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RESEARCH ARTICLE

FORMULATION AND EVALUATION OF GLIPIZIDE HOLLOW MICROBALLOONS FOR FLOATING DRUG DELIVERY

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The present investigation was aimed to formulate and evaluate the gastro-retentive floating microballoons of glipizide using hydrophilic polymers hydroxypropyl methylcellulose (HPMC) and Eudragit RS100 (RS 100) by emulsion solvent evaporation technique. The floating microballoons were evaluated using micromeritic properties, buoyancy, *in vitro* drug release, scanning electron microscopy and stability studies. The densities of floating microspheres (0.475-0.975 g/cm^3) were found to be less than the density of gastric fluid (1.004 g/cm^3), therefore showed an extended floating time of more than 12 h over the gastric fluid. The entrapment efficiency of prepared floating microspheres was satisfactory (41.32-76.19%). The scanning electron microscopy confirmed the hollow nature of microspheres with pores on the surface which imparted floating properties to the prepared floating microballoons. Among all formulations, F4 (Drug:HPMC:RS 100::1:4:3) was found to be the best as it exhibited highest drug release (99.12%) in 12 h followed by diffusion mechanism and was stable for three months at ambient conditions.

Key words: Hollow microballoons, Glipizide, Sustained release, Floating drug delivery.

INTRODUCTION

Floating Drug Delivery Systems (FDDS) are among the several approaches that have been developed in order to increase the gastric residence time of dosage forms. Both single and multiple unit systems have been developed. Drugs that are easily absorbed from the gastrointestinal tract and have a short half-life are eliminated quickly from the blood circulation, so they require frequent dosing. To avoid this drawback, the oral sustained-controlled release formulations have been developed in an attempt to release the drug slowly into the gastro-intestinal tract and maintain an effective drug concentration in the blood over long period of time. However, such oral drug delivery devices have a physiological limitation of low gastric retention time. Variable and short gastric emptying time can result in incomplete drug release from the drug delivery system in the absorption zone (stomach or upper part of small intestine), leading to diminished efficacy of the administered dose (Shinde and More, 2008; Singh *et al* 2009; Nayak *et al* 2010). To overcome these limitations, approaches being proposed to prolong the gastric residence time, include floating drug delivery systems, swelling or expanding systems, mucoadhesive systems, high-density systems, modified-shape systems and other delayed gastric emptying devices (Ma *et al* 2008).

Floating drug delivery is of particular interest for drugs that (1) act locally in the stomach, (2) are primarily absorbed in the stomach, (3) are poorly soluble at an alkaline pH, (4) have a narrow window of absorption, and (5) are unstable in the intestinal or colonic environment (Jain *et al* 2006). To provide good floating behavior in the stomach, the density of the