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Nanoparticles prepared from N, N-dimethyl, N-octyl chitosan as the novel approach for oral delivery of insulin: Preparation, statistical optimization and *in vitro* characterization

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The aim of this study is preparation, optimization and *in vitro* characterization of nanoparticles prepared from octyl chitosan as a new strategy for oral insulin delivery. For this study, N, N-dimethyl N-octyl chitosan was synthesized. Nanoparticles containing insulin were prepared using PEC method, and then were statistically optimized using the Box-Behnken response surface methodology. The independent factors were considered to be the insulin concentration, polymer concentration and pH of the polymer solution, while the dependent factors were characterized as the size, zeta potential, PdI and entrapment efficiency. The optimized nanoparticles were morphologically studied using SEM. The cytotoxicity of the nanoparticles on the Caco-2 cell culture was studied using the MTT cytotoxicity assay method, while the permeation of the insulin nanoparticles across the Caco-2 cell monolayer is also determined. Nanoparticles posed appropriate physicochemical properties. The SEM morphological studies showed spherical to sub-spherical nanoparticles with no sign of aggregation. The *in vitro* release study showed that 95.5±1.40% of the loaded insulin was released in 400 min. The cytotoxicity studies on the Caco-2 cell culture showed no significant toxicity after 5 h incubation. The permeability studies revealed significant enhancement in the insulin permeability using nanoparticles prepared from octyl chitosan at 240 min (11.3±0.78%). The obtained data revealed that insulin nanoparticles prepared from N, N-dimethyl, N-octyl chitosan can be considered as the good candidate for oral delivery of insulin compared to nanoparticles prepared from N, N, N- trimethyl chitosan.

Biography

Parham Norouzian is pharmacist student at Hamadan University of Medical Sciences. He has published 2 articles in International journal of biology.

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