Development and Optimization of Terpene-Enriched Vesicles (Terpesomes) for Effective Ocular Delivery of Fenticonazole Nitrate: In vitro Characterization and in vivo Assessment

باللغة الإنجليزية

The aim of the current study was to load fenticonazole nitrate, a slightly water-soluble antifungal agent, into terpene-enriched phospholipid vesicles (terpesomes) as a potential delivery system for the management of ocular fungal infection. Thin film hydration method was used to prepare terpesomes according to a 32 full factorial design to inspect the effect of several variables on vesicles' features. The investigated factors were terpenes type (X1) and terpenes amount (X2) while the dependent responses were encapsulation efficiency percent (Y1), particle size (Y2) and polydispersity index (Y3). Design Expert® program was used to choose the best achieved formula. The selected terpesomes were further optimized via incorporation of a positive charge inducer (stearylamine) to enhance adhesion to the negatively charged mucus covering the eye surface. The in vivo performance of the optimized fenticonazole nitrate-loaded terpesomes relative to drug suspension was evaluated by measuring the antifungal activity (against *Candida albicans*) retained in the tear's fluid at different time intervals after ocular application in albino rabbits.The optimized terpesomes showed spherical vesicles with entrapment efficiency of 79.02±2.35%, particle size of 287.25±9.55 nm, polydispersity index of 0.46±0.01 and zeta potential of 36.15±1.06 mV. The in vivo study demonstrated significantly higher ocular retention of the optimized fenticonazole nitrate-loaded terpesomes relative to the drug suspension. Moreover, the histopathological studies proved the safety and biocompatibility of the prepared terpesomes. The obtained results verified the potential of the terpesomes for safe and effective ocular delivery of fenticonazole nitrate.