

Development And Evaluation Of A Polyherbal Emulgel For Anti-Acne Activity

Shaikh Atique Shaikh Bismillah¹, Amol Jadhao², Mayuri Zore³

¹Research Scholar, Department of Pharmaceutics, Gawande College of Pharmacy, Sakharkherda, Tal. Sindkhed Raja, Dist. Buldhana, Maharashtra, India – 443202

²Research Guide, Department of Pharmaceutics, Gawande College of Pharmacy, Sakharkherda, Tal. Raja, Dist. Buldhana, Maharashtra, India – 443202

³Lecturer, Department of Pharmacy, Gawande College of Pharmacy, Sakharkherda, Tal. Sindkhed Raja, Dist. Buldhana, Maharashtra, India – 443202.

ABSTRACT

Acne vulgaris is a common dermatological disorder caused by excessive sebum production, bacterial colonization, inflammation, and follicular blockage. Conventional anti-acne therapies such as benzoyl peroxide and antibiotics are often associated with adverse effects including skin irritation, dryness, and development of microbial resistance. Therefore, there is an increasing need for safe and effective herbal alternatives. The present study aimed to develop and evaluate a polyherbal gel/emulgel formulation for anti-acne activity using neem (*Azadirachta indica*), Aloe vera (*Aloe barbadensis*), and tea tree oil (*Melaleuca alternifolia*). Herbal extracts were prepared, subjected to phytochemical evaluation, and incorporated into a gel/emulgel base. Five formulations (F1–F5) were developed using different polymer concentrations and evaluated for physical appearance, pH, viscosity, spreadability, homogeneity, in-vitro antibacterial activity against acne-causing bacteria, skin irritation, and stability. The optimized formulation exhibited acceptable physicochemical properties, good spreadability, suitable skin-friendly pH, significant antibacterial activity comparable to benzoyl peroxide, and no signs of skin irritation. The results demonstrate that the developed polyherbal formulation is safe, stable, and effective for topical anti-acne application, suggesting its potential as a natural alternative to conventional anti-acne therapies.

Keywords: Polyherbal formulation, Acne vulgaris, Neem, Aloe vera, Tea tree oil, Emulgel, Antibacterial activity.

INTRODUCTION

Acne vulgaris is a chronic inflammatory disorder of the pilosebaceous unit that predominantly affects adolescents and young adults, although it may persist into adulthood.¹ The pathophysiology of acne involves multiple interrelated factors, including increased sebum production, hyperkeratinization of the follicular epithelium, colonization by acne-causing bacteria such as *Cutibacterium acnes*, and subsequent inflammatory responses.² These processes lead to the formation of comedones, papules, pustules, and, in severe cases, nodules and cysts, significantly affecting the quality of life and psychological well-being of affected individuals.³ Conventional anti-acne therapies include topical agents such as benzoyl peroxide, retinoids, and antibiotics, as well as

systemic treatments for severe cases.⁴ Although effective, these treatments are often associated with undesirable side effects such as skin irritation, erythema, dryness, peeling, photosensitivity, and the development of bacterial resistance upon prolonged use.⁵ Benzoyl peroxide, one of the most commonly prescribed topical agents, can cause excessive dryness, burning sensation, and allergic contact dermatitis, limiting patient compliance and long-term use.⁶

In recent years, herbal medicines have gained considerable attention in dermatological applications due to their natural origin, better safety profile, and reduced incidence of adverse effects.⁷ Herbal formulations possess multiple pharmacological activities, including antimicrobial, anti-inflammatory,

Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

antioxidant, and wound-healing properties, which are beneficial in the management of acne.⁸ The use of plant-based therapies also aligns with the growing demand for natural and sustainable healthcare solutions.⁹ Neem (*Azadirachta indica*) is well known for its potent antibacterial, antifungal, and anti-inflammatory properties.¹⁰ Its bioactive constituents such as alkaloids, flavonoids, tannins, and terpenoids contribute to its effectiveness against acne-causing microorganisms and inflammatory skin conditions.

