Original Article

Chitosan Loaded Ketorolac Tromethamine Nanoparticles for Improved Ocular Delivery in Eye Inflammation

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ABSTRACT

Aim: Ketorolac tromethamine (KT) is highly effective in treating post-operative eye inflammation, allergic conjunctivitis as well other ailments. It is reported that USFDA has approved a 0.45% ophthalmic solution of KT (Acuvail, Allergan, Inc) for the treatment of pain and inflammation after cataract surgery. However, the bioavailable amount of an ocular dosage form is very low due to continuous defensive mechanism in the eye. Thus the aim of present study was to improve the bioavailability of KT via sustained release using the polymer matrix (Chitosan) as a carrier. **Materials and Methods:** Nanoparticles of Ketorolac tromethamine were prepared by ionotropic gelation method. Design expert software was used to evaluate the effect of chitosan and tripolyphosphate (TPP) concentration on particle size and entrapment efficiency of nanoparticles. Prepared nanoparticles were physico-chemically characterized for % yield, entrapment efficiency, particle size and Zeta potential, surface morphology, *in-vitro* drug release, release kinetics and stability studies. In accordance with the evaluation parameters and results obtained from factorial design, an optimized batch was designed and evaluated for above mentioned parameters. **Results:** The optimized batch thus prepared was having Percentage yield (66.4%), Percentage Entrapment Efficiency (61.65%), Particle size (153.9 nm), Zeta Potential (-21.8) and percentage drug release (94.368 ± 0.181 & 92.797 ± 0.150% in PBS and STF (pH 7.4) respectively). Results of release kinetic study revealed that drug dissolution followed Zero order release kinetics model. No physicochemical changes were seen when stored at accelerated conditions. **Conclusion:** It was concluded that the principle adopted behind this research work will provide impetus for future researchers to carry out such formulations of wider variety of drugs rendering highly economical utility.

Key words: Ketorolac tromethamine, Chitosan, Tripolyphosphate, Nanoparticles, Design expert.

Submission Date: 15-03-2018;
Revision Date: 15-05-2018;
Accepted Date: 14-08-2018

DOI: 10.5530/ijper.52.4s.99

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INTRODUCTION

Inflammation is the indication of cellular and vascular response of the host tissue to injury which may be inflicted by physical or chemical agents, invasion of pathogens, ischemia, and excessive (hypersensitivity) or inappropriate (autoimmunity) operation of immune mechanisms. Post-operative inflammation includes distracted aqueous-blood barrier, excessive blood flow in conjunctival vessels, miosis, elevated IOP, intervened by COX pathways.[1-2] Ocular inflammation most frequently hastens due to infection, allergens, surgical intervention or trauma.[3] Various ocular problems/diseases i.e. intra-operative miosis (during cataract surgery), postoperative inflammation, cystoid macular edema (CME) following cataract extraction, seasonal allergic conjunctivitis, ocular dis-

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