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Review On Herbal Remedies Of Acne Natural Solution For Clearer Skin

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ABSTRACT:

Acne vulgaris remains one of the most common dermatological disorders worldwide, affecting adolescents and adults and significantly impacting quality of life. Although conventional therapies such as retinoids, antibiotics, and hormonal agents are widely used, their limitations—including antimicrobial resistance, skin irritation, high cost, and systemic side effects—have driven increasing interest toward herbal alternatives. Herbal medicines contain diverse phytochemicals such as flavonoids, terpenoids, phenolics, and alkaloids that offer multi-target actions including antimicrobial, anti-inflammatory, antioxidant, and sebum-regulating effects. This review presents a comprehensive exploration of the etiology and pathophysiology of acne, the role of phytochemicals in its management, and the therapeutic benefits of medicinal plants such as aloe vera, neem, turmeric, green tea, tea tree oil, basil, chamomile, calendula, licorice, and rosemary. Emphasis is placed on the scientific evidence supporting their anti-acne potential, mechanisms of action, safety characteristics, and formulation approaches. The review concludes by highlighting current challenges, gaps in clinical validation, and emerging future prospects in integrating herbal therapeutics into mainstream acne management

KEY WORDS:

Herbal medicine; Acne vulgaris; Natural remedies; Anti-inflammatory agents; Antibacterial phytochemicals; Sebum regulation; Antioxidants; Aloe vera; Neem; Turmeric; Tea tree oil; Green tea; Basil; Witch hazel; Licorice; Rosemary; Chamomile; Calendula; Cutibacterium acnes; Phytochemicals; Dermatology; Plant-based skincare.

INTRODUCTION

Acne vulgaris is one of the most prevalent dermatological disorders affecting millions of adolescents and adults worldwide. It is a chronic inflammatory condition of the pilosebaceous unit characterized by comedones, papules, pustules, nodules, and cysts. Although acne is not life-threatening,[1] it exerts a

substantial psychological burden, often leading to anxiety, low self-esteem, social withdrawal, and even depression. The epidemiological data suggest that nearly 85% of individuals between 12–25 years' experience some form of acne, highlighting it as a significant global health concern.[2]

The pathogenesis of acne is multifactorial, involving excessive sebum production, abnormal follicular keratinization, proliferation of Cutibacterium acnes, hormonal imbalance, and an exaggerated inflammatory response. Conventional treatment strategies include topical retinoids, antibiotics, hormonal therapy, and isotretinoin. While these therapies are effective, they are often associated with adverse effects such as skin irritation, dryness, photosensitivity, microbial resistance, and teratogenicity. This has generated increasing interest in safer, more holistic alternatives that can effectively manage acne with fewer side effects.[3,4]

Herbal medicines have been used for centuries across various traditional systems such as Ayurveda, Unani, Traditional Chinese Medicine, and Western herbalism to treat skin disorders. Plants are rich sources of biologically active compounds including flavonoids, alkaloids, tannins, terpenoids, and phenolic acids, which possess antimicrobial, anti-inflammatory, antioxidant, and woundhealing properties—mechanisms that are highly relevant to acne management. Modern research has validated the therapeutic potential of several herbs such as neem, aloe vera, tea tree oil, turmeric, green tea, basil, and calendula in reducing acne severity and improving skin health.[5,6]

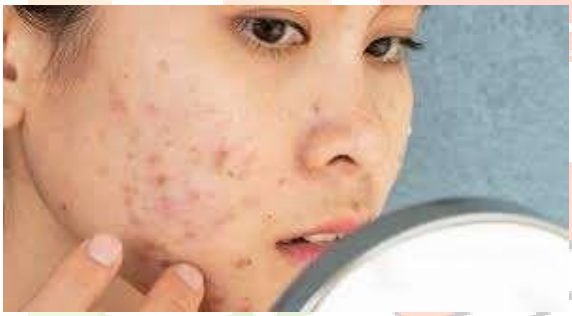

Figure 1: Acne Vulgaris

In recent years, the global cosmetic and pharmaceutical industries have increasingly incorporated plant-derived ingredients into anti-acne formulations. The growing preference for natural skincare, combined with a shift towards integrative dermatology, has sparked extensive scientific interest in herbal remedies as an effective and safer alternative to synthetic drugs.[7,8] Despite this, comprehensive clinical evidence and standardized formulations remain limited, necessitating a detailed review of traditional knowledge and modern research.