Aloe vera (*Aloe barbadensis*) is widely used in dermatological formulations due to its soothing, moisturizing, anti-inflammatory, and wound-healing properties. It also helps reduce skin irritation and supports skin barrier repair. Tea tree oil (*Melaleuca alternifolia*) possesses strong antibacterial and antiseptic activity, particularly against *Cutibacterium acnes*, and has been shown to be effective in reducing acne lesions with fewer side effects compared to synthetic agents. The combination of multiple herbal agents in a polyherbal formulation offers synergistic therapeutic benefits by targeting different pathogenic factors of acne simultaneously.¹¹ Polyherbal formulations can enhance antimicrobial efficacy, reduce inflammation, improve skin healing, and minimize adverse effects compared to single-herb or synthetic formulations. Additionally, incorporation of herbal actives into a gel or emulgel base improves patient acceptability, ease of application, and drug penetration through the skin.¹²

MATERIALS AND METHODS

Materials

Herbal materials: Fresh neem (*Azadirachta indica*) leaves and Aloe vera (*Aloe barbadensis*) leaves were used for the preparation of herbal extracts. Tea tree oil (*Melaleuca alternifolia*) was procured from a certified commercial supplier.¹³

Excipients and chemicals: Carbopol 934, Hydroxypropyl Methylcellulose (HPMC)/Carboxymethyl Cellulose (CMC), triethanolamine, propylene glycol, Tween 80, liquid paraffin, methyl paraben, propyl paraben, ethanol, methanol, phosphate buffer, and purified water were used. All chemicals and reagents were of analytical grade.

Microbial strains: Acne-causing bacterial strains such as *Cutibacterium acnes* and *Staphylococcus aureus* were used for in-vitro antibacterial studies.¹⁴

2.2 Collection and Authentication of Herbal Materials

Fresh neem and Aloe vera leaves were collected from local areas. Tea tree oil was obtained from an authenticated commercial source. The collected plant materials were washed thoroughly with distilled water to remove dirt and foreign matter. Botanical authentication of neem and Aloe vera was carried out by a qualified botanist to confirm the identity of the plant materials.¹⁵

Preparation of Herbal Extracts

Neem leaf extraction: Neem leaves were shade-dried and powdered using a mechanical grinder. The powdered material was subjected to maceration using ethanol or a hydroalcoholic solvent for a specified period. The extract was filtered, concentrated, and dried to obtain a semi-solid mass, which was stored in an airtight container.¹⁶

Aloe vera gel extraction: Fresh Aloe vera leaves were washed thoroughly, and the outer rind was carefully removed. The inner transparent gel was collected, homogenized, and subjected to drying (freeze drying or low-temperature oven drying). The dried gel was extracted using ethanol or water, filtered, concentrated, and stored for further use.¹⁷

Preparation of tea tree oil phase: Tea tree oil was used directly and mixed with Tween 80 to ensure proper solubilization before incorporation into the gel/emulgel formulation.

Phytochemical Evaluation

The prepared herbal extracts were evaluated for their physical characteristics such as color, odor, and consistency. The percentage yield of each extract was calculated based on the weight of dried extract obtained relative to the initial weight of raw material. Preliminary phytochemical screening was performed to detect the presence of alkaloids, flavonoids, tannins, terpenoids, and phenolic compounds using standard qualitative tests.¹⁸



Pre-Formulation Studies

Organoleptic properties: The extracts were evaluated for color, odor, and appearance by visual and sensory inspection.

Solubility studies: Solubility of herbal extracts was determined in distilled water, ethanol, methanol, propylene glycol, and phosphate buffer to select suitable solvents for formulation.

Drug–excipient compatibility: Compatibility between herbal extracts and excipients was assessed through visual observation to identify any physical changes or incompatibility.¹⁹

Formulation of Polyherbal Gel/Emulgel

The gel base was prepared using Carbopol 934 and HPMC/CMC by dispersing them in purified water with continuous stirring. Triethanolamine was added to neutralize the dispersion and form a clear gel base. The herbal extracts of neem and Aloe vera were accurately weighed and incorporated into the gel base. Tea tree oil solubilized with Tween 80 was gradually added with gentle stirring to form a uniform emulgel. Propylene glycol, liquid paraffin, and preservatives were added, and the formulation was mixed thoroughly. Five different formulations (F1–F5) were prepared by varying the concentration of polymers while keeping the herbal actives constant.²⁰

