

## IN VITRO ANTIBACTERIAL ACTIVITY OF SOME PLANT ESSENTIAL OILS

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### ABSTRACT

In this study we aim to in vitro evaluate the antibacterial activity of 15 plant essential oils against six bacterial species. Antibacterial effects of the selected essential oils were investigated against four gram-negative bacteria (*Escherichia coli*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Proteus vulgaris*) and two gram-positive bacteria (*Bacillus subtilis* and *Staphylococcus aureus*), using Zone of inhibition (mm) and the MIC of each extract. Zone of inhibition were tested at four different concentrations (1:1, 1:5, 1:10 and 1:20) using disc diffusion method and the MIC of the active essential oils were tested using two fold agar dilution method at concentrations ranging from 0.2 to 15 mg/ml.

Results showed that majority of the oils exhibited wide range of antibacterial activity against the tested strains. Out of 15 essential oils tested, 11 oils were found to be inhibiting one or more strains. Lemon grass, clove, basil and rosemary oils exhibited significant inhibitory effect against both gram-positive and gram-negative bacteria. Lemon grass and clove oils showed promising inhibitory activity even at low concentrations, whereas sage, ginger, spearmint oils were least active against the tested bacteria; but black amomum, eucalyptus, camphor and sweet marjoram oils failed to inhibit any of the tested bacteria. In general, *B. subtilis* was the most susceptible. On the other hand, *K. pneumoniae* exhibited low degree of sensitivity. Data obtained from MIC confirmed the results obtained from the antimicrobial bioactivity study. Except sage, and ginger oils, the MIC of the other 6 oils were ranged between 0.2-1.5 mg/ml, reached its maximum using rosemary and its minimum using lemon grass oils.

These effects against the tested microorganisms indicated the possible ability of each essential oil as a food preservative. Therefore, it is suggested that further work be performed on food to test the antibacterial properties of these oils.

**Keywords:** aromatic plants - Microorganisms - Essential oils - Food preservatives.

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### INTRODUCTION

For many thousands of years, plant essential oils and extracts have been used in food preservation, pharmaceuticals, alternative medicine and natural therapies [Jones, Reynolds,1996; Balchin and Deans,1997]. Until recently, essential oils have been studied mostly from the viewpoint of their flavour and fragrance chemistry only for flavouring foods, drinks and other