

# The Single and Combination Antimicrobial Effects of *Ocimum Tenuiflorum*, *Plectranthus*, *Amboinicus*, *Azadiracta Indica* and *Murraya Koenigii* against Bacteria Causing Respiratory Tract Infections

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## ABSTRACT

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Nowadays, medicinal plants have gained an increased attention to be applied as alternatives to antibiotics for the treatment of various diseases. This is a result of the overuse and misuse of antibiotics which reduce the effectiveness of antibiotics against the diseases. *Ocimum tenuiflorum*, *Plectranthus amboinicus*, *Azadirachta indica*, and *Murraya koenigii* are among the medicinal plants which have been claimed to exhibit antimicrobial effect against *Streptococcus pneumoniae*, *Streptococcus pyogenes*, and *Pseudomonas aeruginosa* which cause different types of respiratory tract infections. In this study, the individual and synergistic antimicrobial activities of the above mentioned medicinal plants against the above mentioned bacteria were investigated using disc diffusion and agar well diffusion methods. Also, the antimicrobial effect of *A. indica* and *M. koenigii* was compared with that of antibiotics, namely penicillin, erythromycin and tetracycline, which was tested using disc diffusion method. In addition, the potential ability of *S. pneumoniae* and *S. pyogenes* to develop resistance against *A. indica* and *M. koenigii* was investigated using linear gradient plate method. In this study, different individual plant extracts exhibited different levels of antimicrobial effect against each bacterium. The combinatorial plant extract consisting of *A. indica* and *M. koenigii* was more effective than *A. indica* or *M. koenigii* alone against each bacterium. In addition, *A. indica* and *M. koenigii* had higher antimicrobial effect than the antibiotics against *S. pyogenes* and *P. aeruginosa* which was in contrast to their lower effect than tetracycline against *S. pneumoniae*. Moreover, *S. pneumoniae* and *S. pyogenes* were not able to develop resistance against *A. indica* and *M. koenigii*. In conclusion, *A. indica* and *M. koenigii* possess the potential to be applied as antimicrobial agents to treat respiratory tract infections due to *S. pneumoniae*, *S. pyogenes* and *P. aeruginosa*. Therefore, further studies are crucial to confirm their effectiveness and their resistance modifying activity.