Evaluation of Formulations

Physical appearance and homogeneity: Formulations were visually inspected for color, texture, clarity, and homogeneity. Grittiness was checked by rubbing the gel between fingers.

pH determination: The pH of each formulation was measured using a calibrated digital pH meter at room temperature.²¹

Viscosity measurement: Viscosity was determined using a Brookfield viscometer at different spindle speeds to assess flow behavior.²²

Spreadability study: Spreadability was evaluated using the glass slide method to assess ease of application and uniform spreading.²³

In-Vitro Antibacterial Activity

Antibacterial activity of the formulations was evaluated using the agar well diffusion method. Test organisms (*Cutibacterium acnes* and *Staphylococcus aureus*) were inoculated on nutrient agar plates. Wells were filled with the polyherbal formulation, standard drug (benzoyl peroxide), and control (gel base). Plates were incubated, and zones of inhibition were measured to assess antibacterial efficacy.²⁴

Skin Irritation Study

The skin irritation study was conducted according to ethical guidelines. A small quantity of the formulation was applied to a marked area of intact skin. The treated area was observed at 24, 48, and 72 hours for signs of erythema, edema, itching, or inflammation. A control site was maintained for comparison.²⁵

Stability Studies

Stability studies were carried out under short-term (room temperature) and accelerated conditions ($40 \pm 2^\circ\text{C}$ / $75 \pm 5\%$ RH) for a specified period. The formulations were evaluated periodically for changes in appearance, pH, viscosity, and homogeneity to assess stability.²⁶⁻²⁷

RESULT AND DISCUSSION

The present research work was carried out to formulate and evaluate a polyherbal gel/emulgel containing neem extract, Aloe vera extract, and tea tree oil for the treatment and management of acne vulgaris. Herbal formulations have gained considerable importance in dermatological therapy because of their safety, effectiveness, lower incidence of side effects, and better patient compliance compared to synthetic preparations. The current investigation aimed to develop a stable and effective herbal topical formulation possessing antibacterial, anti-inflammatory, antioxidant, and soothing properties suitable for acne management. The results obtained from phytochemical screening, preformulation studies, formulation development, physicochemical evaluation, antibacterial studies, skin irritation studies, and stability testing demonstrated the successful development of an optimized polyherbal anti-acne formulation.



Initially, the herbal extracts were evaluated for their physical characteristics to determine their quality, purity, and suitability for formulation development. Neem extract appeared as a dark green to brown colored semi-solid mass with a characteristic bitter odor, indicating the presence of tannins, alkaloids, and flavonoids. Aloe vera extract was observed as a light green to pale yellow viscous mass with mild

characteristic odor due to the presence of polysaccharides and hydrophilic constituents. Tea tree oil appeared as a pale-yellow clear liquid possessing a strong aromatic odor characteristic of essential oils rich in terpenoids. The physical appearance of all extracts indicated good quality, proper extraction procedures, and absence of visible impurities.

Table 1: Physical Characteristics of Herbal Extracts

Herbal Extract	Physical State	Color	Odor	Remarks
Neem extract	Semi-solid	Dark green to brown	Characteristic bitter odor	Good quality
Aloe vera extract	Viscous	Light green to pale yellow	Mild odor	Uniform consistency
Tea tree oil	Liquid	Pale yellow	Aromatic odor	Clear and pure

The extraction yield of herbal materials was determined to evaluate the efficiency of extraction methods. Neem extract showed a percentage yield of 12.5%, whereas Aloe vera extract showed a comparatively higher yield of 18% because of the presence of high moisture content and polysaccharides. The obtained yields indicated efficient extraction of active phytoconstituents suitable for formulation development.

Table 2: Percentage Yield of Herbal Extracts

Herbal Material	Weight of Plant Material (g)	Weight of Extract Obtained (g)	Percentage Yield (%)
Neem leaves	100	12.5	12.5
Aloe vera leaves	100	18.0	18.0
Tea tree oil	—	—	—

Preliminary phytochemical screening revealed the presence of several important bioactive compounds responsible for anti-acne activity. Neem extract showed the presence of alkaloids, flavonoids, tannins, terpenoids, and phenolic compounds. Aloe vera

extract showed flavonoids and phenolic compounds, whereas tea tree oil showed terpenoids responsible for antimicrobial activity. These phytoconstituents are known for their antibacterial, anti-inflammatory, antioxidant, and wound-healing properties, which are beneficial in acne treatment.

