A NOVEL POLYELECTROLYTE COMPLEX NANOCOMPOSITE OF CHITOSAN AND KARAYA GUM DERIVATIVES FOR CO-DELIVERY OF 5-FLUOROURACIL AND CURCUMIN IN CANCER THERAPY

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Combination chemotherapy is a preferred method for cancer treatment, which has been developed recently. The use of the chemo drug, 5-fluorouracil (5-Fu) is limited due to its non-specificity, low bioavailability and side effects. The efficiency of 5-Fu in cancer therapy could be enhanced by combination approach. In the present work, a novel pH sensitive polyelectrolyte complex (PEC) of trimethylchitosan (TMC) and carboxymethylkaraya gum (CMKG) containing Ag nanoparticles were developed as matrix material for co-delivery of 5-Fu and curcumin (Cur). The experimental conditions for the formation of the PEC nanocomposite have been optimized for high yield and high swelling. FTIR, ^{1}H-NMR, FE-SEM, P-XRD, HR-TEM and TGA techniques were utilized to demonstrate the structure of the prepared polyelectrolyte complex and silver nanocomposite. The swelling study indicated pH responsiveness of the polyelectrolyte complexes with higher swelling in solution of pH 7.4 compared that in pH 1.2 for PEC with 3% Ag. Hence the composite with 3% of Ag was selected for the further study. The results showed that the 5-Fu and Cur was successfully incorporated and released from the prepared nanocomposite without the loss of structural integrity and the change in its functionality. The results indicated the release of 95% of 5-Fu and 83% of Cur in the medium of pH 7.4 during 24 h. The developed nanocomposite showed good biodegradability. The results of the study indicate that nanocomposite of modified chitosan and karaya gum is a promising material for the development of dual drug delivery systems for cancer treatment.