Formulation, Optimization, and Evaluation of Solid Dispersions of metformin HCl Using Factorial Design

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Abstract

ABSTRACT

The objective of this study is to achieve the controlling dissolution rate of Metformin HCl, a freely water soluble antidiabetic drug.

Solid dispersions microcapsules were prepared using solvent evaporation method which enclosed preparation of a uniform

dispersion of Metformin HCl in (Hydroxy propyl methylcellulose k100, Ethyl cellulose, Eudragit RL PO, RS PO & Compritol 888 ATO). A

two-factor, General factorial statistical design was used to quantitate the effect of polymer type (X_1) and drug: polymer ratio(X_2) on

the release profile. Where polymer type and drug: polymer ratio were selected as independent variables, while Y_1 (cumulative drug

release after 1 hr.) and Y_2 (cumulative drug release in 3 hrs.), Y_3 (cumulative drug release in 10 hrs.),Y_4 (angle of repose) and Y_5

($Hausner$ ratio) were selected as dependent variables. The solid dispersions were characterized for their in vitro- release rate. The

optimized formulation was further characterized by Drug scanning calorimetry, infrared spectrophotometry, X-Ray Diffractometer

and SEM analysis. A convenient statistical model was made and a significantly controlled release rate was exhibited .the optimized

formulation was investigated by DSC, XRD, FTIR and SEM data which showed the crystalline nature of Metformin HCl in a solid

dispersion, the statistical model helped us to recognize the effects of formulation variables on the dispersion.

Keywords: Metformin HCl, Solid dispersion, controlled release, factorial design, HPMC k 100, Ethyl cellulose, Eudragit RL, RS&

Compritol ATO 888.