Table 3: Preliminary Phytochemical Screening

Phytoconstituent	Neem Extract	Aloe vera Extract	Tea Tree Oil
Alkaloids	+	—	—
Flavonoids	+	+	—
Tannins	+	—	—
Terpenoids	+	—	+
Phenolic compounds	+	+	—

The phytochemical findings strongly supported the therapeutic potential of the selected herbal ingredients. Neem extract contributed antimicrobial and anti-inflammatory activity, tea tree oil provided strong antibacterial effects against acne-causing microorganisms, while Aloe vera contributed soothing and skin-healing properties. The synergistic action of these herbal constituents enhanced the overall anti-acne activity of the formulation.



Preformulation studies were carried out to determine the compatibility of herbal extracts with selected excipients and to evaluate their physicochemical behavior. Solubility studies revealed that neem extract was moderately soluble in water and freely soluble in ethanol, Aloe vera extract was freely soluble in water, whereas tea tree oil was insoluble in water and required surfactants for proper incorporation into the gel system. Tween 80 was selected as a suitable surfactant for uniform dispersion of tea tree oil within the formulation. Drug–excipient compatibility studies confirmed the absence of significant interactions between herbal extracts and selected excipients, indicating good compatibility and formulation stability. Five different batches of polyherbal gel/emulgel formulations designated as F1–F5 were prepared using varying concentrations of Carbopol 934 and HPMC/CMC while maintaining constant concentrations of herbal extracts. Carbopol 934 acted as the primary gelling agent, whereas HPMC/CMC improved consistency and stability of the formulation.

Table 4: Composition of Polyherbal Gel/Emulgel Formulations

Ingredients (% w/w)	F1	F2	F3	F4	F5
Neem extract	5	5	5	5	5
Aloe vera extract	5	5	5	5	5
Tea tree oil	2	2	2	2	2
Carbopol 934	0.5	0.75	1.0	1.25	1.5
HPMC/CMC	0.5	0.75	1.0	1.25	1.5

During formulation development, formulations F1 and F2 containing lower polymer concentrations showed thinner consistency and lower viscosity. Formulations F3 and F4 exhibited smooth texture, good consistency, and optimum spreadability. Formulation F5 containing higher polymer concentration exhibited excessive viscosity and comparatively lower spreadability. Among all batches, formulation F4 showed optimum physicochemical characteristics suitable for topical application. The prepared formulations were subjected to physical evaluation including appearance, color, texture, clarity, and homogeneity. All formulations appeared smooth, glossy, and homogeneous without visible lumps or grittiness. The optimized formulation F4 exhibited smooth texture, excellent clarity, and balanced consistency.

Table 5: Physical Evaluation of Polyherbal Formulations

Formulation	Appearance	Texture	Clarity	Remarks
F1	Smooth	Thin	Clear	Less viscous
F2	Smooth	Moderately thick	Clear	Good consistency
F3	Glossy	Thick	Clear	More viscous
F4	Smooth and glossy	Uniform	Clear	Optimized formulation
F5	Thick	Highly viscous	Slightly opaque	Reduced spreadability

The pH of all formulations was determined to ensure suitability for topical application. The pH values ranged between 5.6 and 6.1, which falls within the

physiological skin pH range and indicates compatibility with human skin. Formulation F4 exhibited a pH value of 5.9, which is considered ideal for topical anti-acne formulations.

Table 6: pH Evaluation of Formulations

Formulation	pH (Mean ± SD)
F1	5.6 ± 0.1
F2	5.7 ± 0.1
F3	5.8 ± 0.1
F4	5.9 ± 0.1
F5	6.1 ± 0.1



The viscosity study demonstrated that viscosity increased with increasing polymer concentration. All formulations exhibited pseudoplastic or shear-

thinning flow behavior, which is desirable for topical formulations because it facilitates easy spreading during application while maintaining sufficient consistency at rest.

