Improvement of the Dissolution Rate of Piroxicam by Surface Solid Dispersion

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ABSTRACT

In order to improve the dissolution behavior of piroxicam, the surface solid dispersion of the drug in microcrystalline cellulose and in potato starch was prepared by coevaporation method. The in vitro dissolution study was performed according to the USP method. The samples were characterized by X-ray diffractometry. It was found that the dissolution rate and the dissolution parameters of the drug from the surface solid dispersion were higher than those of the intact drug. The degree of the dissolution rate enhancement depended on the nature and the amount of the carrier, i.e., the higher amount of the carrier used, the higher dissolution rate was obtained. The dissolution rate of the drug in potato starch based surface solid dispersion was significantly higher than that in the microcrystalline cellulose based. The surface adsorption of the drug particles onto the surface of the carrier was observed in their physical mixtures. This phenomenon had lowered the dissolution rate of the drug. The extent of the surface adsorption was more significant in piroxicam-microcrystalline cellulose system. According to the results, potato starch is the carrier of choice for preparing the piroxicam surface solid dispersion.

Key words: Piroxicam, Microcrystalline cellulose, Avicel PH101, Potato starch, Surface solid dispersion

INTRODUCTION

The effort to improve the dissolution and solubility of a poorly water-soluble drug remains one of the most challenging tasks in drug development. Several methods have been introduced to overcome this problem. However, these methods possess their own drawbacks which limit their applications in pharmaceutical field .

Solid dispersion technique has been extensively used to increase the solubility of a poorly water-soluble drug (Ford, 1986; Serajuddin, 1999; Dressman and Leuner, 2000). According to this method, a drug is thoroughly dispersed in a water-soluble carrier by suitable method of preparation. The mechanism by which the solubility and the dissolution rate of the drug is increased includes: firstly, the particle size of a drug is reduced to submicron size or to molecular size in the case where the solid solution is obtained. The particle size reduction generally increases the rate of dissolution; secondly, the drug is changed from crystalline to amorphous form, the high energetic state which is highly soluble; finally,