



Review Article

A Systematic: Review on Herbal Anti- Acne Gel

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The study focuses on developing a herbal anti-acne gel using the ethanolic extract of *Salmaliamalabarica* thorns for topical application against *Propionibacterium acnes*. The thorns of *Salmaliamalabarica* are known to contain various bioactive compounds such as alkaloids, glycosides, carbohydrates, reducing sugars, flavonoids, phytosterols, and tannins, which contribute to their therapeutic potential. The formulated herbal gel is designed to undergo physicochemical evaluation, including tests for pH, spreadability, and stability, as well as a skin irritation study to assess its safety for topical use. The main objective of preparing this herbal gel is to reduce excessive sebum secretion, cleanse the skin, and help in the management and prevention of acne infections. The use of herbal ingredients aims to minimize adverse effects commonly associated with synthetic formulations, such as itching, irritation, and dermatitis. Thus, this formulation emphasizes maintaining healthy and clean skin through a natural, safe, and effective approach.

Keywords: *SalmaliaMalabarica*, Herbal, *P. acnes*, Anti-acne gel.

INTRODUCTION

Acne vulgaris is a long-term inflammatory condition of the skin that mainly targets the sebaceous (oil) glands and hair follicles. It results in the formation of comedones (blackheads and whiteheads), papules, pustules, nodules, and cysts. This is one of the most widespread dermatological issues, affecting nearly 85% of teenagers and young adults, and often continuing into later years. Although acne is not a serious medical illness, it can leave lasting scars, dark spots (hyperpigmentation), and lead to emotional challenges such as low self-confidence and distress.

Pathophysiology of Acne

The onset and progression of acne are linked to four major interconnected mechanisms:

1. Increased Sebum Production– Androgen hormones stimulate the sebaceous glands to secrete excess oil, which blocks the pores.
2. Follicular Hyper keratinization – Accumulation of dead skin cells within the follicles leads to obstruction of the pores.
3. Bacterial Proliferation (*Cutibacterium acnes*) – The trapped oil provides a favorable environment for the bacteria *C. acnes* to multiply, triggering inflammation.
4. Inflammatory Reaction– The body's immune system responds to bacterial growth, resulting in redness, swelling, and pus-filled lesions.

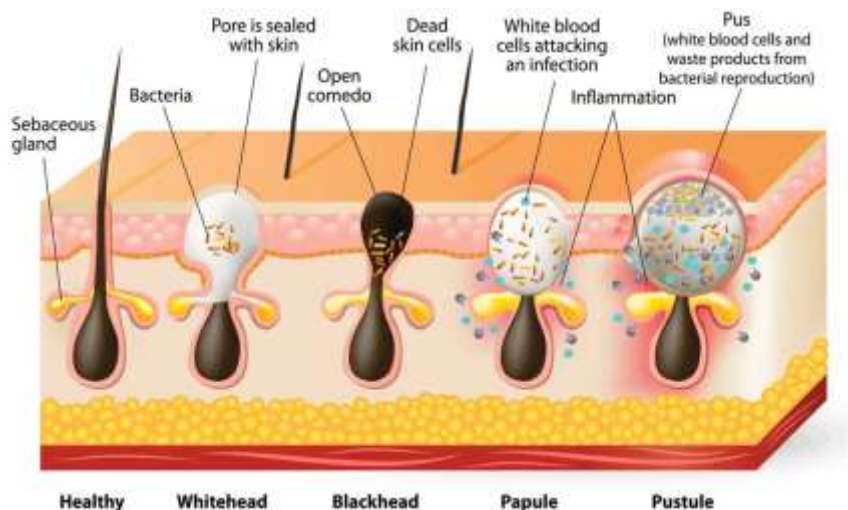


Fig. Structure of skin



Fig Types of Acne

Ideal Properties of a Topical Gel

- The gel should possess a clear and uniform (homogeneous) appearance.
- It must exhibit good stability over time without phase separation or degradation.
- The formulation should be non-sticky and comfortable upon application.
- It should not interact chemically or physically with other components of the formulation.
- The gel must be non-irritating and safe for the skin or any area where it is applied.

