



Formulation, *In vitro* and *In vivo* Evaluation of Pioglitazone Hydrochloride - Effervescent Gastro Retentive Floating Hydrophilic Matrix Tablets.

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Abstract : Aim: Of this study was to formulate and evaluate an anti-diabetic agent, Pioglitazone HCl (PH) to an effervescent gastro retentive floating tablet (GRFT), which can extend its release up to 12 h in gastric pH. To determine the effect of combination of natural gums [sodium alginate (SA), sodium carboxy methyl cellulose (Na CMC), xanthan gum (XG) & guar gum (GG)] with semi-synthetic polymer, HPMC K100M in extending the release of PH up to 12 h in gastric pH. **Methods:** Drug- excipient compatibility studies were done by FT-IR studies. The effervescent PHGRFT was prepared by direct compression. All the formulations were evaluated for pre-compression (angle of Repose (θ), bulk density (BD), tapped density (TD), Carr's Index (CI) & Hausner's Ratio), post-compression (% wt variation, thickness, % friability, % assay, %swelling index and *in vitro* dissolution), *in vitro* buoyancy studies [floating lag time (FLT), total floating time (TFT) and matrix integrity (MI) up to 12 h], drug release kinetics determination. *In vivo* x-ray imaging studies in rabbits and accelerated stability studies in the final 10 cc HDPE package were conducted for the optimized formulation-F4. **Results:** FT-IR studies reveals that PH and the polymers used in the study are compatible. Pre & post-compression parameters were within the acceptable limits for all formulations. Drug release kinetics of formulation-F4(37.5% HPMC K100M and 12.5% GG) suggests it extends the drug release up to 12 h, with a better zero order release profile (as zero order, $r^2=0.999$). Drug release process is not predominantly by diffusion (as Higuchi $r^2= 0.840$); and the mechanism of diffusion is by super case-II transport (as Korsmeyer- Peppas, $n=1.058$). It is exhibiting FLT of 56 s, TFT and a better MI up to 12 h. Hence it is an optimized formulation. F4 batch passes the test for stability as per ICH guidelines. Hence, it was finally concluded that a better twice a daily PHGRFT was formulated and evaluated.

Key words: Pioglitazone HCl (PH), gastro retentive floating tablets (GRFT), hydroxy propyl methyl cellulose (HPMC K100M), sodium alginate (SA), sodium carboxy methyl cellulose (Na CMC), xanthan gum (XG), guar gum (GG), *in vitro* buoyancy studies, *in vivo* X-ray imaging studies.