

## FORMULATION AND EVALUATION OF HERBAL ANTI-ACNE CREAM WITH EXTRACTION OF NEEM AND LICORICE

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### ABSTRACT

Acne vulgaris is one of the most common chronic inflammatory skin disorders affecting adolescents and young adults. It is characterized by the formation of pimples, papules, pustules, and Comedones due to excessive sebum production, bacterial infection, and inflammation of the pilosebaceous glands. The present study aimed to formulate and evaluate herbal anti-acne cream containing natural ingredients such as Neem (*Azadirachta indica*) extract, Liquorice (*Glycyrrhiza glabra*) extracts, and Aloe vera (*Aloe barbadensis*) which possess antimicrobial, anti-inflammatory, antioxidant, and wound-healing properties. The herbal cream was prepared by the emulsification method using suitable excipients, including bees wax, almond oil, liquid paraffin, glycerine, and cetostearyl alcohol. The prepared formulations were evaluated for various physicochemical parameters such as appearance, pH, spreadability, viscosity, washability, extrudability, irritancy, and stability. The results indicated that the formulations exhibited acceptable physicochemical characteristics and good stability without causing skin irritation. Among the formulations, F3 showed better spreadability, suitable pH, and excellent consistency. The study concluded that the formulated herbal anti-acne cream is safe, effective, and can be considered a promising alternative for the management of acne vulgaris.

**KEYWORDS:** Herbal anti-acne cream, Acne vulgaris, Neem, Aloe vera, Liquorice, Evaluation.

### INTRODUCTION

Acne vulgaris is one of the most common chronic inflammatory disorders of the skin affecting approximately 80–90% of adolescents and young adults worldwide. It is characterized by the formation of Comedones, papules, pustules, and nodules due to excessive sebum production, follicular Hyperkeratinization, bacterial colonization, and inflammation of the pilosebaceous units. Although acne is not a life-threatening condition, it can cause physical discomfort, permanent scarring, and psychological problems such as anxiety and low self-esteem.

Conventional anti-acne therapies, including antibiotics, retinoids, and benzoyl peroxide, are effective but are often associated with adverse effects such as skin irritation, dryness, erythema, and the development of bacterial resistance. Therefore, there is a growing interest in herbal formulations as safer and more effective alternatives for the treatment of acne.

Herbal medicines contain bioactive compounds with antimicrobial, anti-inflammatory, antioxidant, and wound-healing properties that help in the management of acne. Neem (*Azadirachta indica*) possesses significant antibacterial and anti-inflammatory activities against acne-causing microorganisms. Aloe vera (*Aloe barbadensis*) is well known for its soothing, moisturizing, and wound-healing properties and promotes skin regeneration. Liquorice (*Glycyrrhiza glabra*) exhibits anti-inflammatory, antioxidant, and skin-lightening effects, helping to reduce acne lesions and post-inflammatory hyperpigmentation.

Considering the therapeutic potential of these medicinal plants, the present study was undertaken to formulate and evaluate a herbal anti-acne cream containing Neem, Aloe vera, and Liquorice extracts and to assess its physicochemical characteristics, stability, and suitability as an effective topical preparation for the management of acne vulgaris.

## MATERIALS AND METHODOLOGY

### MATERIALS

Neem extract, Liquorice extract, Aloe vera gel, Bees wax, Almond oil, Glycerine, Propyl paraben, Cetostearyl alcohol, Lavender oil, Distilled water.

### METHODOLOGY

**Preparation of Neem Extract:** Fresh neem leaves were collected, washed thoroughly with distilled water, and shade-dried for 5–7 days. The dried leaves were powdered using a grinder. About 2 g of neem powder was mixed with 20 mL of distilled water and heated on a water bath at 60–70°C for 30 minutes. The mixture was cooled and filtered through muslin cloth followed by filter paper. The filtrate was concentrated on a water bath to obtain the neem extract and stored in an airtight container for further use.

**Preparation of Liquorice Extract:** Dried roots of liquorice (*Glycyrrhiza glabra*) were cleaned, shade-dried, and powdered. About 2 g of liquorice powder was mixed with 20 mL of distilled water and heated on a water bath at 60–70°C for 30 minutes. The mixture was allowed to cool and then filtered through filter paper. The filtrate was concentrated on a water bath to obtain a semisolid extract, which was stored in an airtight container until further use in the formulation.

