Research Article

Formulation and evaluation of sustained release glipizide tablet using different polymers

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ABSTRACT

The glipizide sustained release (SR) tablet was prepared using different hydrophilic polymers such as hydroxypropyl methylcellulose (HPMC) K4M, HPMC K100M, and ethyl cellulose in various proportions. Design Expert software used for formulation of glipizide SR tablet. The SR tablet was prepared by direct compression method. The prepared SR tablets were subjected to thickness, friability, weight variation test, drug content, hardness, and *in vitro* release studies. The drug excipients compatibility was evaluated by Fourier transform infrared (FTIR) and differential scanning calorimetry (DSC) studies. *In vitro* dissolution study shows that F6 formulation was 97% releases the drug in a controlled manner for 16 h. The DSC and FTIR studies revealed that there was no interaction between drug and excipients. Stability studies were carried out for optimized formulation according to ICH guidelines. Using different hydrophilic polymers in various proportions to prepare SR tablets of glipizide having prolonged therapeutic effect with enhanced patience compliance.

Keywords: Direct compression method, ethyl cellulose, glipizide, hydroxypropyl methylcellulose, *in vitro* release, sustained release

Introduction

Sustained release (SR) is types of modified drug delivery system that can be used as an alternative to conventional system. Among different dosage forms, SR drug delivery system widely used.[1] SR system have benefits such as patient compliance, avoid multiple dosing, cost effectiveness, flexibility, increase the plasma drug concentration, avoid side effects, broad regulatory acceptance, and overcome the problems associated with conventional drug delivery system.[2-4] Hydrophilic polymers are becoming very popular in formulating oral sustain release tablets. As the dissolution medium penetrates the SR tablets, the polymer material swells, and it form hydrogel by the time thus it is able to controlled drug release.[5,6] However, the SR tablet by direct technique is a very simple approach in the pharmaceutical field for its ease, compliance, faster production, in comparison with other controlled release systems. Cellulose ethers such as hydroxypropyl methylcellulose (HPMC) and ethyl cellulose are widely used hydrophilic polymers as release retardants.[7,8]

Glipizide is widely used sulphonyl urea antidiabetic agent, for the treatment of patients with type II diabetes.[9] It is a weak acid (pKa = 5.9) practically insoluble in water and acid solution but as per biopharmaceutical classification system it is highly permeable.[10] The oral absorption is uniform, rapid, and complete with nearly 100% bioavailability with an elimination half-life of 2-4 h. Glipizide having a short biological half-life (3.4 ± 0.7 h) requiring it to be administered in 2-3 doses of 2.5-10 mg per day.[11] SR formulations that would maintain plasma levels of drug for 8-12 h might be sufficient for once a day dosing for glipizide. Sustain release products are needed for glipizide to prolong its duration of action and to improve patient compliance. The objective of this study was to develop a matrix system to completely deliver glipizide, in a zero-order manner over an extended period using various hydrophilic polymers. Thus, the study takes into consideration for research study formulate and evaluate the SR tablet of glipizide using different polymers with different ratio and characterized study using SR tablet.

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