WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
Coden USA: WJPRAP Impact Factor 8.63
Volume 15, Issue 8, 595-603. Research Article ISSN 2277–7105

# FORMULATION AND EVALUATION OF HERBAL ANTI-ACNE GEL CONTAINING NEEM, TULSI, ALOE VERA AND TEA TREE OIL

**Anisha*[1], Vandana Saini[1], Aditya Punia[1], Manish Bhargav[1], Chandra Prakash Mishra[2], Pawan Kumar Basniwal[3], Dr Sonu Sharma[2]**

[1]Schlor Sri Balaji College of Pharmacy, Jaipur.

[2]Associate Professor Sri Balaji College of Pharmacy, Jaipur.

[3]Professor and Principal Sri Balaji College of Pharmacy, Jaipur.

Article Received on 15 March 2026,
Article Revised on 05 April 2026,
Article Published on 16 April 2026,

https://doi.org/10.5281/zenodo.19592620

***Corresponding Author**
**Anisha**
Schlor Sri Balaji College of Pharmacy, Jaipur.

**How to cite this Article:** Anisha*[1], Vandana Saini[1], Aditya Punia[1], Manish Bhargav[1], Chandra Prakash Mishra[2], Pawan Kumar Basniwal[3], Dr Sonu Sharma[2] (2026). Formulation And Evaluation Of Herbal Anti-Acne Gel Containing Neem, Tulsi, Aloe Vera And Tea Tree Oil. World Journal of Pharmaceutical Research, 15(8), 595–603.
This work is licensed under Creative Commons Attribution 4.0 International license.

## ABSTRACT

Acne vulgaris is one of the most common dermatological disorders affecting adolescents and young adults worldwide. The condition is characterized by inflammation of pilosebaceous units resulting from increased sebum production, microbial colonization, follicular hyperkeratinization, and inflammatory responses. Conventional anti-acne treatments such as antibiotics, benzoyl peroxide, and retinoids are widely used but often produce undesirable side effects including skin irritation, dryness, and development of microbial resistance. Therefore, there is growing interest in the development of herbal formulations that provide effective treatment with minimal adverse effects. The present study aimed to formulate and evaluate a herbal anti-acne gel containing natural ingredients such as neem (Azadirachta indica), tulsi (Ocimum sanctum), aloe vera (Aloe barbadensis), and tea tree oil (Melaleuca alternifolia). These plant-based ingredients are known for their antimicrobial, anti-inflammatory, antioxidant, and wound healing properties. The herbal gel was prepared using Carbopol 940 as a gelling agent, glycerine as a humectant, methyl paraben as a preservative, triethanolamine as a pH adjusting agent, and distilled water as the vehicle. The prepared formulation was evaluated for various physicochemical parameters including appearance, pH, viscosity, spreadability, homogeneity, and stability. The gel showed good physical appearance, smooth texture, and green coloration due to the presence of herbal

extracts. The pH of the formulation was found to be 6.5, which is within the acceptable range for topical skin preparations. The gel demonstrated good spreadability and suitable viscosity for topical application. The results indicate that the formulated herbal anti-acne gel is stable, aesthetically acceptable, and potentially effective in the management of acne. The combination of herbal ingredients provides antimicrobial and anti-inflammatory effects that may help reduce acne lesions while minimizing side effects associated with synthetic drugs.

**KEYWORDS:** Herbal anti-acne gel, Azadirachta indica, Ocimum sanctum, Aloe vera, Tea tree oil, Carbopol gel formulation.

## 1. INTRODUCTION

Acne vulgaris is a chronic inflammatory skin disorder that affects the pilosebaceous units of the skin. It is one of the most prevalent dermatological conditions worldwide, particularly among adolescents and young adults. According to dermatological studies, approximately 85% of individuals between the ages of 12 and 24 years experience acne at some stage of their life. Acne not only causes physical discomfort but also leads to psychological problems such as low self-esteem, anxiety, and depression.

The development of acne involves multiple factors including increased sebum production, follicular hyperkeratinization, colonization of bacteria, and inflammatory responses. The bacterium *Cutibacterium acnes* (formerly *Propionibacterium acnes*) plays a crucial role in the pathogenesis of acne by proliferating within clogged hair follicles and releasing inflammatory mediators.

Neem (*Azadirachta indica*) is widely used in traditional medicine due to its strong antibacterial and anti-inflammatory activities. Tulsi (*Ocimum sanctum*) contains essential oils and phenolic compounds that help reduce microbial growth and inflammation. Aloe vera (*Aloe barbadensis*) is well known for its soothing, moisturizing, and wound healing properties. Tea tree oil (*Melaleuca alternifolia*) has strong antimicrobial activity against acne-causing microorganisms.