This review aims to provide an extensive scientific overview of herbal remedies used for acne treatment, focusing on their phytochemical composition, mechanisms of action, pharmacological evidence, formulations, safety profiles, and future perspectives. By compiling and analyzing existing data, this work seeks to contribute to the advancement of natural, evidence-based therapeutic strategies for clearer and healthier skin.

Acne vulgaris is a chronic and multifactorial dermatological disorder affecting the pilosebaceous unit,[9,10] primarily during adolescence but increasingly observed in adults. It manifests through diverse lesions such as comedones, papules, pustules, nodules, and cysts. The condition results from a complex interplay of biological, genetic, hormonal, microbial, and environmental factors. Understanding its classification, underlying mechanisms, and risk determinants is essential for selecting appropriate treatment strategies, including herbal and natural therapies that target multiple pathways.

DEFINITION AND CLASSIFICATION

Acne vulgaris is defined as a disorder of the pilosebaceous unit characterized by abnormal keratinization, excessive sebum production, colonization of Cutibacterium acnes, and inflammation. It typically appears on the face, chest, shoulders, and back, where sebaceous glands are most abundant. The condition progresses through distinct lesion types that can be broadly classified into noninflammatory and inflammatory forms.[11]

Classification of Acne Lesions

Acne lesions are categorized based on the presence or absence of inflammation. This classification helps clinicians determine severity, prognosis, and required treatment intensity.

A. Non-inflammatory Acne

Non-inflammatory acne primarily presents as comedones, which develop due to the accumulation of sebum and keratin within the follicular canal. These lesions are usually not painful and represent the earliest stage of acne development.

1. Open Comedones (Blackheads)

Open comedones occur when the follicular opening remains dilated, allowing oxidized melanin and sebum to form a dark plug on the skin surface. Despite the dark appearance, blackheads are not caused by dirt but by oxidation of lipids.[12,13]

2. Closed Comedones (Whiteheads)

Closed comedones form when the follicular opening closes, trapping sebum and keratin beneath the skin. These appear as small, flesh-colored bumps and often progress to inflammatory lesions if colonized by bacteria.

B. Inflammatory Acne

Inflammatory acne results when comedones become infected or irritated, leading to redness, swelling, and pain. These lesions are more severe and often associated with scarring.

1. Papules

Small, red, tender bumps caused by localized inflammation without visible pus.
They indicate an immune response to follicular irritation.

2. Pustules

Similar to papules but filled with purulent material. Pustules are the hallmark of bacterial involvement, particularly C. acnes overgrowth.[14,15]

3. Nodules

Large, deep-seated painful lumps originating within the dermis. Nodules signify severe inflammation and often lead to pigmentation and scarring.

4. Cysts

Soft, fluctuant lesions filled with pus, representing the most severe form of acne. Cysts can coalesce and cause permanent tissue damage.[16,17]

C. Severity Grading Systems

Several grading systems are used to assess acne severity for diagnosis, monitoring, and research. These systems consider lesion type, number, and affected area.

Table 1: Common Severity Grading Methods [18-20]

System	Description	Classification Levels
Global Acne Grading System (GAGS)	Assigns scores to different facial regions based on lesion severity	Mild, Moderate, Severe, Very Severe
Leeds Technique	Uses photographic standards to match patient lesions	Grade 1–12 severity scale
Cook's Acne Grading	Numerical photographic scale	0–8 scale
FDA Investigator Global Assessment	Common in clinical trials	Clear, Almost Clear, Mild, Moderate, Severe

Severity grading helps in treatment selection—for example, mild acne may respond to topical herbal formulations, whereas severe acne may require stronger or multi-modal therapies.

