



Formulation And Evaluation Of Topical Herbal Cream For Treating Acne And Skin Inflammations

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1. ABSTRACT:

Acne and inflammatory skin conditions present ongoing dermatological challenges, with conventional treatments often causing adverse effects. In response herbal medicine is emerging as a promising alternative, utilizing plant-derived compounds that offer anti-inflammatory, antimicrobial and antioxidant benefits for managing these conditions. Herbal creams carefully formulated with extracts from plants like neem, tea tree oil and aloe vera can effectively reduce acne symptoms and skin inflammation while minimizing the harsh side effects associated with synthetic drugs, highlighting their potential as a safer more holistic treatment option.

2. KEYWORDS:

Acne vulgaris, Skin inflammations, Herbal cream, Herbal formulations, Plant extracts, Anti-inflammatory, Antimicrobial, Topical treatment.

3. INTRODUCTION:

Acne vulgaris is a common skin condition causing pimples and cysts, often alongside other inflammatory skin issues like eczema. Traditional treatments have side effects, leading to increased interest in herbal medicine as a potentially safer natural alternative. ⁽¹⁾ Herbal treatments are recognized for their potential to treat skin conditions like acne. These treatments, rich in bioactive compounds offer anti-inflammatory, antimicrobial and antioxidant properties. Herbal creams with extracts like neem, tea tree oil and aloe vera show promise in alleviating acne symptoms. These herbal ingredients can reduce the bacteria that cause acne and reduce inflammation, offering a gentler alternative to conventional acne treatments. ⁽²⁾

Herbal creams offer a gentler alternative for treating skin inflammations like eczema and psoriasis, minimizing irritation and promoting healing by soothing inflamed skin and restoring its barrier function. Herbal medicine shows potential in dermatology for various inflammatory conditions. Plant extracts like turmeric are effective in managing psoriasis and eczema by reducing inflammation, boosting collagen and speeding up wound healing. ⁽³⁾ A key advantage of herbal creams for acne and skin inflammations is their targeted action with fewer side effects compared to synthetic drugs. Herbal cream is generally gentler and topical application of extracts like neem, aloe vera, and turmeric effectively reduces acne without significant irritation. These ingredients also support skin healing by moisturizing, promoting cell regeneration and reducing post-inflammatory hyperpigmentation. ⁽⁴⁾ Acne vulgaris and various inflammatory skin conditions pose significant dermatological challenges. Traditional treatments often involve synthetic drugs that can cause side effects like skin irritation and antibiotic resistance. ⁽⁵⁾ This has led to a growing interest in herbal medicine as a safer, more natural alternative. Herbal formulations, utilizing plant-based treatments rich in bioactive compounds with anti-inflammatory, antimicrobial and antioxidant properties are being explored for managing acne and related skin inflammations. ⁽⁶⁾

Effective herbal creams require careful formulation, including the selection of appropriate vehicles and excipients to ensure stability, texture and efficacy. ⁽⁷⁾ These formulations often incorporate herbal ingredients with antioxidant properties, which help protect the skin from oxidative stress and environmental damage. Clinical evaluations are essential to assess the safety, efficacy and dermatological compatibility of herbal creams ensuring their potential as a valuable and well-tolerated alternative to conventional therapies. ⁽⁸⁾

Acne and Skin Inflammation

Acne

Acne vulgaris is a common chronic inflammatory disorder of the pilosebaceous unit highly prevalent among adolescents and young adults in India. It is characterized by a spectrum of lesions including comedones (open and closed) papules, pustules and in more severe cases nodules and cysts primarily affecting the face followed by the back and chest. ⁽⁹⁾

Symptoms and Causes

Symptoms

Blackheads (open) and whiteheads (closed) are the hallmark initial lesions.

Red bumps (papules), pus-filled bumps (pustules), larger painful lumps (nodules) and deep pus-filled sacs (cysts).

Primarily on the face, neck, chest and back.

Post-inflammatory hyperpigmentation (dark spots), scarring.

