IJBPAS, August, 2026, 15(8): 3912-3922

ISSN: 2277–4998

International Journal of Biology, Pharmacy and Allied Sciences (IJBPAS)

'A Bridge Between Laboratory and Reader'

www.ijbpas.com

ROLE OF DERMOSCOPY AND NATURAL OIL BLENDS IN MODERN DERMATOLOGICAL DIAGNOSIS AND THERAPY

JEBARSAN G, SAKTHI PRIYADARSINI S* AND KAMARAJ R

Department of Pharmacognosy, SRM College of Pharmacy, Faculty of Medicine and Health Science and Technology, SRM Institute of Science and Technology, Kattankulathur-602 203, Chengalpattu District, Tamil Nadu, India

***Corresponding Author: Dr. Sakthi Priyadarsini S: E Mail: sakthips1@srmist.edu.in**

Received 25th July 2025; Revised 20th Sept. 2025; Accepted 22nd Jan. 2026; Available online 1st Aug. 2026

https://doi.org/10.31032/IJBPAS/2026/15.8.10405

ABSTRACT

Dermoscopy has emerged as a valuable non-invasive diagnostic tool in dermatology, enabling early detection and accurate assessment of skin, hair, and nail disorders. In parallel, natural oil blends are gaining prominence as complementary therapeutic agents due to their rich phytochemical composition, including fatty acids, vitamins, sterols, and phenolic compounds with anti-inflammatory, antimicrobial, antioxidant, and wound-healing properties. The synergistic blending of oils enhances dermal absorption, hydration, oxidative balance, and formulation stability, while also supporting angiogenesis, fibroblast proliferation, and re-epithelialization, thereby accelerating tissue repair and regeneration. Evidence suggests that combining dermoscopy with phytoconstituent-based therapeutic strategies may improve patient compliance and minimize side effects associated with conventional topical treatments such as corticosteroids. Furthermore, advanced delivery systems—including liposomes, lipid nanoparticles, nanosponges, and microencapsulation—enhance the bioavailability and efficacy of oil-based formulations. Despite promising clinical and preclinical findings, further large-scale studies are required to establish standardized protocols and optimize the integration of dermoscopy and natural oil blends into mainstream dermatological practice.

Keywords: Dermoscopy, Natural Oil Blends, Modern Dermatological Diagnosis and Therapy

INTRODUCTION:

The various studies that have been published over the past years have shown that the dermoscopy can be of great help in aiding the noninvasive diagnosis of various widespread dermatological issues **[1]**.

There is a wide range of skin, hair, and nail diseases (dermatological), which include both common conditions such as acne, eczematous, and fungi as well as long-lasting, debilitating illnesses such as psoriasis and vitiligo. Such disorders not only have physical manifestations, including itching, pain and cosmetic changes, but also serious psychosocial effects, including impact on mental health and quality of life **[2–4]**.

Compounds of natural oils have received much interest in the dermatology field due to their good safety profiles and versatile therapeutic properties. The compositions collaborate to make the skin healthy by integrating a number of plant-based oils, which are all abundant with bioactive compounds such as terpenes, phenylpropanoids, fatty acids, and antioxidants. Essential and natural oils include lavender, tea tree, chamomile, peppermint, coconut, argan, and jojoba which have anti-inflammatory, antibacterial, antioxidant, skin barrier-repair, and wound-healing effect **[5]**. Clinical and laboratory evidence is increasingly accumulated in favor of their use in the treatment of skin disorders, i.e. psoriasis, acnes, eczemas, photoaging, and/or skin drying. Also, using a combination of natural oils, tailor-made dermatological products, which solve specific skin problems by enhancing their hydration, reducing inflammation, and microbial balance, can be designed. In spite of encouraging results, more comprehensive clinical trials are required to demonstrate efficacy and develop safe and standardized criteria of these blended natural oil preparations in dermatology **[5, 6]**.

Although both traditional and synthetic topical therapy is widely used, dermatology has several disadvantages of traditional and synthetic topical therapy which influence their effectiveness and compliance with the patient. These medicines have many local adverse effects such as skin irritation, burning, dryness, and allergic reactions that can reduce treatment adherence. The use of certain synthetic medicines like topical corticosteroids over an extended duration weakens the skin barrier functioning and leads to skin atrophy, pigment alteration, steroid addiction, and susceptibility to infections **[7, 8]**.