RISK FACTORS FOR ACNE

Acne vulgaris is a multifactorial skin disorder influenced by a variety of internal and external factors. These risk determinants modify skin physiology, increase susceptibility to inflammation, and may trigger or aggravate acne outbreaks. Understanding these underlying risk factors is essential for designing preventive strategies and individualized therapeutic approaches. Among

the most significant contributors to acne development are genetic predisposition, dietary habits, lifestyle behaviors, cosmetic usage, and exposure to environmental pollutants. Each factor interacts with the skin's microbiome, immune response, and hormonal regulation, making acne a complex condition influenced by daily habits, biological characteristics, and environmental conditions.[28,29]

ROLE OF HERBAL MEDICINE IN DERMATOLOGY

Herbal medicine has long been integral to dermatological care across different cultures and medical systems. The skin, being the body's largest organ and the primary barrier against environmental assaults, is highly susceptible to infections, inflammation, pigmentation issues, and chronic disorders. Herbal remedies offer therapeutic value by combining traditional knowledge with scientifically validated bioactive compounds. These plant-derived agents exhibit potent anti-inflammatory, antimicrobial, antioxidant, and woundhealing actions, making them especially relevant in managing acne and other dermatological conditions. With growing interest in natural skincare, herbs have become increasingly incorporated into modern formulations such as creams, gels, oils, and cosmetic products, highlighting their enduring importance and therapeutic relevance.[36]

INDIVIDUAL HERBAL REMEDIES FOR ACNE Aloe vera (Aloe barbadensis Miller)

Aloe vera is one of the most widely used medicinal plants for dermatological disorders due to its soothing, anti-inflammatory, and wound-healing properties. Its gel contains over 75 bioactive compounds including aloesin, acemannan, polysaccharides, glycoproteins, vitamins C and E, which help reduce erythema and accelerate skin repair. Aloesin has been shown to inhibit

tyrosinase and reduce post-inflammatory hyperpigmentation commonly seen in acne. Aloe vera also exerts antimicrobial activity against Cutibacterium acnes and Staphylococcus aureus, while its hydrating nature supports barrier function. Regular use helps calm inflamed lesions, improve scar healing, and minimize irritation caused by conventional topical agents.[46]

Figure 4: Aloe vera (Aloe barbadensis Miller)

Neem (Azadirachta indica)

Neem is a potent herbal remedy traditionally used in Ayurveda for its strong antibacterial, anti-inflammatory, antifungal, and antioxidant actions. The plant contains azadirachtin, nimbolide, nimbin, quercetin, and various limonoids that directly inhibit C. acnes proliferation and reduce excess sebum secretion. Neem

reduces inflammatory cytokines such as TNF-α and IL-6, helping relieve swelling and redness in acne lesions. Its astringent properties tighten pores and aid in detoxification of the skin.

Neem-based formulations—whether leaf paste, oil, or extracts—are effective in managing pustules, blackheads, and inflammatory acne without causing dryness.[47]

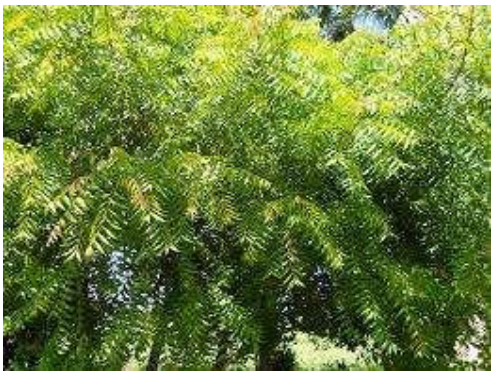

Figure 5: Neem (Azadirachta indica)

