

Preparation of Gliclazide Nanoparticles via Electrospraying Method and Evaluation of Their Physicochemical Properties

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Abstract

Introduction:

Gliclazide is a second-generation sulfonylurea used in the treatment of non-insulin dependent diabetes mellitus. Gliclazide is practically insoluble in water, therefore, researchers try to find techniques to improve its physicochemical properties. On the other hand, researches has shown that nanoparticles are effective in improving the physicochemical characteristics of poorly water-soluble drugs. There are many methods to prepare nanoparticles, among all, electrospraying as a one-step and cost-benefit technique can be easily applied in industrial scale.

Methods and Results:

Gliclazide and polymer (Eudragit RS100 or PEG6000) were co-dissolved in acetone with drug: polymer ratios of 1:5 and 1:10, so that the polymer solution concentrations were 10, 15 and 20% (w/v). Then these solutions were electrosprayed. The particle size and morphology were evaluated using scanning electron microscopy (SEM). The physicochemical characteristics of nanofibers and nanoparticles were evaluated by DSC thermograms, FTIR spectroscopy and X-Ray crystallography. Drug release profiles were studied as well. The size of prepared nanofibers and nanobeads, ranged from 100 nm-500 nm. Based on the physicochemical characteristics, there was a transition from crystalline to amorphous state of Gliclazide. No interaction between drug and polymers were observed in the prepared nanoparticles. In vitro drug release studies revealed that the drug-release patterns were improved in the prepared nanoparticles.

Conclusions:

Electrospraying is a simple and low-cost method that can be used to produce Gliclazide nanoparticles in industrial scale and improve physicochemical properties of the drug.

Key words: Gliclazide, Eudragit RS100, PEG6000, Physicochemical properties, Nanoparticles, Electrospraying

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