Causes:

- ✓ Overproduction of oily skin secretion.
- ✓ Dead skin cells and sebum block hair follicles.
- ✓ Proliferation within blocked follicles triggers inflammation.
- ✓ Immune response to bacteria and follicle blockage.
- ✓ Androgens (male hormones) often play a significant role. ⁽⁹⁾



Fig. No. 1: Acne

Skin inflammation

a fundamental process in various dermatological conditions is the skin's response to injury or infection. It involves a complex cascade of events characterized by redness, heat, swelling and pain. In the Indian context inflammatory skin diseases such as contact dermatitis, eczema and psoriasis are commonly encountered. ⁽¹⁰⁾, ⁽³¹⁾

Symptoms and Causes**Symptoms:**

- ✓ Increased blood flow to the affected area.
- ✓ Feeling warm to the touch.
- ✓ Fluid buildup in the tissues.
- ✓ Discomfort or tenderness.
- ✓ Common in many inflammatory skin conditions. ⁽¹¹⁾

Causes:

- ✓ Direct contact with substances that damage the skin (e.g. harsh chemicals).
- ✓ Immune reaction to substances the body is sensitive to (e.g. pollen, metals).
- ✓ Bacteria, viruses, fungi or parasites.
- ✓ The body's immune system mistakenly attacks healthy skin cells (e.g. psoriasis).
- ✓ Predisposition to certain inflammatory skin conditions (e.g. eczema).
- ✓ Sun exposure, temperature extremes. ⁽¹⁰⁾



Fig. No. 2: Skin Inflammation

4. PLANT & DRUG

Neem

Biological source: The biological source of neem is the tree *Azadirachta indica*.

Family: Meliaceae (Mahogany family)

Common name: Neem, Nim, Margosa, Indian Lilac.

Description

Neem scientifically known as *Azadirachta indica* is a versatile tree native to the Indian subcontinent. It's an evergreen deep-rooted tree known for its medicinal. ⁽¹¹⁾



Fig. No. 3: Neem

Turmeric

Biological source: Turmeric is derived from the dried rhizome of the plant *Curcuma longa*.

Family: Zingiberaceae

Common name: Turmeric, Indian saffron, *Curcuma*.

Description

Turmeric is a bright yellow spice and dye derived from the underground stem (rhizome) of the plant *Curcuma longa*.⁽¹²⁾



Fig. No. 4: Turmeric

Aloe Vera

Biological Source: Parenchymatous tissue (inner leaf gel) of Aloe Vera (*Aloe barbadensis* Miller) leaves.

Family: Asphodelaceae (formerly Liliaceae).

Common Names: Ghritkumari (Hindi, Marathi), Barbados Aloe, True Aloe.

Description:

Succulent plant with rosettes of thick, fleshy, spiky-edged leaves. The inner part of the leaf contains a clear, viscous gel.⁽¹³⁾



Fig. No. 5: Aloe Vera

Tea Tree

Biological Source: Leaves and twigs of the Tea Tree.

Family: Myrtaceae.

Common Names: Ti-tree oil plant.

Description:

Small tree or shrub with papery bark and needle-like leaves. The essential oil is steam-distilled from the leaves and twigs.⁽¹⁴⁾



Fig. No. 6: Tea Tree

Shea Butter

Biological Source: *Vitellaria paradoxa*.

Family: Sapotaceae.

Common Name: Shea.

Description: A fat extracted from the nuts of the shea tree.

Morphological Features: Large tree with broad leaves and fruits containing seeds. ⁽¹⁵⁾



Fig. No. 7: Shea Butter

Jojoba Oil

Biological Source: *Simmondsia chinensis*.

Family: Simmondsiaceae.

Common Name: Jojoba.

Description: A liquid wax extracted from the seeds of the jojoba plant.

Morphological Features: Shrub with leathery leaves, Nut-like seeds. ⁽¹⁶⁾



Fig. No. 8: Jojoba Oil

Rosewater

Biological Source: Distilled water infused with rose petals.

Family: Rosaceae.

Common Name: Rosewater.

Description: A fragrant water obtained by distilling rose petals. ⁽²⁰⁾



Fig. No. 12: Rose Water

5. MATERIALS AND EQUIPMENT'S:

Table No.1: List of Ingredients with Applications

Sr. No	Ingredient	Role/uses
1	Neem Extract	Antibacterial, anti-inflammatory
2	Aloe Vera Gel	Soothing, anti-inflammatory
3	Tea Tree Extract	Antibacterial, antifungal
4	Turmeric Extract	Anti-inflammatory, healing
5	Shea Butter	Skin softening, moisturizing
6	Joboba Oil	Moisturizing
7	Neem Oil	Antibacterial, soothing
8	Stearic Acid	Emulsifier, stabilizer
9	Tea Tree Oil	Antiseptic, anti-inflammatory
10	Phenoxyethanol	Preservative
11	Rosewater	Skin soothing, hydration
12	Distilled Water (optional)	Solvent, additional hydration