Chemistry and phytoconstituents of natural oils:

Phytoconstituents Natural oils contain a variety of phytoconstituents that are useful

in therapy and cosmetics in the dermatology of the skin. The main chemical components include:

Fatty acids: Fatty acids constitute the key lipid constituents of natural oils, and are palmitic acid (saturation fatty acid), oleic acid (monounsaturated fatty acid), and linoleic acid (an omega-6 polyunsaturated fatty acid). These fatty acids are moisturising, anti-inflammatory and promote the integrity of the skin barrier **[9]**.

Vitamins: Vitamin A and vitamin E (tocopherols) are antioxidant vitamins that are commonly found in oils and are fat soluble.

Sterols: Phytosterols found in oils provide hydrating, anti-inflammatory, and skin barrier-supporting properties.

Phenolic compounds: It is an anti-inflammatory, anti-microbial and antioxidant. Essential oils contain monoterpenes and sesquiterpenes which are linalool, a-pinene, and b-caryophyllene that are medicinal **[10]**.

The importance of the development of blended natural oils is due to synergetic potentiation of the inherent bioactivities of the same. The combination of oils that are enriched with complementary phytoconstituents can enhance the effects of anti-inflammatory, antioxidant, antimicrobial, and emollient, which exceed those of distinct oils. These systems of mixture allow multifactorial adjustment of the complex dermatological conditions through the regulation of several biochemical pathways, as well as the enhancement of formulation stability, dermal absorption, and sensorial properties of topical usage.

Rational for oil blending in dermatology:

The composition highlights the evolving concept of combining scientific dermoscopic assessment with natural, biocompatible formulations, promoting a holistic and evidence-based perspective in modern dermato-cosmetic research.

Oil blending is also used in dermatological formulations to increase dermal absorption, increase stratum corneum moisture content, stabilize bioactive ingredients, maintain oxidative balance, and increase formulation stability. These rationales are expounded upon in the following sections and supported by the current literature on recent research and systematic reviews.

Improved Skin Penetration and Hydration:

The diffusion of the essential and carrier oils is increased due to their lipophilicity nature, which facilitates diffusion into the stratum corneum lipid matrix. The simmondsia chinensis (jojoba) and argania spinosa (argan), and vitis vinifera (grapeseed) oils are penetration-enhancing oils which work synergistically with various emollient carriers to achieve rapid and sustained hydration, as well as to

restore the skin barrier and enhance dermal elasticity **[11, 12]**.

Stability and Antioxidant Balance:

Blended oil mixtures tend to be more chemically stable than single oil since a blend offers a more expanded antioxidant profile. The antioxidants of b-carotene, sesamol and caffeic acid show synergistic behavior in mixtures, in overcoming lipid peroxidation at various oxidative stages and hence rancidity and molecular degradation is slowed down. These antioxidative constituents in blended preparations provide defense against oxidative stress against polyunsaturated lipids and labile phytoconstituents**[13, 14]**.

Anti-aging potential for natural oil blends:

Natural oils contain antioxidants such as polyphenols, tocopherols, and carotenoids that help protect the skin by neutralizing reactive oxygen species (ROS), which play a major role in skin aging **[15]**.

Natural oil blends exhibit significant potential in anti-aging skincare because of their rich antioxidant and anti-inflammatory constituents. These oils help protect the skin from oxidative stress, reduce inflammation, and support the restoration of the skin's natural barrier. By preventing collagen degradation and improving elasticity, they contribute to maintaining a youthful, healthy complexion **[16]**.

A 2024 review emphasizes the powerful antioxidant components of olive oil, including oleuropein and hydroxytyrosol, which exhibit superior anti-aging effects compared to vitamin E. These compounds enhance the skin's photostability and shield it from oxidative damage caused by UV exposure **[17]**.

Wound healing activity of blended oils:

Oil mixtures, in particular the essential oil mixtures, which include the vegetable oils have significant therapeutic potential in wound repair. Preclinical and clinical studies have shown evidence of their efficacy being mediated by increased re-epithelialization, angiogenesis stimulation, and fibroblast proliferation and migration, which are all involved in increased tissue regeneration and wound healing.

