Recombinant proinsulin-transferrin fusion protein—A novel insulin analog with sustained and liver-selective hypoglycemic activity

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Objectives: First; to develop rabeprazole (RP)-alginate core coated chitosan nanoparticles (NP) utilizing W/O nanoemulsion technique. Second; formulation of transdermal patches loaded RP-NP that avoid drug peroral acid sensitivity and first pass effect.

Method: The influence of six factors on RP-NP formulation was investigated using Plackett-Burman (PB) design. The studied factors were considered for their effect on particle size (Y1) and loading efficiency (Y2). Formulation optimum desirability was identified; a proposed formulation prepared and characterized. In vitro permeation of the prepared NP compared with RP was studied. Transdermal patches loaded drug or RP-NP were prepared and characterized. Patches ex vivo permeation through rat skin was studied, kinetic analysis and permeation mechanism were investigated.

Results: Chitosan, oil phase and surfactant to oil ratios had significant effects on Y1 while, Y2 was significantly affected by the same variables affecting Y1 and span80-tween80 ratio. Scanning electron microscope imaging illustrated sphericity of the NP. The optimized RP-NP exhibited sustained release pattern. The prepared patches showed minimal patch to patch variations. Patches loaded RP-NP exhibited substantial skin permeability and controlled drug release, and were in favor of Fickian diffusion.

Conclusion: Transdermal patches loaded RP-NP is effective drug delivery and alternative to drug peroral route.

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Influence of the formulation factors of structured polymeric aggregates nanoparticles preparations based on chitosan on the release characteristics of Diclofenac

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The objective of this research is to understand the influence of formulation factors such ratio and molecular weight of chitosan, amount and type of fatty acid used, type and concentration of chitosan on the release of diclofenac from nanoparticle liquid preparation based on chitosan. The nanoparticle preparations are made of the drug, chitosan, fatty acid and surfactant. Chitosan is capable of forming complexes with anionic substances. Diclofenac as anionic substance is capable of forming complexes with chitosan. Fatty acid was used to shield the drug as it also forms complexes with chitosan. Addition of suitable surfactant made the surface of the particles hydrophilic where it can be dispersed in water as nanoparticle liquid preparation. Different nanoparticles formulations were prepared by varying the concentrations and the type of materials used. Drug release was studied by placing the formulation inside a semipermeable dialysis tube capable of retaining the complex and allowing the passage of the free drug. The bag was placed inside 6.8 phosphate buffer in USP apparatus II at rotational speed of 100 rpm. Samples were withdrawn at suitable intervals and analyzed using validated HPLC method. Results demonstrated that formulas were capable of sustaining the release of the drug and the formulation factors studied influenced drug release characteristics. The change in release characteristics was correlated with physicochemical properties of the nanoparticle preparations specially the viscosity of the polymer used or its concentration. Control of the factors studied is essential for the development of sustained release nanoparticle formulation with optimum drug release.