Polymeric-Based Formulation as Smart Drug Delivery System

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ABSTRACT

Conventional oral formulations are mainly absorbed in the small intestine. This limits their use in the treatment of some diseases associated with the colon, where the drug has to act topically at the inflammation site. This paved the way for the development of a smart colonic drug delivery system, thereby improving the therapeutic efficacy, reducing the dosing frequency and potential side effects, as well as improving patient acceptance, especially in cases where enemas or other topical preparations may not be effective alone in treating the inflammation. In healthy individuals, it takes an oral medication delivery system about 5 to 6 h to reach the colon. A colonic drug delivery system should delay or prohibit the medication release during these five to six hours while permitting its release afterward. The main aim of this study was to develop a smart drug delivery system based on pH-sensitive polymeric formulations, synthesized by a free-radical bulk polymerization method, using different monomer and crosslinker concentrations. The formulations were loaded with 5-amino salicylic acid as a model drug and Capmul MCM C8 as a bioavailability enhancer. The characterization, in vitro swelling and release studies were performed to evaluate the produced formulations, determine the ability of the developed system to retard the drug release at conditions mimicking the stomach and small intestine while triggering its release at conditions mimicking the colon. The polymer-based formulation was found its promising applicability as a potential smart colonic drug delivery system.

Key Words: 5-amino salicylic acid; smart delivery system; sustainable polymers; triggered drug delivery; ulcerative colitis