Turmeric (Curcuma longa)

Turmeric is rich in curcumin, a powerful anti-inflammatory and antioxidant compound known to modulate the pathways involved in acne formation. Curcumin suppresses nuclear factor-kappa B (NF-κB), prostaglandins, and inflammatory mediators responsible for papules and pustules. It also exhibits broad-spectrum antimicrobial activity against acne-causing bacteria and fungi. Turmeric reduces oxidative stress in the pilosebaceous unit, preventing comedone formation. Additionally, its skin-brightening effect helps fade acne scars and hyperpigmentation. Both topical turmeric pastes and curcumin-based creams are beneficial in reducing lesion severity and improving overall complexion.[48]

Figure 6: Turmeric (Curcuma longa)

Tea Tree Oil (Melaleuca alternifolia)

Tea tree oil is one of the most scientifically validated herbal treatments for acne due to its high content of terpinen-4-ol, which provides strong antibacterial and anti-inflammatory effects. It effectively inhibits C. acnes, reduces swelling, and helps dry out pustular lesions without the resistance issues seen with synthetic antibiotics. Tea tree oil also dissolves excess oil, unclogs pores, and reduces comedone formation. Clinical studies show tea tree oil (5%) performs comparably to benzoyl peroxide but causes fewer side effects such as peeling and erythema. It is especially helpful for oily and acne-prone skin.[49]

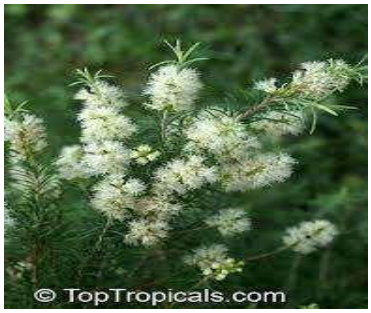

Figure 7: Tea Tree Oil (Melaleuca alternifolia)

Green Tea (Camellia sinensis)

Green tea contains polyphenols—particularly epigallocatechin gallate (EGCG)—which provide anti-inflammatory, antimicrobial, and sebumreducing benefits. EGCG inhibits the lipogenesis pathway in sebocytes, thereby lowering sebum production and minimizing shine. Its antioxidant activity neutralizes free radicals and reduces oxidative stress associated with acne inflammation. Green tea extracts also inhibit C. acnes biofilm formation, enhancing skin clarity. Topical preparations such as green tea gels, lotions, and compresses visibly reduce lesion count and erythema while refreshing the skin.[50]

Figure 8: Green Tea (Camellia sinensis)

Basil (Ocimum sanctum / Ocimum basilicum)

Basil, especially Holy basil (O. sanctum), is valued for its purifying, antibacterial, and adaptogenic properties. It contains eugenol, linalool, ursolic acid, and flavonoids that combat C. acnes and reduce inflammation in the follicular unit. Basil extracts regulate sebum secretion, making them beneficial for greasy and acne-prone skin. Their antioxidant activity protects skin from pollution-induced acne. Tulsi (Holy basil) also possesses stress-reducing adaptogenic effects, indirectly supporting acne management where stress is a trigger. Basil-based face packs or hydrosols help clear blemishes and soothe irritation.[51]

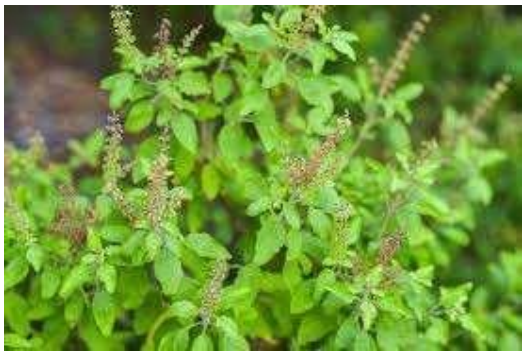

Figure 9: Basil (Ocimum sanctum / Ocimum basilicum)

