Abstract

Background and Objective: The aim of this study was to determine the chemical composition, antibacterial and antifungal effects of Thymus vulgaris and Cuminum Cyminum essential oils against foodborne pathogens and Candida species in vitro.

Methods: The essential oils were extracted from the aerial parts of Thymus vulgaris and dried Cuminum Cyminum seeds using a Clevenger apparatus for 3 hours. Analysis of the essential oils’ constituents was performed using gas chromatography-mass spectrophotometry. The antibacterial activity of Cuminum Cyminum essential oil and essential oil of Thymus vulgaris against Bacillus cereus, Listeria monocytogenes, Escherichia coli and Salmonella typhimurium were evaluated in agar culture medium. The minimum inhibitory concentration (MIC) of these essential oils against fungal strains of Candida albicans, C. tropicalis, C. parapsilosis and C. dubliniensis was measured.

Results: Thymol (64.45%) and cuminaldehyde (29.02%) were the main components of the essential oil of Thymus vulgaris and Cuminum Cyminum, respectively. The largest inhibition zone diameter in the essential oils of Thymus vulgaris and Cuminum Cyminum in the agar disk diffusion method was related to B. cereus with 30 and 21 mm diameter, respectively. The largest growth inhibition zone diameter by the essential oil of Thymus vulgaris in the well diffusion method was 21 mm and against B. cereus. The MIC of essential oil of Thymus vulgaris in the microdilution method was 0.09% against all the four Candida strains. The MIC of Cuminum Cyminum essential oil against strains of C. albicans and C. tropicalis was 0.39%, while it was found as 0.19% against C. parapsilosis and C. dubliniensis.

Conclusion: In this study, Cuminum Cyminum essential oil and essential oil of Thymus vulgaris show suitable inhibitory effects against the growth of bacteria using well and disk diffusion methods. Regarding the antifungal effects, the MIC of essential oil of Thymus vulgaris is lower than the Cuminum Cyminum essential oil, which indicates the higher antifungal activity of the essential oil of Thymus vulgaris. This study has raised the possibility of using these essential oils as suitable antimicrobial compounds and alternatives for chemical preservatives in the food industry.

Keywords: essential oil, Cuminum cyminum, Thymus vulgaris, antibacterial, antifungal.