ROLE OF POLYACRYLIC ACID ON DRUG RELEASE FROM CONTROLLED POROSITY OSMOTIC PUMP USING CHITOSAN-POLYACRYLIC ACID COMPLEXES AS POLYMERIC OSMOGENTS

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ABSTRACT

The aim of this study is to evaluate the swelling properties of the type of polyacrylic acid (PAA) and various ratios of chitosan-polyacrylic acid (CS-PAA) interpolymer complexes by using swelling force, swelling ratio and Fourier transform infrared (FTIR) characterization. The best swelling interpolymer complexes will be used as osmotic agents for the development of controlled-porosity osmotic pump tablets (CPOPs). The FTIR results indicated that interpolymer complex was formed between CS and PAA through an electrostatic interaction of the protonated amine (NH_3^+) group of CS and the carboxylate (COO^-) group of PAA. The swelling force and swelling ratio of CS-PAA interpolymer complex using PAA 971P NF at the ratio of 2:1 showed the best swelling properties. Diclofenac sodium was used as a model drug for the CPOPs drug formulations containing the CS-PAA interpolymer complex and using PAA 971P NF at the ratio of 2:1. The core tablets were coated with a mixture of 4% w/v cellulose acetate in acetone solution containing PVP K90 (50% w/v with respect to cellulose acetate) as pore formers, using 25% w/w TEC as a plasticizer, to achieve 10% additional weight by using the perforated pan coater. Finally, CPOPs were coated with the mixture of 6% w/w Eudragit L 100-55 in 95% ethanol/acetone (3:1) solution containing 25% w/w PEG6000 of the film content as a plasticizer, to achieve 6% additional weight by using the perforated pan coater. The results showed that the more amount of CS-PAA in tablet formulation was added, the more drug release rate was also increased. The data of enteric coated tablet showed that there were no drug release into the acidic medium solution within 2 h. It was acceptable for the tablet, which was designed to release drug in the intestine. Only the formulation containing the ratio of CS-PAA00 gave the zero order kinetic condition, whereas the others were fitted to the Higuchi model. The properties of the polymer, the ratios and the amount of the composition were the important factors to formulate these osmotic tablet formulations. The amount of CS-PAA could effect the rate of drug release from the tablets. It might be the more swelling and greater force producing to push the drug through the pores on the cellulose acetate. In conclusion, the formulation with CS-PAA gave less zero order kinetics than the formulation without CS-PAA.

KEY WORDS: CONTROLLED-POROSITY OSMOTIC PUMP / CHITOSAN / POLYACRYLIC ACID / SWELLING PROPERTY / OSMOGENTS

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