

Antimicrobial and Phytochemical Screening of Endophytic Fungi Isolated from *Melastoma malabathricum*

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Structured Abstract

Background: The emergence and spread of multidrug-resistant (MDR) bacterial pathogens have also made it the ultimate quest of countries throughout the world to find out new antimicrobial agents. Endophytic fungi are asymptomatic fungi that grow in the interior of plants and have further emerged to be rich sources of bioactive secondary molecules. *Melastoma malabathricum* is a common medicinal plant, used in traditional Southeast-Asian medicine, which offers a prospective home of endophytic fungi, which might possess antimicrobial activity. This study aims to isolate endophytic fungus utilizing *M. malabathricum* leaves and estimate the antimicrobial activity and phytochemical composition, which could be a clue to natural materials to fight antibiotic resistance.

Methods: Endophytic fungi were isolated from *M. malabathricum* leaf surface using potato dextrose agar (PDA). The primary screening of the pure fungal isolates against various test microorganisms, both Gram positive and negative bacteria was carried out by agar plug method. The most vigorous isolates were fermented and extracted by using ethyl acetate. The disc diffusion method was applied as secondary screening and then flavonoids, glycosides and saponins were screened. All the assays incorporated the use of positive and negative controls to make the results accurate.

Results: Twelve endophytic fungal isolates were produced where two of the isolates namely T3 and MD3 were found to have significant antimicrobial activity. In disc diffusion tests, MD3 extract exhibited significant inhibitory effects towards *Staphylococcus aureus*, *Bacillus cereus*, and MRSA in which inhibitable zone was more than 25 mm and T3 extract also performed moderate inhibition of the various pathogens. The analysis carried out using phytochemical tests indicated that flavonoids and glycosides were present in the MD3 extract, which implied that they contributed to antimicrobial activity. None of the saponin was detected significantly. These data prove the possibility of the supposition that endophytic fungi itself do contain strong antimicrobial substances in *M. malabathricum*.

Conclusion: Endophytic fungi isolated from *Melastoma malabathricum* demonstrated promising antimicrobial activity, particularly against Gram-positive bacteria. The presence of flavonoids and glycosides in active fungal extracts indicates their potential as sources of novel antimicrobial agents. Further research including compound isolation and MIC analysis is warranted to validate their therapeutic applicability.

Keywords: *Melastoma malabathricum*, endophytic fungi, antimicrobial screening, flavonoids, glycosides, disc diffusion.

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