

The Antimicrobial Activity of Marjoram Essential Oil Against Some Antibiotic Resistant Microbes Isolated from Hospitals

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Abstract : Infectious diseases are a major cause of death worldwide. The treatment of infections continues to be problematic in modern time because of the severe side effects of some drugs and the growing resistance to antimicrobial agents. Hence, the search for newer, safer and more potent antimicrobials is a pressing need. Herbal medicines have received much attention as a source of new antibacterial drugs since they are considered time-tested and comparatively safe both for human use and the environment. In the present study, the antimicrobial activity of marjoram (*Origanum majorana* L.) essential oil on some gram positive and gram negative reference bacteria, as well as some hospital resistant microbes, was tested. Marjoram oil was extracted and the oil chemical constituents were identified using GC/MS analysis. *Staphylococcus aureus* ATCC 6923, *Pseudomonas auregonosa* ATCC 9027, *Bacillus subtilis* ATCC 6633, *E. coli* ATCC 8736 and two hospital resistant microbes isolates 16 and 21 were used. The two isolates were identified by biochemical tests and 16s rRNA as *proteus* spp. and *Enterococcus faecalis*. The effect of different concentrations of essential oils on bacterial growth was tested using agar disk diffusion assay method to determine the minimum inhibitory concentrations and using micro dilution method to determine the minimum bactericidal concentrations. Marjoram oil was found to be effective against both reference and hospital resistance strains. Hospital strains were more resistant to marjoram oil than reference strains. *P. auregonosa* growth was completely inhibited at a low concentration of oil (4µl/ml). The other reference strains showed sensitivity to marjoram oil at concentrations ranged from 5 to 7µl/ml. The two hospital strains showed sensitivity at media containing 10 and 15µl/ml oil. The major components of oil were terpineol, cis-beta (23.5%), 1,6 - octadien -3-ol,3,7-dimethyl, 2 aminobenzoate (10.9%), alpha terpieol (8.6%) and linalool (6.3%). Scanning electron microscope (SEM) and transmission electron microscope (TEM) analysis were used to determine the difference between treated and untreated hospital strains. SEM results showed that treated cells were smaller in size than control cells. TEM data showed that cell lysis has occurred to treated cells. Treated cells have ruptured cell wall and appeared empty of cytoplasm compared to control cells which shown to be intact with normal volume of cytoplasm. The results indicated that marjoram oil has a positive antimicrobial effect on hospital resistance microbes. Natural crude extracts can be perfect resources for new antimicrobial drugs.

Keywords : antimicrobial activity, essential oil, hospital resistance microbes, marjoram

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