

Antimicrobial activity of endophytic fungus isolated from *Plectranthus amboinicus*

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Structured Abstract

Background: With antimicrobial resistance (AMR) rendering many conventional antimicrobials ineffective against multidrug-resistant (MDR) pathogens, there is an urgent need for novel antimicrobial research. Compared to synthetic drugs, plant-derived compounds are often more biocompatible and environmentally sustainable, making them a valuable source. However, the yield of plant-based extract is relatively low. Endophytic fungi, are one of the potential sources of bioactive compounds with pharmaceutical properties since they can be grown at a laboratory scale. *Plectranthus amboinicus* is a well-documented medicinal plant with notable antibacterial activity, yet research on its antimicrobial potential remains limited. This study aims to fill this research gap and evaluate the antimicrobial activity, properties and efficacy of endophytic fungus isolated from *P.amboinicus* as an antimicrobial agent against clinical pathogenic microorganisms.

Methods: The crude extract of endophytic fungus isolated from *Plectranthus amboinicus* was obtained through fermentation and extracted using ethyl acetate as a solvent. The fermentation process was conducted at 30°C for 16 days in darkness to mimic the natural interactions between endophytes and its host plant. Antimicrobial activity was tested using disc diffusion method. MIC, MBC, and MYC were determined to test the extract's efficacy as an antimicrobial agent. Phytochemical analysis was performed to screen bioactive compounds present in the fungal crude extract responsible for its antimicrobial properties.

Results: Disc diffusion assay showed fungal crude extract at concentration of 100 mg/ml, exhibited significant antimicrobial activity with Gram-positive bacteria strains being the most susceptible, followed by gram-negative strains and yeasts. The findings of MIC, MBC and MYC values revealed that MRSA has the lowest MIC value (most susceptible) among all the test microorganisms with an MBC/MIC ratio of 1 suggesting bactericidal activity. Additionally, the qualitative phytochemical test of the fungal extract showed positive results for 5 out of 7 tested compounds such as flavonoids, terpenoids, phenols, tannins and glycosides.

Conclusion: In conclusion, the study's findings revealed the potential of the fungal crude extract of *Plectranthus amboinicus* as a valuable source of broad-spectrum antimicrobial agents, that effectively inhibit or kill a wide range of clinical pathogenic microbes. Furthermore, phytochemical analysis further confirmed the presence of bioactive compounds responsible for its antimicrobial properties.

Keywords: Endophytic fungus, *Plectranthus amboinicus*, antimicrobial resistant, antimicrobial activity, novel antimicrobial drug research

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