

Antibacterial Activity of Commercialized Gamat Oil Against *Staphylococcus aureus* and *Pseudomonas aeruginosa*

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Structured Abstract

Background: Antimicrobial resistance has emerged as a pressing global health crisis, significantly reducing the efficacy of conventional antibiotics. *Staphylococcus aureus* and *Pseudomonas aeruginosa* are two of the most clinically relevant bacterial pathogens exhibiting high levels of resistance, making treatment increasingly difficult. In response to this challenge, natural alternatives such as marine-derived products are being investigated for potential antimicrobial properties. Sea cucumber-derived gamat oil has long been used traditionally for its wound healing and anti-inflammatory benefits. This study aims to scientifically evaluate the antibacterial activity of two commercialized gamat oil products against *S. aureus* and *P. aeruginosa*.

Methods: The antibacterial properties of commercialized gamat oil were assessed using disk diffusion, minimum inhibitory concentration (MIC), and minimum bactericidal concentration (MBC) methods. Disk diffusion was performed on Mueller-Hinton agar involved testing 70%-100% concentrations of gamat oil. MIC and MBC were determined via resazurin-based microdilution and subculturing, respectively. Additionally, Fourier-Transform Infrared (FTIR) spectroscopy was employed to identify molecular changes in the bacterial cells treated with gamat oil, particularly changes in functional groups linked to proteins and lipids.

Results: This study shows that no inhibition zones were observed in the disk diffusion assay at all tested concentrations for either gamat oil against *S. aureus* or *P. aeruginosa*. MIC and MBC results confirmed that gamat oils lacked bactericidal or inhibitory effects. However, FTIR spectroscopy revealed shifts in functional groups associated with proteins and lipids in treated bacterial cells, indicating structural changes. This suggests some interaction at the molecular level, although not sufficient for antimicrobial action.

Conclusion: The findings of this study indicated that while commercialized gamat oil showed no significant antibacterial effect against *S. aureus* and *P. aeruginosa*, FTIR results suggest structural alterations in bacterial cells. Further phytochemical analysis and formulation improvements are needed to explore the potential of gamat oil as a natural antibacterial agent.

Keywords: Gamat Oil, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, Antibacterial Activity, Antimicrobial Resistance

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