

Preparation and Characterization of Ion-Triggered In-situ Gelling Ocular Formulation Containing Ketorolac in Alginate-chitosan Mucoadhesive Base

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Abstract

Introduction:

The poor bioavailability and therapeutic response exhibited by conventional ophthalmic solutions may be overcome by use of in situ gel-forming systems. Alginate has properties that make a sol to gel transition in the presence of multivalent cations. Chitosan has mucoadhesive properties due to its ability to make electrostatic interaction with the negative charges of mucus.

Methods and Results:

Alginate was used in combination with chitosan. Ketorolac tromethamine, the drug which is applicable as an anti-inflammatory agent was used as model drug to check the efficacy of the formulation. Different compositions were examined and optimized formulation was selected based on clarity, gelling capacity in the face of simulated tear fluid, rheological study, mucoadhesive capacity examined by excised calf corneal membrane, in-vitro drug release through cellophane membrane and eye irritation tests.

A concentration of 0.5% chitosan and 0.5% alginate underwent a rapid gelation upon facing with Ca^{2+} in tear, based on its satisfactory viscosity and gelling capacity. The developed formulation showed sustained release of drug for up to 8 hrs. In rheological studies, formulation presented a pseudoplastic as well as thixotropic behavior, which were suitable for ocular uses. Moreover, acceptable mucoadhesion was found due to the presence of chitosan. No ocular damage or abnormal clinical signs to the cornea, iris or conjunctiva were visible. Alginate-chitosan solution as a base for ion triggered in-situ gel forming eye drop showed appreciable properties via enhanced viscosity and bioadhesion on application in eye.

Conclusions:

Alginate-chitosan solution as a base for ion triggered in-situ gel forming eye drop showed appreciable properties via enhanced viscosity and bioadhesion on application in eye.

Key words:

Ocular formulation, In-situ gelling, Mucoadhesive, Ketorolac, Chitosan, Alginate.

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