**Preparation of Oil Phase:** The oil phase was prepared by first cleaning and drying all glassware and equipment. Beeswax and cetostearyl alcohol were accurately weighed, and the required quantity of almond oil (or liquid paraffin) was measured. These ingredients were transferred into a clean beaker and heated on a water bath at 70–75°C with continuous stirring using a glass rod. Heating was continued until all the ingredients melted completely, forming a clear and uniform mixture. The oil phase was maintained at 70–75°C until it was ready to be mixed with the aqueous phase.

**Preparation of Aqueous Phase:** The aqueous phase was prepared by cleaning and drying all glassware and equipment. The required quantity of distilled water was measured, and glycerin was added, followed by propyl paraben, which was mixed until completely dissolved. The prepared neem extract, liquorice extract (or other herbal extracts), and aloe vera

gel were then added to the solution with continuous stirring to obtain a uniform mixture. The aqueous phase was heated on a water bath and maintained at 70–75°C until it was ready for emulsification.

**Emulsification:** Both the oil phase and aqueous phase were maintained at 70–75°C before emulsification. The aqueous phase was slowly added to the oil phase with continuous stirring to form a stable emulsion. Stirring was continued during the cooling process to obtain a smooth, homogeneous cream. When the temperature reached approximately 40°C, lavender oil was added and mixed thoroughly to produce the final herbal anti-acne cream.

### Packaging

After the preparation of the herbal anti-acne cream, the finished formulation was carefully transferred into a clean, dry, airtight container to prevent contamination and maintain its quality. The container was then properly labeled with the formulation details, batch number, and date of preparation. Finally, the packaged cream was stored at room temperature in a cool, dry place away from direct sunlight to ensure its stability and preserve its effectiveness throughout the storage period.



Oil phase of anti acne cream



Aqueous phase of anti acne cream



Emulsification

### FORMULATION TABLE

| INGREDIENTS         | ACTIVITY                 | QUANTITY (50GRAMS) |
|---------------------|--------------------------|--------------------|
| Neem powder         | Anti-inflammatory        | 2.5g               |
| Liquorice powder    | Skin brightening         | 2.5g               |
| Aloe vera gel       | Soothing, antimicrobial  | 12.5g              |
| Bees wax            | Stiffening agent         | 5g                 |
| Almond oil          | emollient                | 12.5ml             |
| glycerine           | Humectant                | 5g                 |
| Cetostearyl alcohol | Emulsifier, thickener    | 5g                 |
| Propyl paraben      | Preservatives            | 0.05g              |
| Lavender oil        | Fragrance, antimicrobial | 1.25ml             |
| Purified water      | Vehicle                  | q.s. to 50g        |

## EVALUATION TEST

- 1. Organoleptic Evaluation (Appearance)-** Observe the prepared cream visually for its **color, odor, texture, and appearance**. Record whether the cream is smooth and free from lumps.
- 2. pH Determination-** Weigh **1 g of cream** and disperse it in **10 mL of distilled water**. Allow it to stand for 2 hours. Measure the pH using a **digital pH meter**.
- 3. Spreadability Test-** Place **1 g of cream** between two glass slides. Place a weight of **100 g** on the upper slide for 5 minutes. Measure the time taken by the upper slide to move a certain distance.
- 4. Viscosity Determination-** Fill the cream into the sample container of a **Brookfield viscometer**. Measure the viscosity at a suitable spindle speed. Record the viscosity in **cP (centipoise)**.
- 5. Irritancy Test-** Apply a small amount of cream on a **1 cm<sup>2</sup> area of skin**. Observe for **redness, itching, or irritation** after 24 hours.
- 6. Extrudability Test-** Fill the cream into a collapsible tube. Press the tube gently and measure the amount of cream extruded. Evaluate the ease of extrusion.
- 7. Washability Test-** Apply a small amount of cream on the skin. Wash with tap water. Observe whether the cream is removed easily.
- 8. Homogeneity-** Place a small quantity of cream on a glass slide. Observe for the presence of **lumps, grittiness, and phase separation**.
- 9. Irritancy Test-** Apply a small amount of cream on a **1 cm<sup>2</sup> area of skin**. Observe for **redness, itching, or irritation** after 24 hours.



