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Novel floating and bioadhesive biphasic release tablets of repaglinide and glipizide for strategic and effective treatment of diabetes mellitus

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Diabetes be of any kind is still one of the major threat to world in 21st century. As diabetes mellitus needs combination of effective oral agents from different chemical classes to maintain adequate blood glucose level. Design, development and optimization of floating and bioadhesive biphasic tablet become a rational approach for the treatment of type-II diabetes mellitus. This system enhances patient compliance by reducing the repetitive administration, and may improve bioavailability. A 2^3 factorial design was employed using three factors viz. HPMC K4M (X_1), Na CMC (X_2), $NaHCO_3$ (X_3) were used as independent variables with two dependent variables which were: Percent cumulative drug release after 12 h (Y_1) and Floating lag time (Y_2) for formulating floating and bioadhesive tablets. This system contained immediate release layer of repaglinide (RPG) and floating bioadhesive sustained release layer of glipizide (GPZ) prepared by the direct compression technique. Drug-drug compatibility study was carried out by FTIR and DSC. Tablets were evaluated for buoyancy study, swelling study, adhesion retention period, and in vitro release Optimized formulation (C2) released more than 90% RPG within 30 min from immediate layer while 93.44% of GPZ was released at the end of 12 h with the floating lag time of 142 sec. The tablet remained buoyant throughout all studies. Kinetic release models were applied for all formulations and 'n' values obtained from Korsmeyer–Peppas. Stability study on optimized formulation was also done. All the studies conducted signifies clearly that approach used is well defined, studied accordingly and will serve a valuable mean to treat diabetic complications.

Development of solid self microemulsifying drug delivery system for enhanced bioavailability

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Improvement of bioavailability of drug presents one of the greatest challenges in drug formulation. One of the most popular and commercially viable formulation approaches for this challenge is solid-self micro emulsifying drug delivery system (S-SMEDDS). Liquid SMEDDS are inconvenient to use and have incompatibility problems with the shells of soft gelatin. S-SMEDDS have recently been described and they overcome disadvantages of liquid SMEDDS as well as exhibited more commercial potential and patient acceptability. Present study aimed towards development of S-SMEDDS of poorly soluble cardiovascular drug via spray drying for enhanced bioavailability. In this study solubility of drug was determined in various oil, surfactant and co-surfactant. Pseudoternary phase diagrams were used to evaluate microemulsification existence area. Three component SMEDDS formulation were established and selected combinations were exposed to spray drying using water soluble solid carrier. S-SMEDDS formulations were tested for reconstitution properties such as dilution study, globule size and zeta potential. Also solid state characterization such as XRD, DSC and SEM of S-SMEDDS were determined. The in-vitro dissolution studies of S-SMEDDS filled into hard gelatin capsule and pure drug were carried out. Results showed that the mean droplet size of all reconstituted S-SMEDDS were very low and all were found to be in the nanometric range (<100 nm). Drug releases from S- SMEDDS formulations were found to be significantly higher as compared with that of pure drug. Thus study concluded with S-SMEDDS provides useful solid dosage form to improve solubility and dissolution rate of poorly soluble cardiovascular drug and concomitantly bioavailability.