

Title: Halal Insulin Nanoparticles: An Innovative and Painless Drug Delivery Patch for Diabetics

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Abstract

In a conventional method, insulin is injected subcutaneously two to four times a day before each meal to maintain the therapeutic effectiveness of diabetic patients. These multiple injection routines are complex, painful, inconvenient and fear of hypoglycemia. To improve patient compliance and convenience, poly(lactide-co-glycolide-PLGA) based sustained release formulation of insulin delivery has been developed. The major drawbacks in the development of PLGA microspheres are the high initial burst and incomplete release of encapsulated insulin. The slow or no release period is often referred to as the "lag phase" and continues until extensive degradation of PLGA starts. During this period, the patient may not be effectively treated due to the lack of sufficient insulin release. In this study, insulin encapsulated PLGA microspheres were prepared using a fast degrading hydroxyl terminated–PLGA to remove the lag phase and to reduce the initial burst release.Insulin-loaded hydroxyl terminated-PLGA microspheres have been prepared by a conventional water-in-oil-in-water (w/o/w) and a modified water-in-oil-in-oil-in-water (w/o/o/w) emulsion solvent evaporation method. Microspheres prepared with w/o/w emulsion technique exhibited high encapsulation efficiency. High initial burst release of insulin was observed in all formulations prepared by w/o/w emulsion technique. A significant reduction of initial burst release of insulin was observed when microspheres were prepared by a modified w/o/o/w emulsion method. Sustained release of insulin was achieved without any lag phase in both w/o/w and w/o/o/w emulsion techniques when microspheres were prepared with a fast degrading PLGA. The optimized formulation of insulin-loaded microspheres was nonporous, smooth-surfaced, and spherical shape under scanning electron microscope (SEM) with a mean particle size of 7.25 µm and encapsulation efficiency of 98.46%. It can be concluded that microspheres prepared with hydroxyl terminated-PLGA by a modified w/o/o/w emulsion method can be proposed as a potential delivery system of therapeutic insulin.

Biography:

Dr. Mohd Mokhlesur Rahman has completed his PhD in Analytical Chemistry by Universiti Teknologi Malaysia and postdoctoral studies from Universiti Teknologi Malaysia. He has worked as Associate Professor of Pharmaceutical Chemistry at International Islamic University Malaysia. He has published more than 59 papers in reputed journals, two books and one book chapter,14 award in International, National and University level Innovation competitions. He has supervised two PhD and five Masters students and patented two products in Malaysia. Now; he has been serving as a Head of the Laboratory of Institute of Community Quality Health Development (i-CODE), University Sultan Zainal Abidin, Gong Badak, Terengganu, Malaysia.

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