ABSTRACT

The present study is focused on the development of an adjustable polymeric drug carriers by introducing two novel techniques such as, interpolymer complexes (IPCs) and polymer blend based on miscibility study, towards achieving a sustained release drug delivery system for a highly water soluble and low permeable Class-III antidiabetic drug metformin hydrochloride (Met). Towards the same, chapters II and III are focused on interpolymer complexes of chitosan (CH) and two different viscosity grades of hydroxypropyl methylcellulose - HPMC (K4M and K100M) at various ratios in addition to hydrophobic polymers to obtain a sustained release tablet. The remaining chapters are mainly focused on polymer blend formulations in the form of microspheres and microparticles based on miscibility of eudragit (Eu)/chitosan (CH) and eudragit (Eu)/ HPMC K100M polymers at two different temperatures (30 & 40°C) determined by viscosity, ultrasonic velocity, density and refractive index measurements.

Preformulation study has been carried out for Met and a standard curve plotted at two different pH buffer solutions (pH-2 and pH-6.8). The formation of IPCs and polymer blends are confirmed by TGA, XRD, FTIR, DRS techniques. The drug compatibility is confirmed by FTIR and XRD techniques. The physical parameters of formulated tablets, microspheres and microparticles were found to be optimum as per the standard limits. Drug content, in vitro dissolution study and drug release kinetics have also been carried out at two different pH, say, 2 and 6.8.

In vitro dissolution studies were performed for all tablet formulations and the best one is compared with marketed sustained release and immediate release metformin hydrochloride tablets. The best tablet formulation shows good sustained release property as compared to marketed drug. The formulated microspheres containing high concentration of chitosan show good swelling behaviour as compared to eudragit based microspheres. Microparticles act as a better sustained release drug carrier than their bulk counterparts.

Thus, from our study, it is observed that polymer matrices in the form of IPCs and blends act as good drug carriers better than pure parent polymers playing a significant role towards achieving a sustained drug delivery system for class III antidiabetic drug Met.