Witch Hazel (Hamamelis virginiana)

Witch hazel is a natural astringent rich in tannins, which tighten pores, reduce oiliness, and calm irritated skin. Its anti-inflammatory compounds, including hamamelitannin and proanthocyanidins, decrease redness and swelling associated with inflammatory acne. Witch hazel also reduces surface bacteria and removes impurities without stripping the skin's natural moisture. Its barrierstrengthening effect makes it ideal for sensitive, acne-prone individuals. Regular use of witch hazel toners helps prevent blackheads, minimize pore appearance, and settle inflamed nodules.[52]

FUTURE PROSPECTIVE:

The future of herbal-based acne management is promising, with innovations in biotechnology, nanotechnology, and phytopharmacology paving the way for more effective and standardized formulations. Nanocarriers such as nanoemulsions, liposomes, and phytosomes can greatly enhance the penetration and stability of herbal compounds like curcumin, tea tree oil, and green tea catechins, improving therapeutic outcomes. Advanced extraction techniques— including supercritical CO_2 extraction and green solvent extraction—will improve yield, purity, and safety of phytochemicals.

Another significant prospect lies in genomics and personalized herbal therapy, where treatment can be customized based on an individual's genetic predisposition, hormonal profile, and skin microbiome composition. Integration of herbal medicine with artificial intelligence (AI)-driven dermatology applications will also guide personalized skincare routines and prediction of herbal efficacy.

CONCLUSION:

Herbal medicine provides a promising, multi-dimensional, and safer approach for managing acne vulgaris compared to conventional therapies. The phytochemical diversity of medicinal plants enables them to target multiple aspects of acne pathogenesis, including inflammation, bacterial proliferation, oxidative stress, and excessive sebum production. Many herbs demonstrate strong efficacy with minimal side effects, making them suitable for long-term use and for individuals with sensitivity to synthetic drugs. However, the lack of standardized extracts, limited clinical trials, and variability in plant composition remain significant barriers to their universal adoption.

In comparison to synthetic treatments, herbal remedies offer a holistic approach by addressing both symptoms and underlying skin imbalance. Their antioxidant and skin-regenerative properties further improve healing and reduce chances of scarring and hyperpigmentation. While the available scientific evidence supports the efficacy of various herbs, future research must focus on validating their clinical performance, optimizing extraction methods, ensuring quality control, and developing innovative delivery systems. Thus, herbal therapeutics have enormous potential to be integrated into modern dermatological practice as an effective and natural solution for clearer skin.

SUMMARY:

Acne vulgaris is a multifactorial skin disorder influenced by hormonal imbalance, excessive sebum production, abnormal keratinization, bacterial colonization, and inflammatory responses. Although multiple modern treatments are available, their side effects, high cost, and reduced efficacy over time have encouraged growing interest in herbal-based alternatives. Herbal remedies offer a rich source of bioactive compounds such as flavonoids, phenolics, essential oils, tannins, and alkaloids that exhibit multiple pharmacological activities beneficial for acne management. Plants such as aloe vera, neem, turmeric, tea tree oil, green tea, basil, chamomile, calendula, garlic, licorice, and rosemary demonstrate strong antimicrobial effects against Cutibacterium acnes, reduce sebum production, soothe inflammation, accelerate wound healing, and protect the skin from oxidative damage.

This review integrates classical herbal knowledge with contemporary scientific evidence, offering a comprehensive understanding of their mechanisms, therapeutic relevance, and formulation possibilities. Additionally, literature from recent years confirms the increasing global interest in using botanicals for skincare, especially in reducing acne severity and improving overall skin health. Despite promising outcomes, challenges such as inadequate standardization, batch-to-batch variations, and limited clinical data remain. Overall, herbal remedies represent a promising and sustainable direction for future acne treatments.

