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Mucoahhesive microspheres for gastroretentive delivery of metformine hydrochloride: *In vitro* evaluation

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Background and Aims: The present study involves preparation and evaluation of gastric-mucoadhesive microspheres with Metformin Hydrochloride as model drug for prolongation of gastric residence time. The microspheres were prepared by the emulsification solvent evaporation technique using polymers Carbomer 934p and ethylcellulose.
Methods: The microspheres were prepared by emulsion solvent evaporation method. The prepared gastric-mucoadhesive microspheres were characterized for encapsulation efficiency, drug loading, particle size, and surface morphology, degree of swelling, in-vitro mucoadhesion, drug release, in-vivo studies and stability studies.
Results: The microspheres exhibited spherical shape with very good percentage of mucoadhesion and drug entrapment efficiency. The release of drug was prolonged to 12 h (78.8 ± 3.9) when incorporated into mucoadhesive microspheres. The poor bioavailability of metformine is attributed to short retention of its dosage form at the absorption sites (in upper gastrointestinal tract to duodenum and jejunum). The results of mucoadhesion study showed better retention of metformine microspheres (8.0 ± 0.8 h) in duodenal and jejunum regions of intestine. The results of qualitative and quantitative GI distribution study also showed significant higher retention of mucoadhesive microspheres in upper GI tract.
Conclusions: Therefore, it may be concluded that drug loaded gastric-mucoadhesive microspheres are a suitable delivery system for metformin hydrochloride, and may be used for effective management of NIDDM (Non Insulin Dependent Diabetes Mellitus).

Keywords: Gastric-mucoadhesive; Microsphere; Metformin hydrochloride; Emulsion solvent evaporation technique; Ethylcellulose; Carbomer 934p