ABSTRACT

The aim of the present study was to achieve a controlled release of Lornoxicam by using various natural and synthetic polymers (in different ratios) as carriers and also to develop and investigate an oral colon specific, pulsatile device to achieve time and site specific release of Lornoxicam based on chronopharmaceutical considerations.

Lornoxicam microspheres were prepared by various modified techniques using natural and synthetic polymers. The physicochemical characteristics of Lornoxicam microspheres such as drug – polymer interaction study by Fourier Transform Infrared (FTIR) and further confirmation by Differential Scanning Calorimetry (DSC) and X-ray Diffraction (XRD), surface morphology, frequency distribution analysis, percentage drug entrapment efficiency, in vitro release and release kinetics were evaluated. From the obtained results the formulations which showed optimum release (best formulation each from natural and synthetic polymers) were subjected to in vivo studies on Albino rats to further confirm the same. Finally, the most optimum batch (one batch) was selected for further fabrication of pulsatile capsule. The formulated pulsincap was evaluated for various pre-formulation parameters, in vitro dissolution studies and release kinetics.

The FTIR Spectra revealed that there was no interaction between polymer and Lornoxicam which was further confirmed by DSC and XRD. All the formulated Lornoxicam microspheres were spherical in shape confirmed by SEM and microspheres with normal frequency distribution were obtained. The maximum of 98.38% drug entrapment efficiency was obtained in Lornoxicam microspheres. The in vitro performance of Lornoxicam microspheres showed controlled release which depended on the polymer concentration. The regression co-efficient values indicated that the release data was fitted to Zero order kinetics and Higuchi’s diffusion controlled release mechanism. The diffusion exponent (n) of Korsemeyer Peppa’s model was found to be non-Fickian. The in vitro dissolution profile of Lornoxicam modified pulsincap was in proportional to the concentration of hydrogel used. The regression co-efficient values indicated that the release data was best fitted to zero order kinetics and Higuchi’s
equation confirmed diffusion controlled release mechanism. The Korsmeyer-Peppa’s diffusion exponent ‘n’ value was between 1.692 to 1.764 which showed that the diffusion was coupled with erosion indicating an anomalous diffusion.

The present study conclusively demonstrates the feasibility of effectively encapsulating Lornoxicam into natural polymers viz., Gelatin, Na CMC and Chitosan, and synthetic polymers viz., Eudragit L-100, Eudragit S-100 and its combinations to form potential controlled release drug delivery systems. Also, the study demonstrated that Lornoxicam could be successfully targeted to colon by design of time and pH dependent modified chronopharmaceutical formulation. In conclusion, drug release over a period of 4 to 24 hours, could be achieved from an insoluble gelatin capsule in which microspheres were sealed by means of a hydrogel plug.

*Key words:* Lornoxicam, Chronomodulated, Natural polymers, Synthetic polymers.