REFERENCES:

1. Vargas AJ, Thompson PA. Diet and acne: A review of the evidence. Int J Dermatol. 2024;63(2):145–53.
2. Kim D, Lee H, Park JH, et al. Anti-acne potential of botanical extracts: A systematic review. Phytother Res. 2024;38(1):12–26.
3. Lim SH, Tan WS, Tan YQ, et al. Tea tree oil in dermatology: A comprehensive appraisal. J Herb Med. 2023;38:100622.
4. Patel R, Desai S, Kumar V. Natural antioxidants in acne management: Mechanisms and clinical outcomes. J Cosmet Dermatol. 2023;22(9):2501–12.
5. Das A, Jena S, Nayak S. Aloe vera gel: A multifunctional botanical for skin inflammation and acne. Pharmacogn Rev. 2023;17(34):89–97.
6. Liu M, Wang X, Zhou Y, et al. Phytochemicals targeting Cutibacterium acnes: A pharmacological review. Fitoterapia. 2022;160:105249.
7. Singh A, Singh S. Neem-based formulations for acne vulgaris: Evidence and recent advances. J Ayurveda Integr Med. 2022;13(4):100582.
8. Hassan N, Ismail R, Triantafillou V. Anti-inflammatory botanicals in acne therapy. Dermatol Ther. 2022;35(2):e15209.
9. Gupta V, Sharma R. Herbal extracts for sebum regulation: Biological insights. Int J Cosmet Sci. 2022;44(1):34–42.

10. Oyetakin-White P, Suggs AK. Tea-polyphenols and skin inflammation: A review. Skin Pharmacol Physiol. 2021;34(5):251–60.

11. Kaur P, Kaur R. Curcumin: A powerful topical agent for acne management. J Ethnopharmacol. 2021;273:113957.

12. Macedo P, Figueiredo J. Therapeutic value of witch hazel in dermatological disorders. Planta Med. 2021;87(10):790–9.

13. Al-Rimawi F, Morsyn M. Calendula officinalis: Anti-inflammatory and woundhealing effects. J Pharm Sci Res. 2021;13(7):420–7.

14. Rios JL. Essential oils as antibacterial agents against acne pathogens. Molecules. 2021;26(19):5982.

15. Rocha MA, Marto J, Gonçalves LM. Herbal therapeutics for acne vulgaris. Phytochem Rev. 2021;20:1269–95.

16. Tang KT, Lien MH. Anti-acne activity of flavonoids: Mechanistic insights. Arch Dermatol Res. 2020;312(7):493–502.

17. Ali A, Khan I. Triterpenoids and alkaloids for skin inflammation. Nat Prod Commun. 2020;15(9):1–9.

18. Gunes T, Aksu Y. Basil species in dermatology: A pharmacological review. Ind Crops Prod. 2020;154:112668.

19. Lim V, Lee ML, Chua LS. Green tea catechins for oily skin and acne. J Dermatol Treat. 2020;31(4):422–30.

20. Shakespeare A. Herbal medicine in dermatology practice. J Altern Complement Med. 2020;26(5):405–14.

21. Zaman R, Parvin N. Licorice: A potent botanical for acne and pigmentation. Pharmacogn J. 2019;11(6):1234–42.

22. Park JS, Choi Y, Kim H. Rosemary extract as an antimicrobial for acne-causing bacteria. J Microbiol Biotechnol. 2019;29(10):1682–9.

23. Adewusi EA, Afolayan AJ. Anti-inflammatory activity of Aloe vera constituents. J Med Plants Res. 2019;13(8):178–86.

24. Daley A. Garlic-derived organosulfur compounds: Effects on skin infections. Phytother Res. 2019;33(6):1481–9.

25. Namazi N, Salehi M. Herbal treatments in dermatology: A review. Iran J Dermatol. 2019;22(3):83–92.

26. Goel N, Kaur M. Natural terpenes with antibacterial action: An acne perspective. J Appl Microbiol. 2018;125(5):1323–33.