Table 7: Viscosity Measurement of Formulations

Formulation	Viscosity at 10 rpm (cP)	Viscosity at 20 rpm (cP)	Viscosity at 50 rpm (cP)
F1	4200 ± 120	3600 ± 110	2900 ± 95
F2	5800 ± 140	4800 ± 130	3900 ± 120
F3	7600 ± 180	6400 ± 160	5200 ± 140
F4	9100 ± 200	7800 ± 180	6500 ± 160
F5	11200 ± 240	9800 ± 210	8200 ± 190

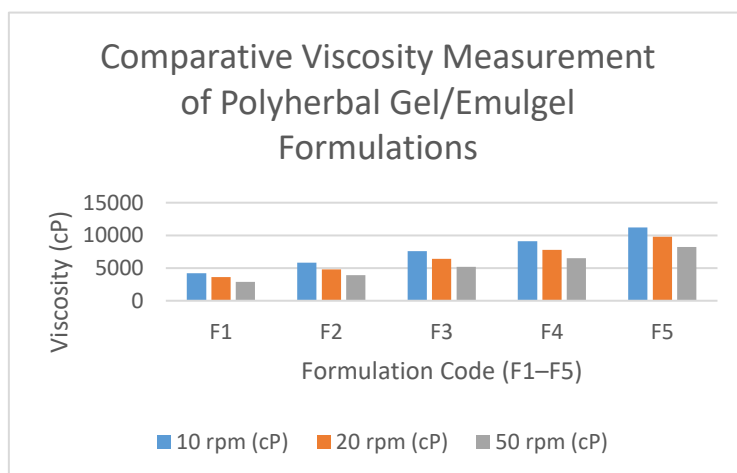


Figure 1: Comparative Viscosity Profile of Polyherbal Gel/Emulgel Formulations (F1–F5)

Table 8: Spreadability Study of Formulations

Formulation	Spreadability (g·cm/sec)
F1	18.6 ± 0.8
F2	16.9 ± 0.7
F3	14.8 ± 0.6
F4	13.5 ± 0.5
F5	11.2 ± 0.4

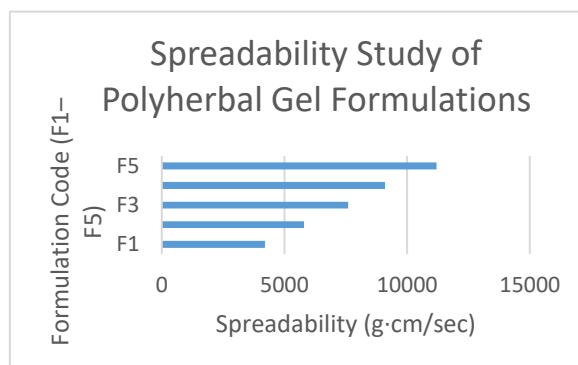


Figure 2: Comparative Spreadability Study of Polyherbal Gel/Emulgel Formulations (F1–F5)

The spreadability study indicated that formulations with lower viscosity showed higher spreadability whereas highly viscous formulations exhibited reduced spreadability. Formulation F4 showed optimum spreadability with good retention properties suitable for topical use.

Table 9: In-Vitro Antibacterial Activity

Test Sample	Zone of Inhibition against <i>C. acnes</i> (mm)	Zone against <i>S. aureus</i> (mm)
Control	No zone	No zone
Standard (Benzoyl peroxide)	22.4 ± 1.2	20.8 ± 1.0
Polyherbal formulation F4	18.9 ± 1.0	17.6 ± 0.9

Although benzoyl peroxide showed slightly higher antibacterial activity, the developed herbal formulation exhibited better skin tolerability and reduced irritation potential, making it more suitable for long-term topical use.

Skin irritation studies confirmed that all formulations were safe and non-irritant. No erythema, edema, inflammation, or itching was observed throughout the study period. The irritation score for the optimized formulation was found to be zero, indicating excellent dermal compatibility.