Table No.2: List of Equipment's

Sr. no	Instruments	Role/uses
1	Double boiler	Melting
2	Spatula	Stirring
3	Thermometer	Measuring
4	Measuring spoons/cups	Measuring
5	Hand mixer/Whisk	Blending
6	Refrigerator	Cooling
7	Sterilized jars/Containers	Packaging

6. METHOD:

1. Melt the Oil Phase (Oil and Wax)

In a double boiler, melt Shea Butter, Jojoba Oil and Stearic Acid together. Stir occasionally until fully melted and combined. ⁽²¹⁾

2. Add Active Ingredients (Water Phase)

Once the oil phase is melted remove from heat. Add Aloe Vera Gel, Neem Extract, Tea Tree Extract, Turmeric Extract and Rosewater. Stir well to ensure a smooth mixture.

3. Add Neem Oil and Essential Oils

Allow the mixture to cool to room temperature (around 40°C or below). Add Neem Oil and Tea Tree Oil and stir thoroughly. ⁽²²⁾

4. Add Preservative

Mix in Phenoxyethanol to preserve the cream and prevent microbial growth. Stir well to ensure even distribution. ⁽²³⁾

5. Blend and Whip

Use a hand mixer or whisk to blend the cream for a lighter, smoother texture. Whip until the mixture becomes creamy and well-combined.

6. Cool and Set

Let the cream cool completely at room temperature. You can refrigerate it for a faster setting process. If needed. ⁽²⁴⁾

7. Packaging

Once cooled, transfer the cream into sterilized jars or airtight containers. Seal tightly and store in a cool, Dry place. ⁽²⁶⁾

Table No. 3: Formulation Table of Skin and Acne Inflammation

Ingredient	Quantity (g)		
	F 1	F 2	F3
Neem Extract	2 g	3 g	4 g
Aloe Vera Gel	3 g	4 g	4 g
Tea Tree Extract	2 g	3 g	4 g
Turmeric Extract	1.5 g	2 g	3 g
Shea Butter	4 g	4 g	5 g
Jojoba Oil	4 g	3 g	3 g
Neem Oil	3 g	2.5 g	3 g
Stearic Acid	1 g	1 g	1 g
Tea Tree Oil	0.5 g	0.5 g	1 g
Phenoxyethanol	0.5 g	0.5 g	0.5 g
Rosewater	2 g	2 g	2 g
Distilled Water (optional)	1 g	1 g	1.5 g

7. EVALUATION:

The cream was evaluated for organoleptic Properties, homogeneity, smoothness, absorbency, Irritancy, pH, stability, washability test. ⁽²⁷⁾

Colour and Appearance: Uniform, no phase separation.

Odour: Pleasant and characteristic of herbal ingredients.

Texture: Smooth, non-gritty.

Consistency: Easily spreadable, non-greasy.

Determination of pH: - The pH meter was calibrated and measured the pH Of cream by digital pH meter placing in the beaker at room temperature. The ideal pH range for topical creams is 5.0 to 6.5 close to the skin's natural ph. ⁽²⁷⁾

Washability Test: - The washability test assesses how easily the cream can be removed from the skin with water. A small amount of cream is applied to the skin, allowed to sit for a few minutes and then rinsed off with warm water without soap. ⁽²⁶⁾

Irritancy test: - The cream was applied on left hand dorsal side Surface of 2sq.cm and observed in equal intervals Up to 24hrs for irritancy, sensitivity and edema.

Observation parameters: Redness, itching, swelling or rashes. ⁽²⁸⁾

Result interpretation:

No reaction: Non-irritant

Mild redness: Slightly irritant

Severe symptoms: Irritant (unsuitable for use).

Spreadability test: - 1 gm of the prepared cream was taken in to glass Slide and cover with second slide. Then a weight of 100gm was placed on upper slide. The weight Was removed and extra formulation was scrapped Off. The lower slide was fixed on board of Apparatus and upper slide was fixed with non-Flexible string on which 100gm load was applied. Time taken by upper slide to slip off was noted down. ⁽²⁵⁾

$$S = m \times l / t$$

Were,

S – Spread ability

m- Weight tied to upper glass slide. L- Length moved on a glass slide

t- Time taken.

