Polymeric versus lipid nanocapsules for miconazole nitrate enhanced topical delivery: *in vitro* and *ex vivo* evaluation

باللغة الإنجليزية

Nanocapsules can be equated to other nanovesicular systems in which a drug is entrapped in a voidcontaining liquid core surrounded by a coat. The objective of the present study was to investigate thepotential of polymeric and lipid nanocapsules (LNCs) as innovative carrier systems for miconazolenitrate (MN) topical delivery. Polymeric nanocapsules and LNCs were prepared using emulsification/nanoprecipitation technique where the effect of poly(e-caprolactone (PCL) and lipid matrix concentrationswith respect to MN were assessed. The resulted nanocapsules were examined for their averageparticle size, zeta potential, %EE, and in vitro drug release. Optimum formulation in both polymericand lipidic nanocapsules was further subjected to anti-fungal activity and ex vivo permeation tests.Based on the previous results, nanoencapsulation strategy into polymeric and LNCs created formulationsof MN with slow biphasic release, high %EE, and improved stability, representing a goodapproach for the delivery of MN. PNCs were best fitted to Higuchi's diffusion while LNCs followedBaker and Lonsdale model in release kinetics. The encapsulated MN either in PNCs or LNCs showedhigher cell viability in WISH amniotic cells in comparison with free MN. PNCs showed less ex vivopermeation.PNCs were accompanied by high stability and more amount drug deposition (32.2 ± 3.52 mg/cm2) than LNCs (12.7 ± 1.52 mg/cm^2). The antifungal activity of the PNCs was high 19.07mm comparedto 11.4mm for LNCs. In conclusion, PNCs may have an advantage over LNCs by offering dual actionfor both superficial and deep fungal infections.