

## Antibacterial Activity of Methanolic Extract of *Plectranthus Amboinicus* Against Pathogenic Bacteria

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### Structured Abstract

**Background:** The emergence of multidrug-resistant bacteria demands exploration of alternative antimicrobial agents. *Plectranthus amboinicus*, a species belonging to the *Lamiaceae* family, has demonstrated promising antibacterial activity in preliminary studies. However, a comprehensive understanding of its mechanism of action against pathogenic bacteria remains elusive. The significance of this study lies in its potential to provide new treatment options for drug-resistant pathogens and offer sustainable alternatives to synthetic antibiotics. This study aims to bridge this gap by comprehensively reviewing existing research on the antibacterial activity of methanolic *P.amboinicus* extracts against pathogenic bacteria.

**Methods:** Powdered leaves of *P. amboinicus* was extracted with methanol for 24 hours. Gram-positive (*S. aureus*, MRSA ATCC 43300, *B. subtilis*) and Gram-negative (*E. coli*, *P. aeruginosa*, *S. typhi*) strains were cultured and prepared as inoculum. In this study, Kirby-Bauer disc diffusion assay and MIC and MBC determination were used for determining the antibacterial activity. Different extract concentrations (50-400 mg/mL) were impregnated onto discs and tested against bacteria on MHA plates. Inhibition zones were measured after 24 hours. Extract dilutions were added to microtiter plates with standardized bacterial inoculum. Minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) were determined using resazurin and colony counting methods.

**Results:** The methanolic crude extract of *P.amboinicus* leaves demonstrated significant antibacterial activity against Gram-positive bacteria, with inhibition zones dependent on extract concentration (400-50 mg/mL). MRSA ATCC 43300 was the most susceptible strain, exhibiting inhibition zones ranging from 10.7 mm to 21.7 mm across concentrations. However, no inhibition was observed against Gram-negative bacteria at any tested concentration. MIC ranged from 100 mg/mL to 200 mg/mL against selected bacterial pathogens, with MRSA ATCC 43300 and *P. aeruginosa* presenting the strongest activity at the lowest MIC values. MBC ranged from 400 mg/mL to 200 mg/mL, indicating bactericidal action against all tested microorganisms, with a favourable MBC/MIC ratio of 4 or below.

**Conclusion:** In conclusion, the findings of this study indicated that there is considerable potential for this extract as a natural antibacterial agent, particularly against Gram-positive. This study suggests that the methanolic extract of *P.amboinicus* could potentially contribute to the development of new antimicrobial drugs.

**Keywords:** *Plectranthus amboinicus*, Multidrug-resistant Bacteria, Mechanism of Action, Natural Antibiotics, Alternative Medicine

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