The combination of these herbal ingredients can provide a synergistic therapeutic effect in the treatment of acne. Topical gels are considered an ideal dosage form for dermatological preparations because they are non-greasy, easily spreadable, and provide better drug penetration through the skin.

Therefore, the present study focuses on the formulation and evaluation of a herbal anti-acne gel containing neem, tulsi, aloe vera, and tea tree oil using Carbopol 940 as a gelling agent.

Conventional therapies for acne include topical antibiotics, benzoyl peroxide, retinoids, and hormonal therapy. Although these treatments are effective, they are often associated with several side effects such as skin irritation, dryness, peeling, and antibiotic resistance. In addition, long-term use of synthetic drugs may cause damage to the skin barrier and increased sensitivity.

Due to these limitations, there is growing interest in the use of herbal medicines for the treatment of acne. Herbal formulations contain natural bioactive compounds such as flavonoids, alkaloids, terpenoids, tannins, and phenolic compounds that exhibit antimicrobial, anti-inflammatory, antioxidant, and wound healing properties.

## 2. MATERIALS AND METHODS

### MATERIALS

The materials used in the formulation of the herbal anti-acne gel were selected based on their known antimicrobial, anti-inflammatory, and skin-soothing properties. All chemicals and excipients used in the study were of pharmaceutical or analytical grade.

#### Neem Extract (Azadirachta indica)

Neem extract was used as one of the primary herbal active ingredients in the formulation. Neem is widely recognized for its strong antibacterial, anti-inflammatory, and antifungal properties. The extract contains important bioactive compounds such as nimbidin, azadirachtin, and quercetin, which exhibit inhibitory activity against acne-causing microorganisms. Neem extract helps reduce bacterial growth, control excess sebum production, and decrease skin inflammation, making it highly useful in acne treatment.

#### Tulsi Extract (Ocimum sanctum)

Tulsi extract was incorporated as a herbal active ingredient due to its antimicrobial, antioxidant, and anti-inflammatory properties. Tulsi contains several active phytoconstituents such as eugenol, rosmarinic acid, and ursolic acid, which help inhibit bacterial growth and reduce inflammation associated with acne lesions. Tulsi also helps purify the skin and prevent microbial infection in clogged pores.

**Aloe Vera Gel (Aloe barbadensis)**

Aloe vera gel was included in the formulation because of its moisturizing, soothing, and wound-healing properties. Aloe vera contains important components such as acemannan, vitamins A, C, and E, enzymes, and polysaccharides, which help in skin hydration and repair of damaged tissues. It also reduces redness and irritation caused by acne lesions and enhances the overall healing process.

**Tea Tree Oil (Melaleuca alternifolia)**

Tea tree oil was used in small quantity as an active herbal ingredient due to its strong antimicrobial activity. The main active compound in tea tree oil is terpinen-4-ol, which is effective against acne-causing bacteria such as *Cutibacterium acnes*. Tea tree oil helps reduce inflammation, prevent bacterial infection, and promote faster healing of acne lesions.

**Carbopol 940**

Carbopol 940 was used as a gelling agent in the formulation. It is a synthetic high-molecular-weight polymer of acrylic acid widely used in topical pharmaceutical and cosmetic formulations. Carbopol provides viscosity, consistency, and stability to the gel. It also improves the spreadability and aesthetic appearance of the formulation.

**Glycerine**

Glycerine was used as a humectant and moisturizing agent. It helps retain moisture in the skin by attracting water molecules from the surrounding environment. Glycerine improves the smoothness and spreadability of the gel while preventing dryness and irritation of the skin.

**Methyl Paraben**

Methyl paraben was used as a preservative in the formulation. It helps prevent microbial contamination during storage and increases the shelf life of the product. Methyl paraben is widely used in pharmaceutical and cosmetic preparations due to its broad-spectrum antimicrobial activity.

**Triethanolamine**

Triethanolamine was used as a pH adjusting agent and neutralizing agent for Carbopol polymer. It helps convert the Carbopol dispersion into a clear gel structure and maintains the pH of the formulation within the suitable range for skin application.

**Distilled Water**

Distilled water was used as the vehicle or solvent in the formulation. It provides the required volume for the gel and ensures uniform dispersion of herbal extracts and excipients. Distilled water is free from impurities and microorganisms, which helps maintain the stability and purity of the formulation.

