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Enhancement in Antimicrobial and Antioxidant Activity of Cuminum cyminum L. through Niosome Nanocarries

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Abstract : Niosomes are colloidal particles formed from the self-assembly of non-ionic surfactants in aqueous medium resulting in closed bilayer structures. As a consequence of this hydrophilic and hydrophobic structure, niosomes have the capacity to entrap compounds of different solubilities. Niosomes are promising vehicle for drug delivery which protect sensitive drugs and improve the therapeutic index of drugs by restricting their action to target cells. Essential oils are complex mixtures of volatile compounds such as terpenoids, phenol-derived aromatic components that have been used for many biological properties including bactericidal, fungicidal, insecticidal, antioxidant, anti-tyrosinase and other medicinal properties. Encapsulation of essential oils in niosomes can be an attractive method to overcome their limitation such as volatility, easily decomposition by heat, humidity, light, or oxygen. Cuminum cyminum L. (Cumin) is an aromatic plant included in the Apiaceae family and is used to flavor foods, added to fragrances, and for medical preparations which is indigenous to Egypt, the Mediterranean region, Iran and India. The major components of the Cumin oil were reported as cuminaldehyde, γ -terpinene, β-pinene, p-cymene, p-mentha-1, 3-dien-7-al, and p-mentha-1, 4-dien-7-al which provide the antimicrobial and antioxidant activity. The aim of this work was to formulate Cumin essential oil-loaded niosomes to improve water solubility of natural product and evaluate its physico-chemical features and stability. Cumin oil was obtained through steam distillation using a clevenger-type apparatus and GC/MS was applied to identify the main components of the essential oil. Niosomes were prepared by using thin film hydration method and nanoparticles were characterized for particle size, dispersity index, zeta potential, encapsulation efficiency, in vitro release, and morphology.

Keywords : Cuminum cyminum L., Cumin, niosome, essential oil, encapsulation
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