ABSTRACT

Colorectal cancer (CRC) still becomes the second leading cause of global cancer-related mortalities, despite the advances in diagnosis and treatment. Chemotherapeutic drugs, such as 5-fluorouracil (5-FU), still becomes the main treatment modalities for CRC, despite its rapid elimination rate and diverse adverse reactions. Recently, strategies to establish targeted drug delivery systems for the colorectal area have been extensively attempted in order to enhance treatment responses, which is mainly pursued by fabrication of orally-administered drug carriers with mucoadhesive and colon-responsive behaviors. Some biomaterials that have been extensively studied as potential colon-targeted drug carriers are pectin and chitosan, due to their colon microbial-dependent degradation, with pronounced potential anticancer activity towards CRC. Moreover, pectin and chitosan can be chemically modified by thiolation to enhance its mucoadhesive properties. This study aimed in fabricating 5-FU-loaded pectin-based drug delivery system for CRC in the form of beads, through ionotropic gelation. The effects of pectin thiolation and chitosan addition towards drug entrapment efficiency, drug content, physical parameters, drug release profile were evaluated. Furthermore, the *in vitro* anticancer activity of the beads were evaluated, which included cell viability assay and DNA fragmentation assay. Thiolation of pectin significantly improved the entrapment efficiency of 5-FU compared to unmodified pectin, whereas addition of chitosan enhanced the drug content of 5-FU in the formulated beads. However, the drug release profile was similar among all groups, with a burst release profile. Nevertheless, the biomaterial exhibited selective toxicity towards CRC cell line HT-29, highlighting its potential as a CRC-targeted drug delivery system.