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Delivery vehicle for the oral administration of Insulin: Development of Montmorillonite PLGA nanocomposites as drug delivery vehicle

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Insulin, a hormonal protein is the mainstay for diabetes patients. Oral delivery of insulin may significantly improve the quality of life those who routinely required having insulin by the subcutaneous route. However, the oral delivery of insulin is a tough task due to the two main existing barriers including rapid enzymatic degradation in the gastrointestinal tract and poor intestinal absorption. Since last few decades various methodologies, polymers and matrices have been explored for the fulfillment of the objective but without much clinical or commercial success. In the present work, for the first time we are introducing the preliminary feasibility study of a nanocomposites made of an FDA approved naturally occurring layered clay Montmorillonite (Mt) and biodegradable polymer PLGA (Poly lactic-co-glycolic acid), as an oral delivery vehicle for insulin. Insulin-Mt-PLGA nanocomposites were synthesized by double emulsion solvent evaporation method. The synthesized Insulin-Mt-PLGA nanocomposites were successfully characterized with suitable analytical techniques and compared with the analogous Insulin-PLGA nanoparticles for their drug content, physicochemical properties and in vitro insulin release profile. High encapsulation efficiency (~70%), desirable particle size (10-20 nm), prolonged gastric residence time and extended release of insulin in simulated gastrointestinal fluid indicated the effectiveness of presence of Mt in the synthesized Mt-PLGA nanocomposites for the oral delivery of Insulin. Thus, on the basis of our preliminary research findings, it could be concluded that the developed Insulin-Mt-PLGA nanocomposites may offers promising potential for effective oral insulin delivery in near future.

Biography

Seema Lal has completed her PhD in March 2014 and pursuing Postdoctoral studies from Delhi University, India. She has published 6 papers as first author in reputed journals and in the process of publishing 5 new research manuscripts. She has presented more than 20 research papers in national and international conferences in India and abroad. She is the recipient of various awards including Young Scientist Award of Indian Chemical Society and Department of Science and Technology, India, Travel Grant Award to present a research paper at Sorbonne University, Paris.

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