International Journal of Rural Development, Environment and Health Research
[Vol-8, Issue-1, Jan-Mar, 2024]
Issue DOI: https://dx.doi.org/10.22161/ijreh.8.1
ISSN: 2456-8678 ©2024 IJREH Journal

Enhancement of Aqueous Solubility of Piroxicam Using Solvent Deposition System

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Received: 03 Jan 2024; Received in revised form: 10 Feb 2024; Accepted: 20 Feb 2024; Available online: 05 Mar 2024

Abstract**—** *Piroxicam is a non-steroidal anti-inflammatory drug that is characterized by low solubility-high permeability. The present study was designed to improve the dissolution rate of piroxicam at the physiological pH's through its increased solubility by using solvent deposition system.*

Keywords**— NSAID, Piroxicam, SDS, solubility enhancement, Lactose**

I. INTRODUCTION

Piroxicam is a member of the oxicam group of nonsteroidal anti-inflammatory drugs (NSAIDs). The chemical name for piroxicam is 4-hydroxyl-2-methyl-N-2-pyridinyl-2H-1,2-benzothiazine-3-carboxamide 1,1-dioxide. It is indicated for acute or long-term use in the relief of signs and symptoms of osteoarthritis and rheumatoid arthritis (Cavallari C et al., 2002).

According to the Biopharmaceutic Drug Classification System (BCS) proposed by Amidon et al. piroxicam is a class 2 drug, characterized by low solubility–high permeability. Drug dissolution in vivo is the rate-controlling step in drug absorption. Several techniques have been used to improve the oral bioavailability of piroxicam by increasing its solubility (Amidon GL et al., 1995).

II. MATERIALS

Piroxicam was obtained from Vaishali Pharma Private Limited Maharashtra. Acetone and lactose obtained from CDH® of analytical grade.

Solubility studies

The aqueous solubility of a drug is a prime determinant of its dissolution rate and compounds with aqueous solubilities lower than 0.1 mg/ml often present dissolutions limitations to absorption. The solubility of piroxicam in water at 37 °C was found to be 0.0198 mg/ml. At the elevated temperatures, the solubility of the drug barely enhanced from 0.0198 to 0.0671 mg/ml. Therefore, the solubility of piroxicam was tried to be improved by preparing its solvent deposition system. (Karataş A et al., 2005)

Formulation of solvent deposition system (SDS) of piroxicam:

Aqueous solubility of piroxicam will be enhanced by preparing solvent deposition system (SDS) by adsorbing it on lactose. SDS of piroxicam was prepared by taking piroxicam: lactose in the ratios of 1: 0, 1:0.5, 1:1 and 1:1.5, 1: 2. Piroxicam solution was prepared in acetone followed by dispersing the known quantity of lactose in it. The resulting dispersion was dried at room temperature. The dried SDS of piroxicam was passed through 60-mesh sieve and subjected for aqueous solubility determination. An excess different ratio of SDS was added in each four test tube containing 5 ml of water and shaking continuously. Then the solutions were centrifuged at 5000 rpm for a minute and the absorbance of the piroxicam test solutions was measured at the characteristic wavelength of 354nm by UV spectrophotometer (Shimadzu-1600).

III. RESULTS AND DISCUSSION

The aqueous solubility of piroxicam is 0.027±0.02. On formulation of SDS of piroxicam, the aqueous solubility was found 5.568±0.03 to 11.21±0.04. So it was observed that aqueous solubility of piroxicam was increased upto 415 times by formulation of SDS of piroxicam on lactose surface. So SDS of Piroxicam prepared with Piroxicam: lactose in the ratio of 1:1. In further studies it will be selected to prepare the formulations.

S. No.	Piroxicam: Lactose	Aqueous solubility (mg/ml)
1	1:0	0.027 ± 0.02
2	1:0.5	5.568 ± 0.03
3	1:1	11.21 ± 0.04
4	1:1.5	10.22 ± 0.02
5	1:2	10.24 ± 0.02

IV. CONCLUSION

Quantitative solubility studies showed that the piroxicam poorly soluble in water. so solvent deposition system is used to increased the solubility of drug. The aqueous solubility of Piroxicam was enhanced after converting it into SDS. The solubility study indicated enhancement of aqueous solubility of Piroxicam by solvent deposition on lactose. SDS of Piroxicam prepared with Piroxicam: lactose in the ratio of 1:1.

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