2013-14

Rajnibhai V. Patel
PharmInnova Award
Best M. Pharm Thesis

WINNER

Winner

Mr. Devang B. Tandel

Research Guide

Dr. Purvi Shah

Subject:
Quality Assurance

Thesis Title :
Spherical Crystallization Technique for Solubility enhancement of Febuxostat and its Pharmacokinectic application in Rat Plasma by RP-HPLC method

College:
Anand Pharmacy College, Anand

Treatment of Gout with enhanced efficacy

Outcome of Research:

A major challenge in the drug development and delivery process is improving aqueous solubility and rate of dissolution of drugs, which ultimately improves absorption of the drug from the gut. This study attempted to improve the aqueous solubility of febuxostat (drug used to treat gouty arthritis) using a special neutralization method of 'spherical crystallization technique'. This unique technique would help improve the solubility of febuxostat, which in turn would increase the dissolution and then the bioavailability (availability in blood). The maximum plasma concentration was higher than the marketed product in Invivo studies. This ensures reduction of dose and rapid onset of action of febuxostat with resultant healthcare benefits in gouty arthritis in terms of patient compliance.

Thesis Title: Spherical crystallization technique for solubility enhancement of febuxostat and its pharmacokinetic application in rat plasma by RP-HPLC method

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ABSTRACT

Objectives:
To enhance solubility of febuxostat using spherical crystallization technique; and to develop novel bioanalytical method using RP-HPLC along with pharmacokinetic application.

Experimental Work:
Various hydrophilic polymers like PVP K30, chitosan and HPMC E3LV were used for the preparation of spherical agglomerates and characterized in terms of morphology, drug content, solubility, DSC, FTIR, XRD, SEM and in-vitro dissolution studies. In-vivo study was performed using RP-HPLC bioanalytical method by optimization of mobile phase.

Results and Discussion:
Saturation solubility study and mean dissolution time showed improved solubility of spherical agglomerates in water and phosphate buffer (pH-6.8) using PVP K30 (1:5) and HPMC E3LV (1:4) as compared to pure drug. Various characterizationtechniques revealed drug excipient compatibility with HPMC E3LV. The Rt for febuxostat and timolol (ISTD) were 5.55 and 8.88 minute using optimized mobile phase, methanol: 0.02 M potassium dihydrogen orthophosphate buffer pH-6.8 (65:35). The optimal SALLE method showed greater than 90% extraction recovery from plasma. Cmax t for spherical agglomerates of febuxostat was higher compared to marketed formulation.

Conclusion:
The prepared spherical agglomerates of febuxostat are capable of surmounting the shortcomings of least solubility and bioavailability. The developed SALLE–HPLC method also offered a number of features including wide linear range, high recovery, short analysis time, as well as low cost.