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Synthesize and characterization of cationic beta-cyclodextrin polymer as a carrier for buccal insulin delivery

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Background and Aims: The systemic drug delivery through intra-oral membranes may offer novel carrier for delivering macromolecule drugs. The aim of this study was to synthesize a new copolymer made of beta-cyclodextrin, epichlorohydrin (EP) and choline chloride (CC) for buccal insulin delivery. Due to the electrostatic interactions between insulin and cationic beta-cyclodextrin polymer, insulin can be protected from degradation and can have more absorption through biological membranes. The Cationic beta-cyclodextrin polymer was synthesized by a one-step condensation polymerization. The Nuclear Magnetic Resonance (NMR) spectra and Fourier Transform Infrared Spectroscopy were performed to characterize the physicochemical properties of the polymer. The formation of cationic beta- cyclodextrin/ep/cc complexes were confirmed by the NMR and the Fourier Transform Infrared Spectroscopy (FT-IR). The results show that the substitution occurred on both of the primary and secondary sides of beta-cyclodextrin cavity of cationic beta-cyclodextrin polymers. In conclusion, by insulin entry in cationic beta- cyclodextrin cavity, the absorption and protection against degradation were improved and it was found that cationic cyclodextrin could be used as an effective drug carrier in pharmaceutical applications.

Keywords: Cationic beta-cyclodextrin polymer; Buccal; Physicochemical properties