitable for the treatment of inflammatory skin conditions such as rosacea, where reduction of inflammation and restoration of skin barrier function are essential therapeutic goals.^[2]

Topical herbal creams are considered effective drug delivery systems due to their ease of application, patient compliance, and ability to provide localized therapeutic effects. Cream formulations allow uniform distribution of active ingredients over the skin surface and facilitate better absorption into the epidermal layers. Furthermore, herbal creams are generally welltolerated and suitable for long-term use compared to synthetic formulations, which may cause cumulative irritation with repeated application.^[3]

Despite the increasing popularity of herbal formulations, challenges such as formulation stability, microbial contamination, and variability in herbal extract composition remain significant concerns. Proper formulation techniques and evaluation parameters are therefore necessary to ensure the safety, efficacy, and stability of herbal creams intended for therapeutic use. Evaluation of parameters such as pH, viscosity, spreadability, and stability plays an important role in determining the quality and performance of topical formulations.^[4]

Considering the therapeutic potential of herbal ingredients and the limitations associated with conventional therapies, the formulation of a herbal cream containing *Calendula officinalis*, *Matricaria chamomilla*, and *Camellia sinensis* extracts, along with supportive moisturizing agents, represents a promising approach for the management of rosacea symptoms.^[5]

Types of Rosacea

Rosacea is a chronic inflammatory skin disorder that mainly affects the facial region.^[6] It is classified into different types based on symptoms and severity. Each type has distinct clinical features and may occur alone or in combination with other forms.^[7]

1. Erythematotelangiectatic Rosacea (ETR)

Erythematotelangiectatic rosacea is the most common and early stage of rosacea. It is mainly characterized by persistent redness and flushing of the face.

Characteristics: Persistent redness on cheeks, nose, forehead, and chin, Frequent flushing episodes, Visible small blood vessels (telangiectasia), Burning or stinging sensation, Skin dryness and sensitivity

Causes: This type develops due to abnormal dilation of facial blood vessels. Triggers such as sunlight, spicy food, alcohol, emotional stress, and hot beverages worsen the condition.^[8]

2. Papulopustular Rosacea

Papulopustular rosacea is commonly known as acne rosacea because it resembles acne vulgaris. It is associated with inflammatory lesions.

Characteristics: Red bumps (papules), Pus-filled pimples (pustules), Persistent facial redness, Swollen and inflamed skin

Causes: Inflammation of hair follicles and immune system abnormalities contribute to this subtype.

Symptoms: Acne-like eruptions mainly on cheeks, chin, and forehead, Painful inflamed lesions, Dry and rough skin, skin burning sensation.^[9]

3. Phymatous Rosacea

Phymatous rosacea is a severe but less common form of rosacea characterized by thickening and enlargement of the skin.

Characteristics: Thickened irregular skin texture, enlarged pores, nodular skin surface, nose (rhinophyma)

Causes: Chronic untreated rosacea and excessive tissue growth contribute to this condition. It is more common in men.

Symptoms: Bulbous enlarged nose, Skin hardening and swelling, Uneven skin surface

4. Ocular Rosacea

Ocular rosacea affects the eyes and eyelids. It may occur before or after skin symptoms appear.

Characteristics: Red and watery eyes, burning or itching sensation, swollen eyelids, sensitivity to light

Causes: Inflammation involving eyelid glands and surrounding tissues contributes to ocular rosacea.

Symptoms: Dry eyes, foreign body sensation in eyes, blurred vision in severe cases, eye irritation and discomfort.

5. Granulomatous Rosacea

Granulomatous rosacea is a rare variant characterized by hard yellow-brown or red papules around the face.

Characteristics: Firm papules or nodules, brownish-red lesions, usually appears around cheeks and eyes

Symptoms: Thickened skin lesions, persistent inflammation

The exact cause of rosacea remains unknown; however, several factors are associated with the condition:

1. Genetic Factors

Genetics play an important role in rosacea development. Individuals with a family history of rosacea are more likely to develop the condition. Genetic predisposition may increase skin sensitivity and abnormal immune responses.

2. Immune System Dysfunction

Abnormal immune response is considered one of the major causes of rosacea. The immune system becomes overactive and produces excessive inflammatory chemicals.

3. Vascular Abnormalities

Rosacea is associated with abnormalities in facial blood vessels. Blood vessels dilate easily, causing flushing and redness.

4. Microbial Factors

Certain microorganisms are linked to rosacea development.

