

Phytochemical Composition and Antimicrobial Potential of Lemongrass (*Cymbopogon* spp.) in Acne Vulgaris Treatment

Aleesa Raihana Rashidi, Mohd Shafiq Aazmi*

Structured Abstract

Background: Acne vulgaris is a prevalent chronic inflammatory skin disorder, especially affecting adolescents and young adults. It is often associated with the overgrowth of bacteria such as *Cutibacterium acnes* and *Staphylococcus epidermidis*. Although conventional treatments such as antibiotics and chemical-based formulations are widely used, their effectiveness is often challenged by antibiotic resistance, adverse side effects, and high cost. This has led to increasing interest in natural alternatives. Lemongrass (*Cymbopogon* spp.), traditionally used for its antimicrobial and anti-inflammatory properties, has emerged as a promising candidate in dermatological applications. Its essential oil is rich in bioactive compounds that may offer a safer and more sustainable solution to acne management.

Literature Review: Lemongrass essential oil contains several phytochemicals, primarily citral, which consists of geranial and neral. These components exhibit strong antimicrobial activity against acne-causing pathogens. Various extraction techniques, such as steam distillation and ethyl acetate extraction, affect the oil's yield and potency. Studies show that lemongrass essential oil not only inhibits the growth of *C. acnes* and *S. epidermidis* but also disrupts biofilm formation, interferes with microbial metabolism, and enhances skin penetration when formulated into nanoemulsions or microemulsion-based hydrogels. Compared to conventional acne treatments like clindamycin and benzoyl peroxide, lemongrass shows competitive efficacy with fewer side effects. However, variability in composition due to geographical origin, harvest time, and drying method must be considered.

Objective: This review aimed to explore the phytochemical composition and antimicrobial potential of lemongrass essential oil against acne-related pathogens. It sought to identify the major active compounds, evaluate antimicrobial efficacy compared to conventional treatments, understand mechanisms of action, examine formulation strategies for effective delivery, and address safety concerns.

Conclusion: Lemongrass essential oil, particularly its citral components, demonstrates strong antimicrobial activity against acne-related bacteria and holds promise as a natural alternative for acne treatment. Its efficacy is further enhanced through advanced delivery systems like nanoemulsions. While findings are encouraging, further clinical validation and standardization are necessary to facilitate its integration into dermatological formulations. Thus, lemongrass presents a viable, eco-friendly, and cost-effective option for future cosmeceutical development.

Keywords: Lemongrass Essential Oil, *Cymbopogon citratus*, Citral, Antimicrobial, Acne Vulgaris

*Correspondence: shafiqazmi@uitm.edu.my

School of Biology, Faculty of Applied Sciences, Universiti Teknologi MARA, Shah Alam, Malaysia