Enhanced Re-Epithelialization:

Oil blends that are enriched with poly unsaturated fatty acids, including linoleic and oleic acids, and bio active antioxidants are associated with preserving cutaneous hydration, inhibiting inflammatory responses, and tissue remodeling. It is important to note that Opuntia ficus-indica seed oil and self-nanoemulsifying drug delivery system SNEDDS showed a great ability to accelerate wound healing and re-epithelialization, most likely by increasing tissue bioavailability, antioxidative potential as well as anti-inflammatory effects. In the same manner, it has been

defined that lavender essential oil can trigger the expression of growth factors, such as transforming growth factor-b (TGF-b) and this contributes to fibroblast growth and development, biosynthesis of collagen, and re-epithelialization in test animals **[18, 19]**.

Promotion of Angiogenesis:

Bioactive constituents of blended formulations, such as β-sitosterol from *Opuntia ficus-indica* oil and other phytosterols, along with essential oils including lavender, tea tree, and eucalyptus, have been reported to stimulate neovascularization through the upregulation of vascular endothelial growth factor (VEGF). The consequent enhancement in angiogenesis augments oxygen and nutrient delivery to the wound site, thereby supporting cellular metabolism and accelerating tissue regeneration **[20]**.

Increased Fibroblast Content and Activity:

Blended oils have been shown to directly promote fibroblast proliferation and migratory activity, processes fundamental to wound contraction, granulation tissue development, and collagen matrix deposition. Experimental studies with essential oil blends and individual oils such as *Bursera morelensis*, lavender, and clary sage demonstrate their capacity to stimulate fibroblast recruitment to wound sites and enhance biosynthetic function, primarily through modulation of growth factor signaling pathways including transforming growth factor-β (TGF-β) and fibroblast growth factor-2 (FGF-2) **[21, 22]**.

Mechanistic Summary Table:

Mechanism	Oil Blend Example	Reported Effect	Reference
Re-epithelialization	Opuntia ficus-indica blend	Faster closure, more organized tissue	[18, 19]
Angiogenesis	Opuntia, Pumpkin, etc.	Increased VEGF, new blood vessel formation	[20]
Fibroblast activation	Bursera, Lavender blend	Enhanced migration and collagen biosynthesis	[21,22]
Anti-inflammatory	Various EOs	Reduced injury-induced inflammation	[18]

Delivery system for dermatological application:

Dermatological drug delivery systems utilize advanced topical and encapsulation approaches to enhance the therapeutic efficacy, physicochemical stability, and transdermal penetration of bioactive compounds. Innovative strategies, including nano- and micro-encapsulation technologies, lipid-based carrier systems, and the application of physical or biochemical permeation enhancers, are increasingly employed to optimize cutaneous drug delivery and improve the management of dermatological disorders.

Delivery System/Technique	Function	Reference
Liposomes	Vesicles composed of lipid bilayers, entrap both hydrophilic and hydrophobic drugs, offering targeted and controlled delivery to the skin.	[23]
Solid Lipid Nanoparticles	Solid lipid-based nanoparticles enhance drug stability while enabling sustained and controlled release, with improved dermal targeting	[24]
Polymeric Nanoparticles	Drug-encapsulated nanoparticles fabricated from biodegradable polymers enhance physicochemical stability and facilitate sustained release	[25]
Nanosponges	Porous nanocarriers with high drug-loading capacity and controlled release properties, offering therapeutic potential for chronic dermatological disorders	[26]
Microencapsulation	Bioactive compounds encapsulated within microscale carriers exhibit enhanced stability and enable sustained topical delivery.	[27]
Chemical Enhancers	Chemical penetration enhancers such as alcohols, fatty acids, and propylene glycol modulate stratum corneum lipids to increase transdermal permeability	[28]
Physical Techniques	Physical enhancement techniques such as microneedles, iontophoresis, and laser ablation transiently disrupt the skin barrier to facilitate improved transdermal penetration.	[29]

Safety, Toxicology for blended oils:

Blended herbal oils, particularly those enriched with essential oils, are generally recognized for their low toxicity potential when compared to synthetic counterparts, although careful formulation and use remain important. Most plant-derived oils exhibit relatively high median lethal doses (LD_{50}), suggesting low acute toxicity, and are efficiently metabolized and eliminated from the body, minimizing risks of bioaccumulation and chronic toxicity. Nevertheless, the overall safety of these formulations depends on the individual oils selected, their concentrations, and the compatibility of the blend **[30]**.

Certain essential oils in blended formulations may induce skin irritation, allergic responses, or sensitization, particularly when applied in undiluted form or at elevated concentrations. Reports have also documented cases of mild dermatitis, headaches, and nausea resulting from improper or excessive use. Toxicological evaluations in rats indicate that most essential oils are generally safe when administered at controlled doses; however, certain oils may influence hematological parameters such as sodium levels or produce alterations in liver and kidney function markers when consumed internally at high doses or over prolonged periods **[31]**.

