Abstract

In this research work, we synthesised and characterised carboxymethyl tara gum (CMTG). The synthesised CMTG had a DS of 0.84 and the synthesis was ascertained by FTIR, ^{13}C solid state NMR, XRD and DSC studies. The synthesised CMTG was cross-linked with either Al^{3+} and Ca^{2+} ions or with both Al^{3+} and Ca^{2+} ions to develop hydrogel matrices. It was observed that the cross-linking ions had a significant impact of the swelling, erosion and TH dissolution from the hydrogel matrices. Elevation in the concentration of the cross-linking ions significantly retarded TH dissolution, swelling and erosion of the matrices. It was also observed that Al^{3+} ions had a greater impact on the hydrogel matrices compared to Ca^{2+} ions. At the same concentration of the cross-linking ions, retardation of swelling, erosion, and TH dissolution for the hydrogel matrices was more pronounced in case of Al^{3+} ions. When the overall concentration of the cross-linking ions was held constant and the amount of Al^{3+} and Ca^{2+} ions was varied, it was observed that elevation in the concentration of the Al^{3+} ions sustained TH dissolution, and the reverse pattern was observed with the Ca^{2+} ions. In this research work we also reported the development of a novel, one of its kind hydrogel matrix development process, which is a combination of both direct compression and wet granulation method of tablet preparation. TG was added to the hydrogel matrices in two ways. It was incorporated within the granules (intragranlar TG) or within the matrices (extragranular TG). The development of the extragranular TG hydrogel matrices made the process a combination of both direct compression and wet granulation method of tablet preparation. Intragranular TG accelerated TH dissolution, while extragranular TG retarded TH dissolution. In vivo pharmacokinetic studies confirmed the sustained release properties of the extragranular TG hydrogel matrices. Finally, accelerated stability studies indicted the stability of the hydrogel matrices under adverse storage conditions.