Weighing of ingredients using digital balance.

| S.NO | EVALUATION PARAMETER | METHOD               | RESULT                                 |
|------|----------------------|----------------------|----------------------------------------|
| 1.   | Appearance           | Visual inspection    | Smooth, homogeneous cream              |
| 2.   | Colour               | Visual inspection    | Yellowish green                        |
| 3.   | Odour                | Olfactory evaluation | Pleasant (characteristic herbal odour) |
| 4.   | pH                   | pH meter             | 5.5 -6.0                               |
| 5.   | Spreadability        | Flow test            | Very good                              |
| 6.   | Viscosity            | Glass slide method   | High                                   |
| 7.   | Extrudability        | Squeeze test         | Excellent                              |
| 8.   | Washability          | Water wash test      | Easily washable                        |
| 9.   | Homogeneity          | Visual inspection    | uniform                                |
| 10.  | Irritancy test       | Patch test on skin   | No irritation                          |

## EVALUATION TESTS FOR HERBAL ANTI-ACNE CREAM

## 1 Organoleptic Evaluation



**Procedure:**  
Observe the prepared cream visually for its color, odor, texture and appearance. Record the observations.

## 2 pH Determination



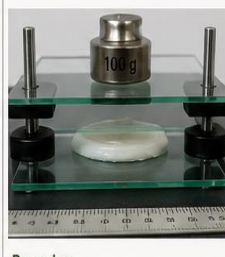
**Procedure:**  
Weigh 1 g of cream and disperse it in 10 mL of distilled water. Allow it to stand for 2 hours. Measure the pH using a digital pH meter.

## 3 Homogeneity



**Procedure:**  
Place a small quantity of cream on a glass slide. Observe for the presence of lumps, grittiness and phase separation.

## 4 Spreadability Test



**Procedure:**  
Place 1 g of cream between two glass slides. Place a weight of 100 g on the upper slide for 5 minutes. Measure the time taken by the upper slide to move a certain distance.

## 5 Washability Test



**Procedure:**  
Apply a small amount of cream on the skin. Wash with tap water. Observe whether the cream is removed easily.

## 6 Viscosity Determination



**Procedure:**  
Fill the cream into the sample container of a Brookfield viscometer. Measure the viscosity at a suitable spindle speed. Record the viscosity in cP.

## 7 Irritancy Test



**Procedure:**  
Apply a small amount of cream on a 1 cm<sup>2</sup> area of skin. Observe for redness, itching or irritation after 24 hours.

## 8 Stability Study



**Procedure:**  
Store the cream at room temperature and accelerated conditions for one month. Observe any changes in color, odor, pH, consistency and phase separation.

## 9 Type of Smear



**Procedure:**  
Apply a small quantity of cream on the skin. Observe whether the film formed is greasy or non-greasy.

## 10 Extrudability Test



**Procedure:**  
Fill the cream into a collapsible tube. Press the tube gently and measure the amount of cream extruded. Evaluate the ease of extrusion.

## RESULT AND DISCUSSION

The prepared herbal anti-acne cream formulations showed good physical characteristics and acceptable pH values, which were found to be within the normal skin p<sup>H</sup> range. The formulations exhibited satisfactory spreadability and viscosity, indicating ease of application and good consistency. No phase separation or grittiness was observed during the study period. The irritancy test revealed that all formulations were non-irritant and safe for topical application. It exhibited better spreadability, optimum viscosity, excellent extrudability, and good stability throughout the storage period. Therefore, considered the optimized formulation for further studies.



Herbal Anti acne cream

## CONCLUSION

The present study successfully formulated and evaluated a herbal anti-acne cream containing Neem, and Liquorice extracts. The prepared formulations demonstrated acceptable physicochemical properties, good homogeneity, suitable  $p^H$ , satisfactory spreadability, and excellent stability. The formulations were found to be non-irritant and suitable for topical application. It shows superior characteristics and was selected as the optimized formulation. The study concludes that the developed herbal anti-acne cream possesses promising potential in the management of acne vulgaris and may serve as a safe and effective alternative to conventional anti-acne preparations with minimal side effect.

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