Acute toxicity of most essential oils is relatively low, as reflected by the high LD_{50} values observed for commonly used oils such as tea tree and lavender, suggesting a broad safety margin. However, certain constituents, such as pulegone present in mint oil, may elicit specific adverse effects—like body weight reduction—when administered at elevated doses **[32]**.

Comparative Efficacy with Synthetic Products:

Tea tree oil (TTO) has been extensively studied for its effectiveness in managing acne, showing comparable or even superior outcomes to conventional synthetic therapies such as erythromycin and adapalene gels. Clinical studies have demonstrated that TTO-based formulations significantly reduce total lesion counts and severity scores, with fewer adverse reactions like skin irritation compared to benzoyl peroxide, which, while more potent against inflammation, is often associated with greater skin irritation **[33].**

Essential oils such as lavender, rosemary, and chamomile possess notable anti-inflammatory, antimicrobial, and skin barrier–enhancing activities, making them effective in managing inflammatory skin conditions like dermatitis and psoriasis. Their diverse mechanisms of action collectively promote skin healing and protection, while typically exhibiting milder adverse effects compared to conventional synthetic anti-inflammatory drugs **[33]**.

Synthetic dermatological agents such as salicylic acid, retinol, and hyaluronic acid are valued for their targeted mechanisms of action, stability, and consistent potency. These compounds effectively penetrate deeper skin layers to address specific conditions such as acne, hyperpigmentation, and signs of aging. However, despite their efficacy, they may induce irritation, dryness, or sensitization, particularly in individuals with sensitive skin **[34]**.

Natural ingredients promote overall skin health by supporting its physiological functions in a holistic manner and are generally well tolerated by individuals prone to chemical sensitivities or allergies. Many people also favor herbal oils for their rich antioxidant and anti-aging properties, which offer skin nourishment and protection with comparatively fewer adverse effects than synthetic formulations **[35]**.

Future perspective and challenges:

In the domain of personalized dermatology, the integration of oil blends into cosmeceuticals and functional dermatology formulations is increasingly guided by advanced artificial intelligence and data science approaches, enabling bespoke formulations tailored to individual skin phenotypes, environmental exposures, and cutaneous microbiome profiles **[36]**.

Future directions in personalized dermatology emphasize the seamless integration of artificial intelligence for diagnostic assessment, algorithm-driven selection of formulations, and the development of customized oil blends from standardized palettes, including clinician-guided prescriptions that bridge over-the-counter and prescription dermatology products. Concurrently, there is an

increasing focus on sustainability and biocompatibility, employing plant-derived oils such as jojoba, rosehip, and argan, supported by clinical evidence demonstrating moisturizing, anti-aging, and anti-inflammatory efficacy **[36]**.

CONCLUSION:

Natural oil blends exhibit multiple dermatological benefits, demonstrating synergistic effects that surpass the efficacy of individual oils. They possess anti-inflammatory, antimicrobial, and moisturizing properties, while also promoting tissue repair and cellular regeneration. Evidence suggests potential therapeutic applications for conditions such as acne, eczema, and xerosis; however, further research is required to optimize safe and effective usage. Advances in delivery technologies are enhancing percutaneous absorption and bioavailability of these oils. Integration with diagnostic tools, such as dermoscopy, may further refine treatment strategies, positioning natural oil blends as a promising modality in evidence-based skin care.

REFERENCES:

[1] Errichetti E, Stinco G. Dermoscopy in General Dermatology: A Practical Overview. Dermatol Ther (Heidelb) 2016; 6:471–507. https://doi.org/10.1007/s13555-016-0141-6.

[2] Cleveland Clinic. Skin Diseases: Types of, Symptoms, Treatment & Prevention [Internet]. 2025 [cited 2025 Sep 24]. Available from: https://my.clevelandclinic.org/health/diseases/21573-skin-diseases n.d.

[3] Kathirvel GS, M SS, Preetham P, A S. Understanding dermatological health challenges in rural communities - An epidemiological study. IP Indian Journal of Clinical and Experimental Dermatology 2024; 10:420–6. https://doi.org/10.18231/j.ijced.2024.074.

