Evaluation of the Combined Antibacterial Activity of Azadirachta Indica and Munronia Pinnata Plant Extracts.

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Abstract

The rapid increase in infectious diseases necessitates the ongoing need for the development of novel antimicrobial medications with unique chemical compositions and modes of action. The primary objective of this study was to assess the individual and combined antibacterial efficacy of leaf, bark, and roots extracts of Azadirachta indica and Munronia pinnata. The presence of secondary metabolites was assessed through a qualitative phytochemical analysis, which revealed, compounds such as phenols, tannins, flavonoids, saponins, terpenoids, and alkaloids. These findings were further confirmed by thin-layer chromatography (TLC) analysis. The antimicrobial susceptibility test was performed using the EUCAST disk diffusion assay against Escherichia coli (ATCC® 25922™), Staphylococcus aureus (ATCC® 25923™), Bacillus cereus and Pseudomonas aruginosa (ATCC® 27853™). Extracts from both plants showed significant antibacterial activity exception against E. coli, probably due to its protective outer membrane. When combined the plant extracts showed an antagonistic effect against S. aureus and a synergistic effect against B. cereus and P. aeruginosa. However, an antagonistic effect was observed when the extracts were combined with Gentamycin (positive control), likely due to interference with the antibiotic's mechanism of action. Among the tested extracts, A. indica leaves exhibited the highest zone of inhibition with a diameter of 17.00 ± 0.141 mm against S. aureus indicating potential as an alternative to Gentamicin in cases of antibiotic resistance. Overall, this study lays a foundation for future studies into the therapeutic potential of natural sources and the discovery of novel antimicrobial agents.

Keywords: *Antibacterial activity, ethnopharmacology, secondary metabolites, antibiotic resistance*