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Formulation, Evaluation and Statistical Optimization of Transdermal Niosomal Gel of Atenolol

Authors : Lakshmi Sirisha Kotikalapudi

Abstract : Atenolol, the widely used antihypertensive drug is ionisable and degrades in the acidic environment of the GIT lessening the bioavailability. Transdermal route may be selected as an alternative to enhance the bioavailability. Half-life of the drug is 6-7 hours suggesting the requirement of prolonged release of the drug. The present work of transdermal niosomal gel aims to extend release of the drug and increase the bioavailability. Ethanol injection method was used for the preparation of niosomes using span-60 and cholesterol at different molar ratios following central composite design. The prepared niosomes were characterized for size, zeta-potential, entrapment efficiency, drug content and in-vitro drug release. Optimized formulation was selected by statistically analyzing the results obtained using the software Stat-Ease Design Expert. The optimized formulation also showed high drug retention inside the vesicles over a period of three months at a temperature of 4 °C indicating stability. Niosomes separated as a pellet were dried and incorporated into the hydrogel prepared using chitosan a natural polymer as a gelling agent. The effect of various chemical permeation enhancers was also studied over the gel formulations. The prepared formulations were characterized for viscosity, pH, drug release using Franz diffusion cells, and skin irritation test as well as in-vivo pharmacological activities. Atenolol niosomal gel preparations showed the prolonged release of the drug and pronounced antihypertensive activity indicating the suitability of niosomal gel for topical and systemic delivery of atenolol.

Keywords : atenolol, chitosan, niosomes, transdermal
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