Table 10: Skin Irritation Study

Formulation	24 h	48 h	72 h	Remarks
F1	0	0	0	No irritation
F2	0	0	0	Safe
F3	0	0	0	Non-irritant
F4	0	0	0	Excellent tolerability
F5	0	0	0	Safe

Stability studies conducted under room temperature and accelerated conditions demonstrated that the optimized formulation remained physically stable throughout the study period. No significant changes were observed in appearance, pH, viscosity, or homogeneity. Minor decreases in viscosity under

accelerated conditions remained within acceptable limits and did not affect formulation performance. Overall, the present study successfully demonstrated the development of a stable, safe, and effective polyherbal gel/emulgel for acne management. The synergistic combination of neem extract, Aloe vera extract, and tea tree oil provided significant antibacterial, anti-inflammatory, antioxidant, and soothing effects. Among all prepared formulations, F4 was selected as the optimized batch because of its balanced physicochemical properties, significant antibacterial activity, excellent spreadability, good stability, and absence of skin irritation. The results of the present investigation support the potential use of the developed polyherbal gel/emulgel as a promising herbal alternative for topical anti-acne therapy.

CONCLUSION

The present study successfully formulated and evaluated a polyherbal gel/emulgel containing neem, Aloe vera, and tea tree oil for the management of acne vulgaris. Phytochemical analysis confirmed the presence of bioactive constituents responsible for antibacterial, anti-inflammatory, and antioxidant activities. Among the developed formulations, optimized batches demonstrated acceptable physicochemical properties, including suitable pH, good homogeneity, optimal viscosity, and desirable spreadability for topical application. The polyherbal formulation exhibited significant in-vitro antibacterial activity against acne-associated microorganisms, with results comparable to the standard anti-acne drug benzoyl peroxide. Importantly, the formulation showed good skin compatibility, as no signs of erythema, edema, or irritation were observed during the skin irritation study, indicating its safety for topical use. Overall, the findings suggest that the developed polyherbal formulation is both effective and safe, offering a promising natural alternative to conventional anti-acne therapies. The synergistic action of multiple herbal constituents, combined with improved tolerability, supports its potential use in the management of acne vulgaris with reduced risk of adverse effects.