[4] Lakum M. The Hidden Struggle: Understanding the Psychosocial Impact of Dermatological Diseases. Indian Journal of Postgraduate Dermatology 2024; 2:74. https://doi.org/10.25259/IJPGD_23_2024.

[5] Pezantes-Orellana C, German Bermúdez F, Montalvo J, Packer T, Orellana-Manzano A. Evaluating efficacy, safety, and innovation in skin care applications of essential oils: a systematic review. Front Med (Lausanne) 2025;12. https://doi.org/10.3389/fmed.2025.1589691.

[6] Lin T-K, Zhong L, Santiago J. Anti-Inflammatory and Skin Barrier Repair Effects of Topical Application of Some Plant Oils. Int J Mol Sci 2017; 19:70. https://doi.org/10.3390/ijms19010070.

[7] Chiu H-Y, Tsai T-F. Topical use of systemic drugs in dermatology: A comprehensive review. J Am Acad

Dermatol 2011; 65:1048. e1-1048.e22. https://doi.org/10.1016/j.jaad.2010.08.034.

[8] Oliveira R, Almeida IF. Patient-Centric Design of Topical Dermatological Medicines. Pharmaceuticals 2023;16:617. https://doi.org/10.3390/ph16040617.

[9] Pirbalouti AG, Mohammadi M. Phytochemical composition of the essential oil of different populations of Stachys lavandulifolia Vahl. Asian Pac J Trop Biomed 2013;3:123–8. https://doi.org/10.1016/S2221-1691(13)60036-2.

[10] Sun J, Sun P, Kang C, Zhang L, Guo L, Kou Y. Chemical composition and biological activities of essential oils from six lamiaceae folk medicinal plants. Front Plant Sci 2022;13. https://doi.org/10.3389/fpls.2022.919294.

[11] Çalışkan UK, Karakuş MM. Essential Oils as Skin Permeation Boosters and Their Predicted Effect Mechanisms. vol. 2. 2020.

[12] Herman A, Herman AP. Essential oils and their constituents as skin penetration enhancer for transdermal drug delivery: a review. Journal of Pharmacy and Pharmacology 2015;67:473–85. https://doi.org/10.1111/jphp.12334.

[13] Wang G, Liu L, Peng F, Ma Y, Deng Z, Li H. Natural antioxidants enhance the oxidation stability of blended oils enriched in unsaturated fatty acids. J Sci Food Agric 2024;104:2907–16. https://doi.org/10.1002/jsfa.13183.

[14] Pei X, Yin F, Zhong X, Liu H, Song L, Zhao G, *et al*. Effects of different antioxidants and their combinations on the oxidative stability of DHA algae oil and walnut oil. Food Sci Nutr 2022;10:2804–12. https://doi.org/10.1002/fsn3.2883.

[15] Wang H, Zheng J, Cao S, Lv J. Research on the mechanisms of plant bioactive metabolites in anti-skin aging and future development prospects. Front Pharmacol 2025;16. https://doi.org/10.3389/fphar.2025.1673075.

[16] Hussen NH amin, Abdulla SK, Ali NM, Ahmed VA, Hasan AH, Qadir EE. Role of antioxidants in skin aging and the molecular mechanism of ROS: A comprehensive review. Aspects of Molecular Medicine 2025;5:100063. https://doi.org/10.1016/j.amolm.2025.100063.

[17] Salem MA, Manaa EG, Osama N, Aborehab NM, Ragab MF, Haggag YA, *et al*. Coriander (Coriandrum sativum L.) essential oil and oil-loaded nano-formulations as an anti-aging potentiality via TGFβ/SMAD pathway. Sci Rep 2022;12:6578. https://doi.org/10.1038/s41598-022-10494-4.

[18] Koshak AE, Algandaby MM, Mujallid MI, Abdel-Naim AB, Alhakamy

NA, Fahmy UA, *et al*. Wound Healing Activity of Opuntia ficus-indica Fixed Oil Formulated in a Self-Nanoemulsifying Formulation. Int J Nanomedicine 2021;Volume 16:3889–905. https://doi.org/10.2147/IJN.S299696.

[19] Mori H-M, Kawanami H, Kawahata H, Aoki M. Wound healing potential of lavender oil by acceleration of granulation and wound contraction through induction of TGF-β in a rat model. BMC Complement Altern Med 2016;16:144. https://doi.org/10.1186/s12906-016-1128-7.

