

Antibacterial Activity Assessment of *Moringa oleifera* and *Ganoderma lucidum* Extract

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Structured Abstract

Background: The study investigates the antibacterial activity of polyherbal extracts from *Moringa oleifera* and *Ganoderma lucidum*. The rise of antibiotic resistance has necessitated the exploration of natural alternatives for antibacterial agents. *Moringa oleifera* and *Ganoderma lucidum* are known for their medicinal properties, including antimicrobial effects. This research aims to evaluate their combined efficacy against both Gram-positive and Gram-negative bacteria.

Methods: The study utilized ethanolic extracts of *M. oleifera* and *G. lucidum*. The antibacterial activity was assessed using the agar well diffusion method, minimum inhibitory concentration (MIC), and minimum bactericidal concentration (MBC) assays. The tests were conducted against Gram-positive bacteria (*Escherichia coli* and *Pseudomonas aeruginosa*) and Gram-negative bacteria (*Staphylococcus aureus* and *Bacillus subtilis*). The extracts' efficacy was determined by measuring the zones of inhibition and the minimum concentration required to inhibit and kill the bacterial strains.

Results: The agar well diffusion assay indicated that the polyherbal ethanolic extracts were ineffective against the Gram-negative bacteria tested. In contrast, inhibitory activity was observed against Gram-positive bacteria, with *S. aureus* showing inhibition zones ranging from ± 8 mm to ± 15.67 mm and *B. subtilis* from ± 9 mm to ± 13.33 mm at concentrations up to 500 mg/ml. The MIC values were 250 mg/ml for *E. coli* and 62.5 mg/ml for *P. aeruginosa*, while for *S. aureus* and *B. subtilis*, it was 125 mg/ml. The extracts were bactericidal against *E. coli* and *S. aureus* but bacteriostatic against *P. aeruginosa* and *B. subtilis*.

Conclusion: The polyherbal ethanolic extracts of *M. oleifera* and *G. lucidum* exhibit potential as antibacterial agents, particularly against Gram-positive bacteria. Their efficacy against Gram-negative bacteria was limited under the conditions tested. Further research is necessary to explore higher extract concentrations and a broader range of bacterial species to fully understand their antibacterial potential and mechanisms of action.

Keywords: *Moringa oleifera*, *Ganoderma lucidum*, Antibacterial activity, Polyherbal ethanolic extract, Antibiotic resistance

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