Development of Microparticulate Drug Delivery System for Colon Targeting Using Natural Gum

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Abstract

Crohn's Disease is a non-specific granulomatous inflammation involving sharply demarcated single or multiple areas of the intestine, and probably a non-specific pathological response to a variety of exciting agents. It can affect mostly the terminal ileum or the ileocaecal region. Budesonide is one of the most used drug substances in the Crohn's disease. Budesonide microcapsules were prepared using natural polymers for better treatment of crohn's disease avoiding the side effects of synthetic polymers. The Budesonide microcapsules were prepared by ionotropic gelation technique using different concentrations of Guar gum/Xanthan gum, Sodium alginate and Glutaraldehyde. Central composite design was employed to study the effect of independent variables i.e, concentration of Guar gum/Xanthan gum, concentration of Sodium alginate and concentration of Glutaraldehyde; on dependent variables i.e; percentage entrapment efficiency and percentage cumulative drug release. Prepared microcapsules were then evaluated for flow properties, particle size, compatibility and surface morphology. *In vitro* drug release study in absence and presence of rat caecal content were also studied. Further, kinetic models were employed to find out release mechanisms. Budesonide

loaded microcapsules showed high entrapment efficiency in case of both the polymers i.e, guar gum and Xanthn gum. For the optimized batches %EE was found to be 82.40% and 72.62% respectively. Microcapsules were free flowing, non aggregated and spherical with wavy surface having the size range of 650µm to 900µm in diameter. The *in vitro* drug release study was affected by change in concentration of natural gum, Sodium alginate and Glutaraldehyde. The microcapsules with 1.5%W/V sodium alginate, 0.4%W/V guar gum 3%V/V glutaraldehyde and 1.5%W/V sodium alginate, 0.5%W/V xanthan gum, 3%V/V glutaraldehyde showed minimum release in simulated gastric fluid with the maximum drug release at the end of 24 hour in the presence of rat caecal content. The drug release followed the zero order model.

Key words: Colonic drug delivery, Natural gum, Ionotropic gelation, Budesonide, Microcapsule.