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School of Pharmacy and Pharmaceutical Sciences
Isfahan University of Medical Sciences

Fabrication and characterization of controlled release system of theophylline in chitosan beads

J. Movaffagh[1,*], Sayyed A. Sajadi Tabassi[2], A. Rastgoo[3]

[1]Drug Delivery Research Center, Department of Pharmaceutics, School of Pharmacy, Mashhad University of Medical Sciences, Mashhad, Iran
[2]Pharmacological Research Center of Medicinal Plants, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
[3]Isalamic Azad University, Quchan Branch, Quchan, Iran

Background and Aims: Chitosan is a biodegradable and biocompatible polymer which has received much attention in recent years as an oral drug delivery vehicle for controlled-release formulations. In the present study chitosan beads were prepared by an ionotropic gelation method with tripolyphosphate (TPP) and loaded with theophylline using three molecular weight samples of chitosan.
Methods: Beads were prepared with three different MW of chitosan. The beads were characterized for shape and surface morphology by electron microscope. Loading efficiency of beads was determined by UV spectrophotometric method. Drug release profile was also studied in two media. Also swelling behavior was evaluated both in distilled water and phosphate buffer pH 7.4.
Results: The results of this study showed that chitosan beads with nearly spherical shape and smooth surfaces were prepared with about 93% drug loading. Swelling studies revealed that chitosan beads were able to absorb 1.5 fold as much water as their initial weight. Drug release profile from chitosan beads showed that the release of theophylline in both media increases with time with a steeper slope up to 6 hours and levels off afterwards reaching 30% in 12 hours. This means that a sustained release system of theophylline has been obtained which can release the drug in a slow yet continuous manner.
Conclusions: It can be concluded that chitosan can be used as a vehicle for preparation of controlled release beads loaded with theophylline. It was shown that the release of theophylline from chitosan beads has a two phase pattern and controlled by more than one mechanism.

Keywords: Chitosan beads; Controlled release; Tripolyphosphate; Theophylline