**Formulation of Herbal Anti-Acne Gel**

| S. No | Ingredient | Category | Quantity (for 100 ml) |
|---|---|---|---|
| **1.** | Neem Extract | Herbal Active | 2g |
| **2.** | Tulsi Extract | Herbal Active | 2g |
| **3.** | Aloevera Gel | Herbal Active | 5g |
| **4.** | Tea tree oil | Herbal Active | 0.5ml |
| **5.** | Carbopol 940 | Gelling Agent | 1g |
| **6.** | Glycerine | Humectant | 3ml |
| **7.** | Methyl Paraben | Preservative | 0.2g |
| **8.** | Triethanolamine | pH Adjuster | q.s. |
| **9.** | Distilled Water | Vehicle | q.s.(for 100 ml) |

**METHOD OF PREPARATION**

**Preparation of Gel Base**

Carbopol 940 was accurately weighed and slowly dispersed in distilled water with continuous stirring to prevent lump formation. The dispersion was allowed to stand for approximately 30 minutes to ensure proper hydration and swelling of the polymer.

**Preparation of Herbal Mixture**

Neem extract, tulsi extract, aloe vera gel, and tea tree oil were accurately measured and mixed together to obtain a uniform herbal mixture.

**Addition of Excipients**

Methyl paraben was dissolved in a small amount of warm distilled water. Glycerine was added to the herbal mixture to improve moisturizing properties.

**Incorporation into Gel Base**

The prepared herbal mixture was slowly incorporated into the Carbopol gel base with continuous stirring until a homogeneous mixture was obtained.

**pH Adjustment**

Triethanolamine was added dropwise to neutralize Carbopol and adjust the pH of the gel to approximately 6–6.5.

### 3. Evaluation of Herbal Gel

The prepared herbal anti-acne gel was evaluated for the following parameters.

**Physical Appearance:** The gel was visually examined for color, clarity, homogeneity, and consistency.

**pH Determination:** The pH of the gel was measured using a digital pH meter.

**Spreadability:** Spreadability was determined by placing the gel between two glass slides and measuring the spreading area.

**Viscosity:** Viscosity was measured using a Brookfield viscometer.

**Homogeneity:** The formulation was checked visually to ensure uniform distribution of ingredients.

**Stability Study:** The prepared gel was stored at room temperature and observed for any changes in color, consistency, and pH.

### 4. RESULTS AND DISCUSSION

The herbal anti-acne gel prepared in this study showed satisfactory physicochemical characteristics. The formulation appeared green in color due to the presence of neem and tulsi extracts and exhibited smooth texture with good consistency.

The pH of the gel was found to be 6.5, which is within the acceptable range for skin applications. Maintaining a skin-friendly pH is important to prevent irritation and maintain the stability of the formulation.

The gel demonstrated good spreadability, indicating that it can be easily applied to the skin surface. Adequate spreadability ensures uniform distribution of active ingredients on the affected area.

The viscosity of the formulation was found to be appropriate for topical application. Carbopol 940 acted as an effective gelling agent and provided the required consistency and stability to the gel.

Homogeneity testing showed that the formulation was uniform and free from lumps or aggregates. The stability study indicated that the gel remained stable without significant changes in color, pH, or consistency.

The herbal ingredients used in the formulation possess well-known antimicrobial and anti-inflammatory properties. Neem and tea tree oil exhibit strong antibacterial activity against acne-causing microorganisms, while tulsi helps reduce inflammation and aloe vera promotes healing and hydration of the skin.

The combination of these herbal ingredients may produce a synergistic effect in reducing acne lesions and improving skin health.

## 5. CONCLUSION

The present study successfully formulated and evaluated a herbal anti-acne gel containing neem extract, tulsi extract, aloe vera, and tea tree oil. The formulation was prepared using Carbopol 940 as a gelling agent and showed satisfactory physicochemical characteristics. The prepared gel exhibited good appearance, appropriate pH, suitable viscosity, good spreadability, and stability during storage. The herbal ingredients used in the formulation provide antimicrobial, anti-inflammatory, and soothing effects that may help in the management of acne vulgaris. The results suggest that the formulated herbal anti-acne gel can serve as a promising natural alternative to conventional synthetic anti-acne products. Further studies including antimicrobial testing and clinical evaluation are recommended to confirm the therapeutic effectiveness of the formulation.

## REFERENCES

1. Mr. Suraj Kishan Ghodke, Mr. L.R. Bagwan, Dr. Hingne L.D.(12 December 2021) in INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS “RESEARCH OF FORMULATION AND EVALUATION OF ANTI-ACNE GEL”.
2. Shivangni Rathore, Dr. Shailesh Gupta, Dr. Vivek Gupta (No. 5, 2022) in Journal of Complementary Medicine Research “A Comprehensive Review on Formulation and Evaluation of Herbal Anti-acne Gel”.
3. Julia Afrakoma Ansong, Emmanuel Asante, Raphael Johnson, Mariam El Boakye-Gyasi, Noble Kuntworbe, Frederick William Akuffo Owusu, Kwabena Ofori-Kwakye (2023 Dec 18) in BioMed Research International “Formulation and Evaluation of Herbal-Based Antiacne Gel Preparations”.

