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Development and evaluation of chitosan-based systems for oral delivery of insulin

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Diabetes is a metabolic disease with high prevalence worldwide. Exogenous insulin is given by parenteral route for the management of this condition. Non-invasive routes such as nasal, pulmonary and oral routes were explored to solve problems associated with injections. However, oral administration of insulin is the most convenient method of delivery and could improve disease management and reduce the long-term complications of diabetes. However, peroral delivery of peptides and proteins is challenging mainly due to large size, hydrophilicity and instability of these macromolecules. Nanoparticulate systems based on chitosan were developed by our group to deliver insulin orally. Nanoparticles and nanovesicles were prepared and dispersed in either aqueous or oily vehicles. *In vitro*, pharmacodynamics and pharmacokinetics studies were conducted to compare the above mentioned preparations. The most promising preparation was the one that was fabricated from chitosan, oleic acid and surfactants. This preparation decreased the blood glucose levels of the streptozotocin-diabetic rats remarkably after oral administration compared to the control group (P<0.05) and the antidiabetic activity was prolonged for many hours. The estimated pharmacological availability was 29% and the relative bioavailability was calculated to be 19.98%. The proposed absorption mechanisms for nanoparticles transport is via a special type of endocytosis i.e., clathrin mediated endocytosis and the main transport mechanism might be through lymphatic route. Promising results were obtained, when the nanoparticles were administered to human volunteers. This preparation showed considerable improvement in insulin delivery and could be considered as a platform technology for delivery of other peptides such as calcitonin.

Biography

Amani Mirghani Elsayed has completed her PhD from University of Gezira. She worked as a Research Associate and Doctoral Candidate at Jordanian Pharmaceutical Manufacturing Company (JPM), Jordan, (2005-2009). She patented 2 oral insulin delivery systems. She is now working as an Assistant Professor of Pharmaceutical Technology and Research Scientist at Taif University, Taif, Saudi Arabia. She has many publications in reputed journals.

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