كلية الصيدلة

جامعة دمنهور

A Study on Nanoformulation Drug Delivery System(s) for Nasal Delivery

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Abstract

Repaglinide (REP) loaded solid lipid nanoparticles (SLNs) for intranasal administration is the subject of the current work aiming enhancement of diabetes pharmacotherapy. SLNs were prepared by applying 3^2 factorial design using hot melt emulsion technique. Surfactant and lipid types were selected as the independent variables. The optimized formula composed of glyceryl monostearate and Poloxamer 188 was further integrated in gellan gum (GG 0.5%w/v) *in situ gel* for ease of administration. The optimized SLNs integrated *in situ gel* (SLN_{F1}.$ISG_{0.5}$) showed small particle size (96.34 nm), high entrapment efficiency (80.57 %) and outstanding sustained release of only 83.3% after 30-hour (h). *In situ gel* (*ISG)* formula showed pseudo-plastic behavior, mucoadhesive property and physically stable at 4°C. Transmission electron microscope showed spherical nanoparticles associated with hydrogel matrix. *In-vivo* pharmacodynamic study results in diabetic rats proved to be safe and succeeded to show superior hypoglycemic activity for REP after nasal administration versus oral route manifested by higher 1.2-fold % maximum reduction (MR), 2.5-fold total decrease (TD) in blood glucose level with a significant longer duration of action > 48 h. Conclusively, the developed intranasal drug-loaded SLNs integrated *in situ gel* formula succeeded to achieve the maximum therapeutic outcome of REP in dose reduction frequency for diabetes mellitus treatment.