REFERENCES

1. Rasheed A, Avinash Kumar Reddy G, Mohanalakshmi S, Ashok Kumar. Formulation



- and comparative evaluation of poly herbal anti-acne face wash gels. *Pharm Biol.* 2011 Aug;49(8):771-4.
2. Ms. Shreya B. Pathare et al., *International Journal of Pharmaceutical Research and Applications* Volume 7, Issue 3 May-June 2022, pp: 640-647
 3. Nitin Yadav, Shashikant Maury, Piyush Yadav, Manoj Kumar Yadav, Manish k. Maurya. A Review On:-Formulation And Development Of Face Wash June 2021, Volume 8, Issue 6.
 4. Arbaz S. Shikalgar et al., *Formulation and Evaluation of Semi-synthetic Antiacne Face wash* Volume 10, Is-sue 1 January 2022.
 5. Cleanser [Internet]. Wikipedia. 2025 [cited 2025 Aug 16]. Available from: Wikipedia, The Free Encyclopedia..
 6. Dhanashri sanjaykoli et al., *formulation and evaluta-tion of herbal anti acne face wash*,2001-2006, vol-ume 5, 2016, *World Journal of pharmacy and phar-maceutical sciences*.
 7. Harshran pal singh et al., *Antiacne synergistic herbal face wash gel formulation, evaluation and stability studies* 1261-1273, volume 4, 015, *World journal of pharmaceutical research*.
 8. Amit Ingle et al., *Formulation and evaluation of Ay-urvedic face wash*, 26-30, Volume 8(3), 2018, *inter-national journal of phyto pharmacy*.
 9. ChandrasekarR. et al., *Formulation and evaluation of a polyherbal anti acne gel*, 5-11, volume 11, 2020,
 10. Rasheed A, Reddy GAK, Mohanalakshmi S, Kumar CKA. *Formulation and comparative evaluation of polyherbal antiacne face wash gels.* *Pharm Biol.* 2011;49(8):771-4.
 11. Yellanki SY, Singh J, Manvi FV. *Formulation, characterization and evaluation of metronidazole gel for local treatment of periodontitis.* *Int J Pharm Biosci.* 2010;1(2):1-4.
 12. Dureja H, Kaushik D, Gupta M, Kumar V, Lather V. *Cosmeceuticals: An emerging concept.* *Indian J Pharmacol.* 2005;37(3):155-9.
 13. Leyden JA. *Review of the use of combination therapies for the treatment of acne vulgaris.* *J Am Acad Dermatol.* 2003;49(3 Suppl):S200-10.
 14. Miyague L, Macedo RE, Meca G, Holley RA, Luciano FB. *Combination of phenolic acids and essential oils against Listeria monocytogenes.* *LWT Food Sci Technol.* 2015;64:333-6.
 15. Djeridane A, Yousfi M, Nadjemi B, Boutassouna D, Stocker P. *Vidal antioxidant activity of some Algerian medicinal plant extracts containing phenolic compounds.* *Food Chem.* 2006;97(4):654-60.
 16. Kumari S, Harjai K, Chhibber S. *Topical treatment of Klebsiella pneumoniae B5055 induced burn wound infection in mice using natural products.* *J Infect Dev Ctries.* 2010;4(6):367-77.
 17. Sawarkar HA, Khadabadi SS, Mankar DM, Farooqui IA, Jagtap NS. *Development and biological evaluation of herbal anti-acne gel.* *Int J PharmTech Res.* 2010;2(3):2028-31.
 18. Yamini K, Onesimus T. *Preparation and evaluation of herbal anti-acne gel.* *Int J Pharm Bio Sci.* 2013;4(2):956-60.
 19. Rathore V, Sharma M. *Formulation development and evaluation of novel poly-herbal anti-acne gel.* *Int J PharmTech Res.* 2014;6(1):58-62.
 20. Santhosh MA, Sravani A, Reshma V. *Formulation and evaluation of herbal acne gel.* *World J Pharm Res.* 2015;4(5):2324-30.
 21. Amol G. Jadhao*1, Pranjali G. Patil1, Priya M. Dandekar1, Mayuri G. Zore1, Manasvi S. Patil2, Pooja V. Vidhate3 (2024), *Validation and Evaluation of Synthetic Drug*, *Journal of Technology*, 619.
 22. Amol G. Jadhao, Prachi S. Mankar, Pooja B. Kharat, Vaishnavi N. Thakare, Vaishnavi Navtahle, Punam S. Narwade, Dr. Jayshri B. Sanap, Komal N. Mohite, Manisha R. Jawale, Prashant A. Patil, *Formulation and Various Pharmacological Properties of Hibiscus Rosa Sinesis*, *International Journal of Trend in Scientific Research and Development*.
 23. Amol G. Jadhao, Chaitanya D. Ghode, Nikhil S. Gulhane, Pallavi S. Morande, Prashant A. Patil, Mayuri M. Kale (2020) *"Uses & Soxhlet Extraction of Apigenin from Parsley (Petroselinum Crispum)"* Published in *International Journal of Trend in Scientific Research and Development*.
 24. Amol G Jadhao, Kiran Wadatkar, Sakshi Waghmare, Prashant A Patil (2021), *Various Formulation and Pharmacological Properties of Chinese Chaste Tree*, *International Journal of Trend in Scientific Research and Development*.

25. Amol G. Jadhao^{1*}, Ganesh J. Pimple^{1*}, Priyanka G. Tale¹, Sandhya S. Sonsale¹, Prachi B. Raut¹, Prashant A. Patil³, Vaishali B. Magar⁴ (2022), Formulation, Evaluation and Various Pharmacological Properties and Uses of Thyme, International Journal of Trend in Scientific Research and Development.
26. Mr. Amol G. Jadhao, 2. Mr. Prathmesh R. Dingu, 3. Dr. Jayshri B. Sanap, "A Cost-Benefit Analysis of Real-Time Inventory Tracking Systems for Pharmaceuticals: Balancing Efficiency and Implementation Costs", International Journal for Research Trends and Innovation.
27. Mr. Amol G. Jadhao¹, Megha S. Waghmare², Mayuri G. Zore³, Gayatri R. Ingle⁴, Bharti G. Kokate⁵, Mr. Sudhir V. Jaunjal⁶, Taufik R. Sheikh⁷, Mr. Miss Jayshri B. Sanap⁸ The Formulation, Evaluation and Pharmacological Properties of Rosemary Plant, International Journal of Trend in Scientific Research and Development.

HOW TO CITE: Shaikh Atique Shaikh Bismillah, Amol Jadhao, Mayuri Zore, Development And Evaluation Of A Polyherbal Emulgel For Anti-Acne Activity, J. Pharm. Sci., 2026, 2 (6), 62-70. <https://doi.org/10.5281/zenodo.20548189>