The Influence of Polyvinylpyrrolidone K-30 to the Dissolution Rate of Phenylbutazone Prepared in Solid Dispersion

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Abstract

The influence of vehicle polyvinylpyrrolidone K-30 to the dissolution rate of phenylbutazone prepared in solid dispersion has been investigated. The purpose of the investigation poly was to obtain solid dispersion of phenylbutazone in the vehicle polyvinylpyrrolidone K-30 which has superior dissolution rate in dissolution medium. The solid dispersion of phenylbutazone in polyvinylpyrrolidone K-30 was prepared by solvent method with various ratio (1:1, 1:2, 1:3, 1:4, and 1:5). The solid mass formed was passed by 100-mesh sieve and 200-mesh sieve. The evaluation of solid dispersion phenylbutazone-polyvinylpyrrolidone K-30 included the test of interference of vehicle on the absorption of phenylbutazone, thin layer chromatography, and infrared spectroscopic methods. The dissolution test of solid dispersion phenylbutazone-polyvinylpyrrolidone K-30 was done by dissolution apparatus test of USP type in HCL 0.1 N at temperature 37±0.5°C using basket stirrer with agitation rate 100 rpm. The releases of phenylbutazone in certain times were measured by uv-vis spectrophotometry at 230 nm wavelength, and the concentration determined with standard curve. The evaluation of solid dispersion phenylbutazone-polyvinylpyrrolidone K-30 indicates that there is no interaction between phenylbutazone and polyvinylpyrrolidone, the influence of polyvinylpyrrolidone K-30 was significant on the dissolution rate of phenylbutazone. Further analysis with Tuckey test showed that the dissolution rate of polyvinylpyrrolidone K-30 increased, whereas the solid dispersion phenylbutazone-polyvinylpyrrolidone K-30 ration 1:5 has better dissolution rate than ratio 1:1, 1:2, 1:3, and 1:4. The solid dispersion of phenylbutazone-polyvinylpyrrolidone K-30 was passed by 100-mesh sieve also has superior dissolution rate than solid dispersion was passed by 200-mesh sieve.

Keywords: phenylbutazone, polyvinylpyrrolidin (PVP), dissolution rate, solid dispersion.

Introduction

A drug given orally for systemic purpose should be able absorb (1). The absorption of active compound of a product is mainly related to its dissolution rate, the more quickly it is dissolved the faster the absorption will be in order to give effects.

Phenylbutazone is a drug which is slightly soluble in water. Consequently, it is quite difficult to wet and it might be troubled to dissolve. One method to increase the dissolution and absorption rate of the drug slightly soluble in water is solid dispersion system which was first introduced by Sekiguchi and Obi (reviewed in 2) in 1961. Solid dispersion is defined as one or more drugs dispersed in the vehicle or inert matrix in solid condition made by melting or melting-solvation method.

Dissolution rate of the component on the surface extremely influence the dissolution of the other substance in a mixture, hence, the choice of the vehicle is crucial to the dissolution characteristics of the drugs.

Vehicles with a great solubility in water will produce faster released drugs compared to slightly or insoluble vehicles (2). Water soluble vehicle usually used to increase dissolution rate in solid dispersion system are polyethylenglicol, polyvinylpyrrolidin (PVP), urea, chitin, and deoxycolic acid.

Based on the explanation above, a question arouse whether the dissolution rate of phenylbutazone can be increased if being dispersed in water soluble vehicle. To solve the problem, solid dispersion of phenylbutazone in PVP K-30 with various ratio, 1:1, 1:2, 1:4, and 1:5 were tested using solvation method. The influence of various concentration of PVP K-30 to phenylbutazone release is observed by dissolution test in medium HCl 0.1. The quantity of phenylbutazone released per time unit is measured.