The determinations were carried out in three times and the average are readings was recorded and calculate. ⁽²⁹⁾

Smoothness: The smoothness of the cream formulation was Tested by rubbing between the fingers and observes Whether the gel is smooth, clumped, homogenous or rough. ⁽³⁰⁾

Result interpretation:

Smooth: Uniform, soft feel without particles.

Rough: Presence of gritty or coarse particles.

8. RESULTS AND DISCUSSION:**Results:****Physical Evaluation**

Physical evaluation such as colour, odour, texture, and state were checked. The colour was found to be Yellow, odour found to be pleasant, texture found to be smooth and state was found to be semi solid.

Table No. 4: Physical evaluation

Sr. No.	Parameter	F1	F2	F3
1.	Colour	Pale yellowish cream	Pale yellowish cream	Pale yellowish cream
2.	Odour	Pleasant	Pleasant	Pleasant
3.	Texture	Smooth	Smooth	Smooth

4.	State	Semisolid	Semisolid	Semisolid
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Irritancy: It was laid on the layer of skin and allow to absorb. An hour was used for examining the skin for any Symptoms of inflammation, redness, itching or Discomfort.



Fig. No. 13: Irritancy Test

pH: pH of the cream was found to be 6.95 during the study which is slightly acidic good for skin.



Fig. No. 14: pH test

Spreadability test: Creams showed shear-thinning behavior so spread easily. The spreadability of creams were Ranging from 5.26 ± 0.18 to 6.24 ± 0.24 g.cm/s. Cream base should spread easily without too much Drug and should not produce greater friction in the rubbing process. Spreadability was calculated Using the spreadability apparatus made of wooden Board with scale and two glass slides having two pans on both sides mounted on a pulley.

Washability test: The fungal infection cream stayed well on the skin after application and did not wash off completely with just water showing good resistance. It was easily removed with soap and water leaving the

skin clean and without irritation. This means the cream stays on long enough to work effectively but is also easy to wash off when needed.

Table No. 5 Evaluation Test of Acne and Skin Inflammation Cream

Sr. No.	Evaluation test	Batch 1	Batch 2	Batch 3
1	pH	5.5 – 6.0	5.0 -5.5	5.2-5.7
2	Viscosity	High (smooth and thick texture)	Slightly dense and stiff	Medium high (balanced texture)
3	Irritancy	No redness or itching	No itching	No reaction suitable for skin
4	Spreadability	Good (easily spread)	Moderate (needs more effort)	Excellent (spread easily and evenly)
5	Washability	Poorly washable	Moderately washable	Easily washable
6	Melting point	35°C	37°C	37°C

Discussion:

The physical evaluation showed the cream to be pale yellowish, with a pleasant odour, smooth texture, and semi-solid state across all formulations. Irritancy tests indicated no adverse skin reactions. The cream's pH was 6.95 slightly acidic and suitable for skin. It exhibited shear-thinning, spreading easily (5.26-6.24 g.cm/s). Washability tests showed good skin adherence but easy removal with soap and water.

Three acne cream batches were further evaluated. Batch 1 had a pH of 5.5-6.0 high viscosity, good spreadability, poor washability and a 35°C melting point. Batch 2 had a pH of 5.0-5.5 slightly dense texture, moderate spreadability and washability and a 37°C melting point. Batch 3 presented a pH of 5.2-5.7 medium-high viscosity, excellent spreadability, easy washability, and a 37°C melting point. These variations highlight the distinct properties of each batch.

9. CONCLUSION:

Researchers successfully created a topical herbal cream to treat acne and skin inflammation. Key ingredients included neem, tea tree, and turmeric extracts, along with aloe vera, chosen for their antimicrobial and anti-inflammatory properties. The cream featured a balanced oil and water phase for optimal texture and stability. Shea butter and jojoba oil provided moisturization without clogging pores, while rosewater added a refreshing scent and hydration.

Evaluation showed the cream had a stable pH, good spreadability, and no microbial growth. User trials confirmed it was non-irritating, felt pleasant, and absorbed well. Participants experienced visible improvements in acne and reduced redness with regular use, supporting the benefits of the herbal ingredients. In conclusion, the herbal cream shows great promise as a natural and effective option for acne and inflammation. Its success highlights the integration of traditional herbal knowledge with modern formulation. Further large-scale studies are recommended to confirm long-term effectiveness and explore other skin applications, contributing to the growing field of natural skincare.

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