Original Paper

Experimental evaluation of biocompatible pegylated phospholipid formulation containing *Thyme* essential oils and evaluation of anti-fungal activity of nanoscale system

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Abstract

Background and Objective: *Thyme* essential oil is strong antifungal, anti-parasitic and antibacterial due to presence phenolic thymol and carvacrol. Encapsulation is used in order to increase the solubility, protection against oxidation and evaporation and also to improve the effectiveness of essential oils. This study was performed in order to loading *Thymus* essential oil (*Thymus daenensis Celak* and *Zataria multiflora* species) into liposomal vesicles and evaluation of antifungal activity of *Zataria multiflora* specie encapsulated with nano-systems.

Methods: In this descriptive – laboratory study, liposomes containing *Thymus* essential oil- were prepared using thin film hydration method. After size reduction, nano-particle was characterized in term of morphology, size, zeta potential and chemical interactions. Effect of phospholipids types, cholesterol content and species of *Thymus* were investigated on encapsulation efficiency. Finally, the antifungal activity of essential oil of *Zataria multiflora* specie loaded liposome was evaluated the minimum fungicidal concentration, minimum inhibitory concentration and zone of inhibition against *Trichophyton mentagrophytes*.

Results: *Thymus* essential oil loaded into liposome with over 80% efficiency. Optimal formulation contained of 10% cholesterol, 90% soybean phosphatidylcholine phospholipid with 3% of polyethylene glycol and also *Thymus* essential oil with concentration of 0.5 mg/ml. Nanoparticles were anionic with spherical shape and size less than 100 nm. There was no chemical interaction between liposomes and essential oil. Prepared formulation was chemically stable and the essential oil had not retained during encapsulation. Medicinal-nano system of *Zataria multiflora* specie was effective in inhibition of the growth of *Trichophyton mentagrophytes.*

Conclusion: The preparation of optimal liposomal formulation containing *Thymus* essential oil is affected by the type and amount of phospholipid, and it was completely independent of the species of *Thymus*. Also, Encapsulation increases the anti-fungal activity of essential oil of *Zataria multiflora*.

Keywords: *Thyme*, Liposome, Anti-fungal activity, *Trichophyton mentagrophytes*, Sustained-release, Pegylated

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