4. Shivangni Rathore, Dr. Shailesh Gupta, Dr. Vivek Gupta (No. 5, 2022) in Journal of Complementary Medicine Research "A Comprehensive Review on Formulation and Evaluation of Herbal Anti-acne Gel".
5. Pratibha Dhiwar, Trilochan Satapathy, Arun Kumar Sahu, Nikita Patel (June 2025) in Pharmacological Research - Natural Products "Exploring the potential of herbal bioactives to treat acne: A perspective review"
6. Pratibha Dhiwar, Trilochan Satapathy, Arun Kumar Sahu, Nikita Patel (June 2025) in Pharmacological Research - Natural Products "Exploring the potential of herbal bioactives to treat acne: A perspective review.
7. Samridhi Jayant, Adarsh Kumar, Shivanshu Sharma (January 21, 2026) in ZENODO "Formulation and Evaluation Herbal Aloe Vera Gel for the Acne".
8. Samridhi Jayant, Adarsh Kumar, Shivanshu Sharma (January 21, 2026) in ZENODO "Formulation and Evaluation Herbal Aloe Vera Gel for the Acne" and Evaluation Herbal Aloe Vera Gel for the Acne".
9. P.A.M. Sucharitha, K. Padmasree, K. Kiran Kumar Reddy, G. Sneha Latha Reddy, K. Manoj Kumar, S. Kalapana, S. Nelson Kumar (15/08/2025) in International Journal of Pharmacognosy and Chemistry "Preparation and evaluation of poly herbal anti-acne cream".
10. Versha Sharma, Poonam Kumari, Kavita Kashyap (07/07/25) in STM Journals "Preparation and Evaluation of Herbal Gel Containing Multiple Plant Extracts for Acne Treatment".
11. Rakesh SA, Anusha BN, Prathiksha CC, Nisarga K, Gagan HS, Bhumika BC and Bhagya VH (2025) in Journal of Pharmacognosy and Phytochemistry "Phytotherapeutic face wash gel: Formulation and evaluation for acne treatment".
12. Satya Prakash, Atul Pratap Singh, Jyoti Kumari, Rajkumar, Aakash Kumar, Mansi Aggarwal, Komal (2022) in Journal of Pharmaceutical Negative Results "FORMULATION AND EVALUATION OF HERBAL ANTI-ACNE GEL".
13. Akash E, Gunaseelan V, Jayanthan R, Parvendhan M, Prabavathi T, Rassid Ahmad A (November 22, 2025) in International Journal of Allied Medical Sciences and Clinical Research "FORMULATION AND EVALUATION OF ANTI -ACNE HERBAL CREAM".
14. Biyyala, S. (2022). Formulation and evaluation of anti-acne herbal gel. Innovative Journal of Medical Sciences.

15. Sharma, V., Kumari, P., & Kashyap, K. (2025). Preparation and evaluation of herbal gel containing multiple plant extracts for acne treatment. International Journal of Biochemistry and Biomolecule Research.
16. Nimbalkar, K. R., et al. (2025). Evaluation and formulation of herbal anti-acne cream. International Journal of Pharmacognosy and Life Science.
17. Jayant, S., Kumar, A., & Sharma, S. (2025). Formulation and evaluation of herbal aloe vera gel for acne.
18. Kumar, A. et al. (2023). Formulation and evaluation of anti-acne herbal gel. International Journal of Pharmaceutical Sciences.
19. Sharma, S. & Sharma, K. (2012). Antibacterial activity of neem and tulsi extracts against acne pathogens. International Journal of Pharmaceutical Sciences.
20. Biswas, K., Chattopadhyay, I., Banerjee, R., & Bandyopadhyay, U. (2002). Biological activities and medicinal properties of neem (Azadirachta indica). Current Science.
21. Kelm, M. A. et al. (2000). Antioxidant activity of Ocimum sanctum extracts. Journal of Agricultural and Food Chemistry.
22. Eshun, K., & He, Q. (2004). Aloe vera: A valuable ingredient for pharmaceutical and cosmetic industries. Food Chemistry.
23. Bassett, I. B., Pannowitz, D. L., & Barnetson, R. S. (1990). A comparative study of tea tree oil versus benzoyl peroxide in the treatment of acne. Medical Journal of Australia.
24. Zaenglein, A. L. et al. (2016). Guidelines of care for the management of acne vulgaris. Journal of the American Academy of Dermatology.
25. Kurokawa, I. et al. (2009). New developments in the treatment of acne vulgaris. Journal of Dermatology.