Development and In vitro / In vivo Evaluation of Liposomal Gels for the Sustained Ocular Delivery of Latanoprost

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Abstract:

Objective: Conventional eye drops commonly used in the treatment of glaucoma suffer from short residence time, which results in frequent administration and poor patient compliance. The objective of this work was to develop a liposome-based delivery system for the sustained ocular delivery of latanoprost, a prostaglandin analog commonly used in the management of glaucoma. Methods: Latanoprost was incorporated into different liposomes that were evaluated using variety of techniques. Selected liposomes were incorporated into different gels and their viscosity and drug release kinetics were evaluated. Optimal liposomal gels were evaluated in vivo in rabbits eyes for their irritation potential and ability to reduce intraocular pressure. Results: Fourier transform infrared and differential scanning calorimetry studies confirmed the interaction between the drug and different excipients in the vesicles, which resulted in drug encapsulation efficiency 90%. Drug encapsulation efficiency increased with the drug/lipid ratio and encapsulation efficiency ~98% was obtained at drug/lipid ratio of 50%. Vesicles incorporated into Pluronic® F127 gel had sustained drug release where ~45% of the encapsulated drug was released in 2 days. Latanoprost liposomal gels had neither irritation nor toxic effects on the rabbits eyes. Further, they had a sustained reduction in the rabbits intraocular pressure over a period of 3 days, which was significantly longer than that achieved by the commercial latanoprost eye drops. Conclusion: These results confirm the potential of latanoprost liposomal gels as viable alternatives toconventional eye drops for the safe and efficient management of glaucoma.

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