E-Abstract Book

IUPAC 2025
Kuala Lumpur, Malaysia

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Kuala Lumpur Convention Centre, Malaysia

53rd IUPAC General Assembly (53GA)
12th - 16th July 2025

50th World Chemistry Congress (50WCC)
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ANALYTICAL EVALUATION OF ANTIMICROBIAL PROPERTIES OF PARAPROBIOTIC *LACTOBACILLUS RHAMNOSUS* FOR COSMECEUTICAL APPLICATIONS

Pervin Soyer[a], A. Alper Öztürk[b]*
[a]*Anadolu University, Faculty of Pharmacy, Department of Pharmaceutical Microbiology, Eskisehir, Türkiye.*
[b]*Anadolu University, Faculty of Pharmacy, Department of Pharmaceutical Technology, Eskisehir, Türkiye.*
[*]*Corresponding author: aaozturk@anadolu.edu.tr*

Abstract
In recent years, the use of probiotics and paraprobiotics in skin care formulations has gained increasing interest due to their potential to improve skin barrier integrity, modulate immune responses, and maintain microbial balance. *Lactobacillus rhamnosus* GG (LGG), a well-characterized probiotic strain, exhibits notable anti-inflammatory and antioxidant properties that may benefit individuals with skin conditions such as eczema, atopic dermatitis, and acne vulgaris. Unlike live probiotics, paraprobiotics-defined as non-viable microbial cells or cell components that confer health benefits-offer improved safety, stability, and compatibility for topical applications. However, analytical validation of their bioactivity remains essential for regulatory and formulation purposes. This study aimed to evaluate the antimicrobial potential of sonication-inactivated LGG using standard microbiological assays.[1] LGG bacterial cells were inactivated using probe sonication, a method shown to preserve functional cell wall components responsible for immunomodulatory and antimicrobial effects. The resulting paraprobiotic suspension was tested for antimicrobial activity using disc diffusion and microdilution techniques in accordance with CLSI (*Clinical and Laboratory Standards Institute*) guidelines. A panel of microbial strains was used, including *Pseudomonas aeruginosa* ATCC 27853, *Staphylococcus aureus* ATCC 29213, *Bacillus subtilis* NRRL B478, *Escherichia coli* ATCC 35218, *Candida albicans* ATCC 90028, and *Candida krusei* ATCC 6258.[2-4] The LGG-derived paraprobiotic exhibited dose-dependent antimicrobial activity. At 18 mg.mL^{-1}, inhibition zones were observed against Gram-positive and Gram-negative bacteria, while antifungal activity against *Candida* spp. was recorded at 9 mg.mL^{-1}. These findings indicate the preserved antimicrobial potential of LGG even after inactivation. The reproducibility and clarity of the inhibition zones confirmed the efficacy of the method used and highlighted the paraprobiotic's analytical detectability. Paraprobiotic LGG demonstrated measurable antimicrobial activity, supporting its suitability for cosmeceutical product development. These results suggest that inactivated probiotic components could serve as bioactive ingredients in topical pharmaceutical and skin care formulations. Further studies will focus on complementary biological activities such as antibiofilm, antioxidant, and cytotoxic effects to explore broader dermatological applications.

Keywords: *Lactobacillus rhamnosus*, Paraprobiotic, Antimicrobial activity, Analytical evaluation, Cosmeceuticals, Skin health

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