[20] Poljšak N, Glavač NK, Ravnikar M, Jeras M. Influence of vegetable oils and their constituents on in vitro human keratinocyte and fibroblast proliferation and migration. Sci Rep 2025;15:26898. https://doi.org/10.1038/s41598-025-09711-7.

[21] Ahmed R, Venkatesan K, Sivadasan D, Sirag N, Elfadil H, Anbumani G, *et al*. Mechanistic insights into clary sage oils role in wound healing: targeting oxidative stress and inflammatory pathways. Front Pharmacol 2025;16. https://doi.org/10.3389/fphar.2025.1567205.

[22] Protein-Based Readouts Biological Activity of an Essential Oil Blend in Human Dermal Fibroblasts. n.d.

[23] Ataide JA, Coco JC, dos Santos ÉM, Beraldo-Araujo V, Silva JRA, de Castro KC, *et al*. Co-Encapsulation of Drugs for Topical Application—A Review. Molecules 2023;28:1449. https://doi.org/10.3390/molecules28031449.

[24] Balaji, Goudanavar P. Advancing topical drug delivery: NLC innovations in dermatological therepeutics. Nano Trends 2025;10:100108. https://doi.org/10.1016/j.nwnano.2025.100108.

[25] Prabh A, Sharma P. Nanocarrier-Mediated dermal drug delivery for skin disorders. IP Indian Journal of Clinical and Experimental Dermatology 2025;11:10–21. https://doi.org/10.18231/j.ijced.2025.002.

[26] Afreen N, Sharma A, Chauhan N, Singh U. Gaurav Singh Sikarwar, Neeraj Madhuria, (2025) Nanosponges as A Revolutionary Drug Delivery System for Skin Disorders: Advancements, Challenges, And Future Perspectives. vol. 14. 2025.

[27] Yadav S, Bano A, Sahu S, Kumar Verma P, Singh K. A REVIEW ON MICROENCAPSULATION & TRANSDERMAL PATCHES. IJSDR2401017 WwwIjsdrOrg International Journal of Scientific Development and Research 2024:110.

[28] Chauhan SB. Penetration Enhancement Techniques. Journal of Applied Pharmacy 2017;09.

https://doi.org/10.21065/1920-4159.1000235.

[29] Lee DH, Lim S, Kwak SS, Kim J. Advancements in Skin-Mediated Drug Delivery: Mechanisms, Techniques, and Applications. Adv Healthc Mater 2024;13. https://doi.org/10.1002/adhm.202302375.

[30] Larsson E, Johansson L, Nilsson K. Safety profile of essential oils in pest control: Toxicological studies and regulatory perspectives. International Journal of Pharmacognosy and Life Science 2024;5:137–42. https://doi.org/10.33545/27072827.2024.v5.i2b.160.

[31] Liaqat I, Riaz N, Saleem Q-A, Tahir HM, Arshad M, Arshad N. Toxicological Evaluation of Essential Oils from Some Plants of Rutaceae Family. Evidence-Based Complementary and Alternative Medicine 2018;2018. https://doi.org/10.1155/2018/4394687.

[32] Rached S, Habsaoui A, Mzioud K, Er-rajy M, Abujaber F, Imtara H, *et al*. Chemical profiling, safety assessment, bioactive properties, and molecular interactions of the essential oil derived from Mentha pulegium L. Front Sustain Food Syst 2025;9. https://doi.org/10.3389/fsufs.2025.1511848.

[33] Pezantes-Orellana C, German Bermúdez F, Montalvo J, Packer T, Orellana-Manzano A. Evaluating efficacy, safety, and innovation in skin care applications of essential oils: a systematic review. Front Med (Lausanne) 2025;12. https://doi.org/10.3389/fmed.2025.1589691.

[34] Măgerușan Șoimița E, Hancu G, Rusu A. A Comprehensive Bibliographic Review Concerning the Efficacy of Organic Acids for Chemical Peels Treating Acne Vulgaris. Molecules 2023;28:7219. https://doi.org/10.3390/molecules28207219.

[35] Sathyaseelan S, Rao BH, Anushmati S. Cosmeceuticals: A transit state from synthetic to natural. Indian J Pharmacol 2024;56:42–51. https://doi.org/10.4103/ijp.ijp_244_21.

[36] https://www.chemcopilot.com/blog/the-science-of-ai-generated-skincare-personalized-formulations-for-every-skin-type]. The Science of AI-Generated Skincare: Personalized Formulations for Every Skin Type n.d.