Antibacterial effects of mesoporous nanoparticles loaded with thyme extract on Escherichia coli

Zohreh Eskandari*,Dr.Faten Divsar,

The indiscriminate use of chemical drugs for treatment of diseases has led to the emergence of microbial resistant isolates that their numbers are increasing every day. The emergence of resistant strains to chemical drugs involves trying to find new antimicrobial agents. Herbal extracts have the potential to replace chemical drugs, while the side effects of these compounds are lower compared to chemical drugs. Escherichia coli and Staphylococcus aureus are two of the most important microbial agents accompanied by food poisoning and gastrointestinal infections. Loading extract in the mesoporous cavities and delivering drug to the target cellular tissue increase the drug efficiency and reduce its dose. The aim of this study was to examine the antimicrobial effects of mesoporous nanoparticles loaded with Thymus vulgaris extract on Escherichia coli and Staphylococcus aureus. Methods: In this study, mesoporous SBA-15 nanoparticles were used as an absorbent for encapsulation (trapping) much extract, as well as for its gradual diffusion on target site to significantly reduce its side effects. The microdilution approach was conducted to determine the minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) of the encapsulated extract in the mesoporous silica nanoparticles and comparing it with the free-form extract against strains of Staphylococcus aureus ATCC1113 and Escherichia coli ATCC 25922 in vitro. Results: The findings showed that Thymus vulgaris extract loaded in the mesoporous silica has have significant antimicrobial effect than extract free form with regard to the bacterial zone inhibition, as well as determining MIC and MBC. Considering antimicrobial effects of Thymus vulgaris extract on E. coli and Staphylococcus, it can come to the conclusion that the loaded extract on the nanoparticles has appropriate anti-microbial properties against pathogenic bacteria, and pharmaceutical nanocarrier system such as mesoporous silica containing extract can be used as a

new pharmaceutical system with conducting more studies.

Keywords : Keywords: Mesoporous Silica Nanoparticle, SBA-15, Thymus vulgaris, E.coli, S. aureus, MIC, MBC