Method of Preparation of Gel

1. Extraction of plant material Hot continuous extractioun (Soxhlet Method): The shade-dried thorns of *Salmaliamalabarica* were coarsely
2. Preparation of Gel: The gelling agent (Carbopol 940) was dispersed in a sufficient quantity of distilled water with gentle stirring. To this

powdered using a mechanical grinder and passed through a sieve (No. 40) to obtain uniform particle size. About 50 g of the powdered material was subjected to successive solvent extraction using ethanol in a Soxhlet apparatus maintained at 60°C on a heating mantle. The extraction process continued until the solvent in the siphon tube became colorless, indicating complete extraction of the phytoconstituents. The defatting process was completed after 12 cycles, after which the extracted material was collected, concentrated, and stored for further use.

dispersion, propylene glycol-400 (used as a humectant and plasticizer) was added, followed by methyl paraben and propyl paraben as preservatives with continuous mixing. The pH of the gel base was then adjusted to neutral using Triethanolamine (TEA) to achieve proper gel consistency. The total weight of the gel was made up to 50 g with distilled water. The final mixture was stirred using a propeller stirrer for 2 hours at 500 rpm to obtain a uniform, bubble-free, homogeneous gel, which was then stored at room temperature for further evaluation.

Evaluation of Gel

• Physical Characteristics

The formulated gels were evaluated for their physical properties through visual and instrumental methods:

- 1. Color:** The appearance and color of the gel were examined visually.
- 2. Odour:** The smell of the gel was assessed by dissolving a small quantity in water and checking the aroma.
- 3. Consistency:** The texture and uniformity of the gel were inspected visually to ensure appropriate consistency.
- 4. Homogeneity:** After setting in a container, the gel was visually examined for uniformity and the absence of lumps or aggregates.

• Determination of pH

An accurately weighed 1 g sample of the gel was dispersed in 50 ml of distilled water, and the pH of the resulting mixture was measured using a digital pH meter to ensure skin compatibility.

• Viscosity Measurement

The viscosity of the prepared gels was evaluated using a Brookfield digital viscometer equipped with spindle no. 64 at a speed of 100 rpm, to determine the gel's flow characteristics and consistency.

Determination of pH

gel formulations were visually examined for their appearance and the presence of any aggregates. For pH determination, 1 g of gel was accurately weighed and dispersed in 50 ml of distilled water. The pH of the resulting dispersion was measured using a digital pH meter to ensure compatibility with skin pH.

Viscosity Measurement

The viscosity of the formulated gels was assessed using a Brookfield digital viscometer, equipped with spindle number 64, operated at a speed of 100 rpm to determine the flow behavior and consistency of the gel.

Determination of Spreadability

The Spreadability of the gel was evaluated by placing a small amount of the formulation between two glass slides. The slides were adjusted so that the gel initially occupied a distance of 7.5 cm between them, forming a thin, uniform layer when pressed lightly. A 100 g weight was then tied to the upper slide, causing the two slides to move apart under the applied load. The time required for the slides to separate completely over a 7.5 cm distance was recorded. The experiment was repeated three times, and the mean time was calculated.

The spreadability (S) was determined using the following formula:

$$S = tm \times l$$

Where:

S = Spreadability

m = Weight tied to the upper slide (g)

l = Length moved by the glass slide (cm)

t = Time taken to separate the slides (s)

Skin Irritation Study

The prepared gel formulation was applied to the properly shaved skin of rats to assess any possible irritation. The treated area was observed for 24 hours to monitor any undesirable skin reactions such as discoloration or changes in skin morphology.

Stability Studies

Stability testing of the gel was performed according to ICH guidelines. The samples were stored under two different conditions — $30^{\circ}\text{C} \pm 2^{\circ}\text{C} / 60\% \pm 5\% \text{RH}$ and $40^{\circ}\text{C} \pm 2^{\circ}\text{C} / 75\% \pm 5\% \text{RH}$. During the study period, the formulations were examined for any variations in physical appearance, pH, spreadability, and viscosity to ensure their stability.

In Vitro Diffusion Studies

These drug release from the topical gel was evaluated using a Franz diffusion cell. A 0.5 g sample of the gel was placed on the membrane, and the study was conducted at $37 \pm 1^{\circ}\text{C}$ using 250 ml of phosphate buffer (pH 7.4) as the dissolution medium. Samples of 5 ml were withdrawn at regular intervals of 1, 2, 3, 4, 5, 6, 7, and 8 hours, each time replacing the withdrawn volume with an equal amount of fresh buffer. The collected samples were analyzed using a spectrophotometer, with phosphate buffer serving as the blank solution.

CONCLUSION

The review highlights the significance of herbal gels, which offer therapeutic benefits with minimal or no side effects. These formulations are prepared using natural herbal ingredients, representing a move toward safer and healthier cosmetic alternatives that can be widely adopted for personal care.

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