

Natural polymer based ph responsive nanoparticles for oral insulin delivery

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Gelatin-Eudragit L100 nanoparticles of wet size range 170-563 nm were prepared by two step dissolution method and the effect of different concentrations of eudragit L100 and emulsifying agent - sodium lauryl sulphate (SLS) - on the particle size were studied. Synthesized nanoparticles were characterized by transmission electron microscopy (TEM), attenuated total reflectance-fourier transform infrared spectroscopy (ATR-FTIR) and the mean size distribution. Molecular mechanistic iterations were carried out using static lattice atomistic simulations for determining reactional profile and energetic transformations inherent to the formulation and performance of the polymer morphologies. Insulin loading was done at a pH 7.4 and the in-vitro insulin release studies of nanoparticles were carried out by simulating gastrointestinal tract condition which showed the minimal insulin release at pH 2.5 (20% in 90 min) while appreciable release (40% in first 30 min) at pH of 7.4. This pH responsive release pattern of the synthesized nanoparticles confers protection to insulin from proteolytic degradation in acidic environment of stomach and upper intestinal part while enhancing bioavailability in the later part of intestine. Animal studies were undertaken with varied insulin load of nanoparticles administered orally to the fed diabetic rabbits and, of all doses, the nanoparticles containing 120 I.U of insulin load per kg body weight of rabbit controlled the blood glucose level in physiologically normal range of 120-200 mg/dl and the effect prolonged for 8 hr. Histopathological testing of spleen, liver, stomach, large intestine and small intestine confirmed the nontoxic nature of synthesized nanoparticles. The ability to effectively control blood glucose level coupled with the non toxic behavior of the nanoparticles renders them a potential candidate for oral insulin delivery.

Biography

Lomas Tomar has done masters in Biotechnology and received Ph.D degree in Biomedical Engineering from I.I.T, Delhi, India. At present he is working as SARCHI postdoctoral fellow at WITS Advanced Drug Delivery Platform, University of the Witwatersrand, Johaanesburg, S.A. He has quite a number of research papers in international journals and conferences, two patents and a couple of awards to his credit. One of his research projects was awarded 'Best project of IITD' by IITD Alumni Association. His research interests are synthesis of polymeric micro and nanoparticles, with an application focus on oral delivery of protein and peptides.

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