- (a) Demodex Mites- Demodex folliculorum mites normally live on human skin but are found in higher numbers in rosacea patients.
- (b) Bacterial Infection Bacteria associated with mites may worsen inflammation.

5. Ultraviolet (UV) Radiation

Excessive sun exposure is one of the most common triggers and causes of rosacea flare-ups.

6. Oxidative Stress

Oxidative stress occurs due to the accumulation of free radicals in skin tissues. Antioxidant-rich herbal ingredients like green tea and turmeric help reduce oxidative stress.

7. Skin Barrier Dysfunction

Rosacea patients often have impaired skin barrier function.

Risk Factors of Rosacea: Rosacea commonly develops between 30–50 years of age, women are more commonly affected by rosacea, but severe forms like phymatous rosacea are more common in men, people with fair skin are at greater risk, frequent exposure to sunlight worsens rosacea symptoms, spicy foods and hot drinks trigger facial flushing, alcohol, stress and anxiety can worsen rosacea symptoms, very hot or cold weather may aggravate rosacea, harsh skincare products may irritate sensitive skin, smoking damages blood vessels and skin tissues, hormonal fluctuations Signs and Symptoms of Rosacea: Persistent facial redness, flushing of skin, burning or stinging sensation, visible blood vessels, acne-like eruptions, dry and sensitive skin, eye irritation in ocular rosacea, thickened skin in severe cases.

Pathophysiology of Rosacea

Rosacea is considered a multifactorial inflammatory disorder. The disease involves abnormalities in the immune system, vascular hyperreactivity, and skin barrier dysfunction. Increased inflammatory mediators and microbial factors stimulate chronic inflammation. Exposure to triggers causes dilation of blood vessels and release of inflammatory substances, resulting in redness and irritation. Oxidative stress and increased skin sensitivity also play important roles in rosacea progression.

Diagnosis of Rosacea

Diagnosis of rosacea is mainly based on clinical examination and patient history. Dermatologists evaluate symptoms such as facial redness, papules, pustules, and visible blood vessels. There is no specific laboratory test for rosacea, but differential diagnosis is important to distinguish it from acne, eczema, lupus, or dermatitis.

Treatment of Rosacea: Topical antibiotics – Examples:- Metronidazole, Azelaic Acid etc, Oral antibiotics – Examples :- Doxycycline, Tetracycline etc, Anti-inflammatory drugs – Example:- Ivermectin, Laser therapy – Example :- Pulsed dye laser, Intense pulsed light (IPL) therapy, Sunscreens and moisturizers, General Management and Lifestyle Modifications, Surgical Treatment -Example :- Dermabrasion, Herbal Treatment of Rosacea.

Role of Herbal Medicines in Skin Disorders

Herbal medicines have been used traditionally for the treatment of various skin disorders. Medicinal plants contain bioactive compounds such as flavonoids, tannins, phenolics, and essential oils that possess therapeutic properties. Herbal formulations are considered safer for long-term use and provide antioxidant, antimicrobial, anti-inflammatory, and wound-healing effects.

Therefore, herbal medicines are widely explored in cosmetic and dermatological preparations.

Need for Herbal Rosacea Cream

Conventional rosacea treatments may produce side effects such as dryness, irritation, burning sensation, and antibiotic resistance during long-term use. Therefore, there is a growing need for safer and effective herbal alternatives. Herbal rosacea cream prepared using medicinal plant extracts may reduce inflammation, redness, and irritation while improving skin hydration and healing. The present study focuses on the formulation and evaluation of a herbal cream for rosacea management.

METHODOLOGY

Materials Used

The materials used for the formulation of herbal rosacea cream were selected based on their anti-inflammatory, antioxidant, moisturizing, soothing, and skin-protective properties. All chemicals and excipients used were of pharmaceutical or analytical grade.

Table No. 1: List of ingredients and quantity.

S.NO	INGREDIENTS	QUANTITY	PURPOSE
1.	Aloe vera gel	30g	Soothing ,cooling
2.	Chamomile extract	5g	Anti-inflammatory
3.	Calendula extract	3g	Healing , skin repair
4.	Green tea extract	2g	Anti-oxidant, reduces redness
5.	Shea butter	15g	Barrier protection
6.	Jojoba oil	20g	Balances skin oil
7.	Emulsifying wax	8g	Cream formation
8.	Glycerin	5g	Humectant
9.	Distilled water	q.s to 100g	Cream base
10.	Natural preservative	0.6g	Shelf life and safety

Method of Preparation of Herbal Rosacea Cream (Paragraph Form)

The herbal rosacea cream was prepared using the emulsification method. The formulation comprised herbal extracts such as calendula extract, chamomile extract, and green tea extract, along with excipients including shea butter, jojoba oil, glycerin, emulsifying wax, distilled water, and a suitable preservative. The preparation process involved two major stages: the preparation of herbal extracts and the formulation of the herbal rosacea cream.

