

Summary:

Recently, the tendency to use natural preservatives, especially the essential oils of plants and spices, has increased, which has led to the identification of their compounds by researchers and has brought positive results in overcoming food pathogens and preventing oxidation. This study was conducted with the aim of determining the antimicrobial, antioxidant, cytotoxic and constituent compounds of coriander plant essence (*Bifora Testiculata*(L.) Spreng) in laboratory conditions. In this research, the essential oil of coriander plant was extracted using the water distillation method (Clonger) and the analysis of the chemical composition of the essential oil was done using a GC-MS gas chromatography device and the constituent compounds of the essential oil were identified, then the amount of total phenol was measured by the Folin Ciocalteu method. Also, the antioxidant properties of the essential oil were investigated using three methods, DPPH, FRAP and ABTS, as well as the antimicrobial effect of the essential oil against two Gram-positive bacteria (*Staphylococcus aureus*, *Listeria monocytogenes*) and two Gram-negative bacteria (*Salmonella typhimurium*, *Escherichia coli*) using the method Diffusion of agar wells was done and then the minimum growth inhibitory concentration (MIC) and minimum lethal concentration (MBC) were determined by broth microdilution method. Finally, the cytotoxic effect of the essential oil on two cell lines (breast cancer cells (4T1) and mesenchymal stem cells)) measured by MTT test that the main components of the essential oil are trans-2-dodecen-1-ol (12.29%), 2-dodecenoic acid (11.52%), hexadecanoic acid (10.03%), Lauric acid (7.89%), phytol (7.28%), pheophytadine (1.85-6.83%), E-2-tetradecen-1-ol (4.68%), decanal (4.52 %), nonaldehyde (3.8%), dodecanal (3.45%), 2-pentadecanone trimethylhexa (3.36%) and a small percentage of other compounds. The amount of total phenol in the essential oil was 74.72 ± 6.02 mg of gallic acid per gram, and for the DPPH of the essential oil, the IC₅₀ value was measured as 17.9 mg/ml. Also, in the comparison of the reducing and inhibitory power between the essential oil and BHT, a significant difference was observed, and in general The results showed that coriander essential oil had lower antioxidant activity than synthetic antioxidant BHT. There was a statistically significant difference in the ABTS radical inhibition power between different concentrations of essential oil. The highest percentage of radical inhibition of essential oil was observed at the concentration of 12.5 mg/ml at the rate of 41.05%. In the welling method, the largest diameter of the halo of non-growth was related to *Listeria monocytogenes* bacteria (22 mm) and the smallest halo of non-growth was related to *Escherichia coli* bacteria (13.4 mm), and also in MIC and MBC, the most sensitive among bacteria was *Listeria monocytogenes* MIC and MBC values for *Listeria monocytogenes* bacteria were obtained at concentrations of 2 and 4 mg/ml, respectively. These results showed that coriander essential oil has strong antimicrobial activity against gram positive bacteria. The results of the MTT test showed that the essential oil had the least toxicity on mesenchymal cells, so that at a concentration of 100 ng, the highest cell survival was observed. We had a cell that showed significant cytotoxic activity of coriander essential oil against cancer cell line (4T1). In general, the results of this study showed that coriander essential oil has significant biological effects such as antioxidant, antibacterial and anticancer; Therefore, it is

suggested to conduct more studies on the biological properties of the identified compounds in order to clarify the importance of this plant and to suggest it as a useful and promising compound to the centers of food and pharmaceutical industries.

Key words: (*Bifora Testiculata* (L.) Spreng), antimicrobial activity, antioxidant activity, chemical compounds, cytotoxic, essential oil