27. Gupta R, Pandey R. Neem: An antibacterial and antioxidant herb. Asian J Pharm Clin Res. 2018;11(9):215–20.

28. Ahmed SA, El-Mokasabi FM. Medicinal plants for sebum regulation. J Pharmacogn Phytochem. 2018;7(6):1995–2003.

29. Darwish RM, Aburjai T. Witch hazel extract for acne: A pharmacological insight. Nat Prod Res. 2018;32(14):1691–5.

30. Amensour M, Sendra E. Chamomile phytochemicals in inflammation reduction. Ind Crops Prod. 2018;112:181–9.

31. Hung J, Kang SC. Phenolic-rich botanicals against Cutibacterium acnes. BMC Complement Altern Med. 2017;17(1):328.

32. Das K, Tiwari RK. Turmeric and skin diseases: A review. Pharmacogn Rev. 2017;11(22):150–6.

33. Wölfle U, Seelinger G, Schempp CM. Herbal extracts in dermatology. Planta Med. 2017;83(12–13):946–58.

34. Marquezan MC, Strieder E. Basil oil and its dermatologic applications. J Essent Oil Res. 2017;29(5):345–52.

35. Heo J, Kim J. Licorice constituents in anti-inflammatory therapy. Bioorg Med Chem. 2017;25(17):4856–62.

36. Flores A, Salazar D. Calendula for skin irritation and microbial infections. Rev Bras Farmacogn. 2016;26(2):234–40.

37. Van der Valk PG, Wuite M. Tea tree oil and acne: Clinical observations. Australas J Dermatol. 2016;57(3):210–6.

38. Sultana S, Rahman K. Herbal products in acne therapy. J Herb Pharmacother. 2016;6(2):45–57.

39. Anilkumar M. Aloe vera in dermatological care. J Dermatolog Treat. 2015;26(3):232–8.

40. Ahmad A, Jahan N. Garlic extract in skin infection management. J Ethnopharmacol. 2015;162:96–102.

41. Barnes J, Anderson LA. Herbal Medicines: Acne treatment perspectives. 2nd ed. London: Pharmaceutical Press; 2014.

42. Di Mario F, Donati M. Phytotherapy for inflammatory conditions. Phytother Res. 2014;28(7):933–9.

43. Kiefer D, Pantuso T. Natural antibacterial agents for skin disorders. Am Fam Physician. 2013;87(11):1–8.

44. Magin P, Pond D. Complementary therapies for acne vulgaris. Aust Fam Physician. 2012;41(5):367–70.

45. Rabbani GH, Sharif H. Traditional botanicals used in skin diseases. J Tradit Med. 2010;25(3):147–54.

46. Hajheydari Z, Saeedi M, Morteza-Semnani K, Soltani A. Effect of Aloe vera topical gel combined with tretinoin in treatment of acne. J Dermatolog Treat. 2014;25(2):123–129.

47. Kola-Mustapha AT, Ayinde BA. Anti-acne activity of Azadirachta indica oil: a network pharmacology approach. Molecules. 2023;28(3):1152.

48. Vaughn AR, Clark AK, Sivamani RK, Shi VY. Natural ingredients in acne and rosacea treatment. J Drugs Dermatol. 2017;16(9):796–800.

49. Enshaieh S, Jooya A, Siadat AH, Iraji F. Efficacy of 5% tea tree oil gel in acne: a randomized trial. Indian J Dermatol Venereol Leprol. 2007;73(1):22–25.

50. Lu PH, Hsu CH. Green tea extract supplementation improves acne in women. Clin Nutr. 2016;35(6):1240–1247.

51. Sharma P, Kumar A, Singh D. Anti-acne activity of Ocimum sanctum essential oil. Int J Pharma Bio Sci. 2014;5(1):B326–B331.

52. Schempp CM, Winghofer B, Langheinrich U, Simon JC. Witch hazel extract reduces erythema. Eur J Clin Pharmacol. 2002;58(5):319–324.