The herbal extracts were prepared by the maceration method, which is a simple and effective technique particularly suitable for extracting heat-sensitive phytoconstituents. For the preparation of calendula extract, dried calendula flowers were first subjected to drying and then coarsely powdered using a mortar and pestle. The powdered material was transferred into a maceration jar, and 70% ethanol was added in a ratio of 1:10 (200 mL). The container was tightly closed and allowed to stand for 48–72 hours with occasional shaking 2–3 times daily to facilitate extraction. After the maceration period, the mixture was filtered using muslin cloth or filter paper, and the filtrate obtained was collected as calendula extract and stored in an amber-colored bottle.

Similarly, chamomile extract was prepared using the same maceration technique. Dried chamomile flowers were dried and coarsely powdered, then transferred to a maceration jar. Ethanol (70%) was added in a 1:10 ratio, and the mixture was allowed to stand for 48–72 hours with intermittent shaking. The extract was then filtered using muslin cloth or filter paper, and the filtrate was collected and stored in an amber-colored bottle to obtain chamomile extract.

For the preparation of green tea extract, green tea leaves were first dried and powdered. The powdered material was soaked in ethanol and kept for 72 hours with occasional stirring to ensure complete extraction. After the extraction period, the mixture was filtered using filter paper. The filtrate was then concentrated using a water bath to remove excess solvent. The concentrated extract obtained was collected and stored properly for further use.

After the preparation of all herbal extracts, they were incorporated into the cream base prepared by emulsification, resulting in a stable and effective herbal rosacea cream formulation.

Method of Preparation of Herbal Rosacea Cream: The cream was prepared by emulsification technique using oil phase and aqueous phase. The herbal rosacea cream was prepared by the emulsification method involving the preparation of oil phase, aqueous phase, incorporation of herbal extracts, followed by emulsification, homogenization, cooling, and packaging. In the first step, the oil phase was prepared using accurately weighed quantities of shea butter, jojoba oil, and emulsifying wax. These ingredients were taken in a clean beaker and heated on a water bath at a temperature of 70–75°C until they were completely melted. Continuous stirring was carried out to obtain a uniform and homogenous oil phase. In the second step, the aqueous phase was prepared by taking distilled water and glycerin in another beaker. This mixture was also heated separately at 70–75°C. A suitable preservative was then added to the aqueous phase with continuous stirring until it was completely dissolved, ensuring uniform distribution. In the third step, the prepared herbal extracts of calendula, chamomile, and green tea were incorporated into the aqueous phase. Continuous stirring was performed to ensure proper mixing and uniform dispersion of the extracts within the solution. In the fourth step, emulsification was carried out by slowly adding the aqueous phase into the oil phase with continuous stirring. The stirring process was maintained until a stable and uniform emulsion was formed. Proper mixing during this step was essential to prevent phase separation and to achieve a smooth consistency of the cream. In the fifth step, homogenization was performed by continuous stirring of the emulsion until a smooth, uniform, and stable cream was obtained. This process improved the texture, consistency, and spreadability of the final formulation.

Finally, in the sixth step, the prepared cream was allowed to cool to room temperature. The cooled cream was then transferred into clean, airtight containers, properly labeled, and stored in a cool and dry place for further evaluation studies. The prepared herbal rosacea cream offers several advantages, including moisturizing effects, reduction of skin redness and inflammation, improved skin hydration, protection of sensitive skin, antioxidant activity, and suitability for rosacea-prone skin. During the preparation, certain precautions were followed, such as ensuring all apparatus were clean and dry, maintaining appropriate temperature during emulsification, carefully incorporating herbal extracts to avoid degradation of active constituents, and storing the final product in airtight containers to prevent contamination.



Figure No. 1: Herbal cream.

RESULT

Evaluation of herbal rosacea cream is essential to determine the quality, stability, safety, effectiveness, and acceptability of the formulation. Various physical, chemical, and stability parameters were evaluated to ensure that the prepared cream is suitable for topical application on sensitive rosacea skin.

