Chemical composition and antimicrobial activity of essential oils of selected Apiaceous plants growing in Egypt

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Abstract

Antimicrobial properties of essential oils of plants are continuously being investigated in order to use them as potential drug candidates to overcome the problem of microbial drug resistance [1]. The aim of this research is to study the antibacterial and antifungal effects of ten traditional Apiaceous essential oils; Pimpinella anisum L. (Anise), Carum carvi L. (Caraway), Apium graveolens L. (Celery), Coriandrum sativum L. (Coriander), Cuminum cyminum L. (Cumin), Anethum graveolens L. (Dill), Foeniculum vulgare (Fennel), Petroselinum crispum L. (Parsely), Daucus carota L. var. sativus (Red Carrot) and D. carota L. var. boissieri (Yellow Carrot).GC/MS was carried out to identify the chemical composition of the most active antimicrobial essential oils. Results of agar-well diffusion method revealed that the maximum inhibition zones were obtained with cumin, coriander and caraway oils against the standard bacterial strains Escherichia coli, Bordetella bronchiseptica followed by Staphylococcus aureus. On the other hand, the remaining essential oils showed much smaller inhibition zones or no inhibition at all.
The three most active essential oils; cumin, caraway and coriander were selected to confirm their antibacterial activity by using viable count time-kill method. Results of this experiment revealed that the coriander essential oil had the highest antimicrobial activity with more than 99.999% killing of the exposed cells of the standard E. coli and Bordetella bronchiseptica standard strains during 5 minutes exposure. These results are in accordance with previously published data [2]. The percentage of identified compounds by GC/MS was 92.5, 99.43 and 98.66 for the cumin, coriander and caraway oils respectively. Monoterpenes were the most abundant components in the three oils.

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