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Dual stimuli responsive copolymeric network for oral insulin delivery

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Stimuli-responsive polymeric biomaterials are under extensive research for their use as a carrier for oral drug delivery systems. The aim of this study was to synthesise and characterise a dual-sensitive copolymeric biomaterial responsive to temperature and pH as both of these stimuli are important physiological parameters. Copolymer of poly (NIPAM)-co-acrylic-co-methacrylic acid were synthesized by using free radical polymerisation method using different concentrations of fed monomers. Synthesized copolymers were characterized by FTIR, DSC, texture analysis and Karl-Fischer titration. These systems were further evaluated for their swelling efficacy and *in vitro* drug release under the influence of different temperature and pH environment. FTIR spectrum confirmed the synthesis of the copolymer and thermal analysis using DSC proved that the copolymer was stable at high temperature. Results of the swelling studies showed an increased swelling at 37 °C and pH 7.4. The insulin release studies at various temperature and pH over 180 minutes recorded highest release at 37 °C: up to 78% at pH 7.4 and up to 30% at pH 1.2, while a comparatively lower release was observed at 4°C: up to 28% at pH 7.4 and up to 17% at pH 1.2. The properties of the synthesized copolymer and their *in vitro* insulin release behaviour prove its potential as a material for oral delivery of therapeutic peptides.

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Crosslinked polymeric system for controlled delivery of Loxoprofen: Synthesis, characterization and release kinetics

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Non-steroidal anti-inflammatory drugs are known to be associated with serious gastric disorders due to inhibition of Cyclooxygenase (COX) enzyme. Keeping in view this theory, a study was designed to synthesize an intelligent polymeric system and compare the drug release of two different propionic acid derivatives. For the said purpose, 2-hydroxyethylmethacrylate (HEMA) was crosslinked with methacrylic acid through free radical polymerization method, using Ethylene Glycol Dimethacrylate (EGDMA) as crosslinking agent. The non-steroidal anti-inflammatory drug loxoprofen belonging to propionic acid derivatives class was loaded in the crosslinked pH sensitive hydrogel delivery through absorption method. SEM, FTIR, TGA and DSC of synthesized copolymer were performed to evaluate its morphology, crosslinking and thermal stability respectively. Percent drug release of both these drugs was then evaluated at simulated gastric and intestinal medium. It has been concluded that our designed hydrogel system exhibited successful pH sensitive drug delivery because it showed a minimal drug release at gastric simulated pH while highest release at intestinal simulated pH.

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