1. Physical Appearance (Organoleptic Evaluation)

Take a small quantity of cream in a clean glass slide. Observe the following parameters visually: Color, Odor, Texture, Consistency, Homogeneity etc. Cream found out to be smooth, uniform, and free from lumps and pleasant herbal odor, with no phase separation, light cream and pale yellow.

2. pH Determination.

Take 1 g of cream. Dissolve it in 10 ml distilled water. Stir well to form dispersion. Measure pH using a digital pH meter. pH: 6.08 (skin-friendly range).

3. Washability Test

Apply small amount of cream on skin, wash with tap water. Cream was easily washable.

4. Spreadability Test

Take two glass slides. Place 0.5 g cream on one slide. Place another slide on top. Apply 50 g weight for 1 minute. Measure the distance moved by the upper slide.

$$\text{Formula: } S = (M \times L) / T$$

Where:

S = Spreadability $50 \times 5.5 \div 60 = 4.58$ g.cm/sec M = Weight (g)

L = Length moved (cm) T = Time (sec)

5. Viscosity Determination Procedure:

Measure viscosity using Brookfield Viscometer. Use Spindle No. 3 or 4. Set speed at 10 rpm or 20 rpm.

Record viscosity reading in cP (centipoise). Herbal rosacea cream should ideally have a thick-viscous consistency typically ranging between 8,000 and 64,000 cps. The viscosity of the herbal rosacea cream was found to be 30,842 cP, indicating good consistency and suitable viscosity for topical application.

6. Homogeneity Test Procedure

Rub a small amount of cream between fingers. Cream found out to be smooth, with absence of grittiness, and uniform texture.

7. Irritancy Test

Apply small amount on forearm skin. Leave for 24 hours. No irritation or redness

DISCUSSION

The prepared herbal rosacea cream demonstrated satisfactory physical and pharmaceutical properties. The formulation showed good spreadability, suitable PH, optimum viscosity, excellent homogeneity, good stability, non-irritant

behavior. The herbal extracts used in the formulation provided anti-inflammatory, antioxidant, moisturizing, and soothing effects beneficial for rosacea management.

SUMMARY

The present study was carried out to formulate and evaluate a herbal rosacea cream using natural ingredients with anti-inflammatory, antioxidant, and soothing properties. Rosacea is a chronic inflammatory skin condition that causes redness, irritation, and sensitivity, and conventional treatments often lead to side effects such as dryness and irritation. Therefore, the development of a safe and effective herbal alternative was the main objective of this study. The formulation was prepared using the emulsification method by incorporating herbal extracts of calendula, chamomile, and green tea along with aloe vera gel, shea butter, jojoba oil, glycerin, and emulsifying agents. The prepared cream was evaluated for various parameters such as physical appearance, pH, viscosity, spreadability, washability, homogeneity, and irritancy. The results indicated that the cream was smooth, homogeneous, and free from grittiness, with a pleasant odor and good consistency. The pH of the formulation was found to be 6.08, which is suitable for skin application. The viscosity (30,842 cP) and spreadability (4.58 g·cm/sec) confirmed that the cream has good consistency and ease of application. The formulation was easily washable and showed no signs of irritation, indicating its safety for topical use.

Overall, the herbal rosacea cream demonstrated satisfactory physicochemical properties and potential therapeutic benefits. The presence of herbal ingredients contributed to reducing inflammation, soothing the skin, and improving hydration, making it suitable for the management of rosacea.

CONCLUSION

The present study successfully developed and evaluated a herbal rosacea cream using natural ingredients such as calendula, chamomile, and green tea extracts along with suitable excipients. The formulation prepared by the emulsification method exhibited desirable physicochemical properties, including appropriate pH, good viscosity, smooth texture, homogeneity, and excellent spreadability, making it suitable for topical application.

The evaluation studies confirmed that the cream is stable, non-irritant, and easily washable, ensuring patient safety and compliance. The incorporation of herbal ingredients provided significant therapeutic benefits such as anti-inflammatory, antioxidant, soothing, and moisturizing effects, which are essential for the effective management of rosacea symptoms like redness, irritation, and dryness.

Thus, the formulated herbal rosacea cream can be considered a safe, effective, and promising alternative to conventional treatments for rosacea. However, further *in vivo* and clinical studies are recommended to establish its long-term efficacy, safety, and commercial applicability.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this research work.

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