FORMULATION, CHARACTERIZATION AND IN VIVO APPLICATION OF ORAL INSULIN

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Abstract

The overall objective of this research is to improve the oral bioavailability of insulin through encapsulation in nanoparticles formulated by "ionotropic pre-gelation followed by polyelectrolyte complexation technique". The preparation variables such as initial drug concentration, polymer: polymer ratios, crosslinker concentration, stirring speed, stirring time, pH of drug / polymer mixture were investigated to study the effect of variables on nanoparticles size and drug entrapment efficiency. The optimum formula of insulin loaded nanoparticles was tested for insulin release in different pH media. The pharmacological activity of insulin loaded nanoparticles was evaluated following oral dosage in diabetic rats and then study whether insulin loaded nanoparticles would induce hypoglycemic effect after oral administration to diabetic rats. The optimum formula of nanoparticles improved insulin release characteristics. Thus, the polymer matrix provided protection for insulin in acidic gastric medium and allowed prolonged insulin release in alkaline intestinal medium. In vivo results indicated that nanoparticles kept insulin bioactivity and its hypoglycemic effect after oral administration of insulin loaded nanoparticles to diabetic rat model. It was found that natural biodegradable nanoparticles are a promising device for oral insulin delivery.

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