Studies on solubility of meloxicam by solid dispersion method

1Upasana J. Patel, 1Pinal J. Patel, 1Hetal B. Prajapati, 1Rahul J. Patel, 2M.Moin K. Modasiya
1APMC College of Pharmaceutical Education and Research, Himatnagar, Gujarat, India
2JIT University, Jhunjhunu, Rajasthan, India

Received on: 21-01-2012; Revised on: 14-02-2012; Accepted on: 18-04-2012

ABSTRACT

Meloxicam is a non-steroidal anti-inflammatory drug (NSAID). It is used in both osteoarthritis and rheumatoid arthritis. In some studies, it showed superior results compared to a placebo in the prophylaxis of Alzheimer’s disease, when given in low doses over a long time. It is occasionally used for the healing of acne, because of its anti-inflammatory properties. In this study it was shown that the rate of dissolution of poorly soluble drug of meloxicam was increased by the dispersion of solid dispersions. In this study, the pure drug was coded as D and the solvent evaporation formulations were coded as S1, S2 and S3. The melt dispersion formulations were coded as M1, M2 and M3. The dissolution rate of meloxicam was determined. In solvent evaporation method the drug was taken with mannitol in the proportions of (1:1, 1:4 and 1:8). In solvent evaporation method the rate of dissolution of meloxicam was increased with the proportion of (1:8) when compared to the other formulations. In melt dispersion method the rate of dissolution was increased with the proportion of (1:8) when compared to the other formulations. A number of poorly soluble drugs have been shown to improve their dissolution characteristics, when converted to solid dispersions.

Keywords: Meloxicam, Solvent Evaporation, Melt dispersion, Solubility.

INTRODUCTION

Solid dispersion technique can be used to increase the dissolution and absorption of several insoluble drugs [1, 2]. Today a number of drugs are not showing complete therapeutic effect because of their poor solubility and dissolution, which in turn leads to poor bioavailability of the drug [3, 4]. So, in the modern days, top most importance is given for increasing the dissolution rate of poorly soluble drugs, which enhances their bioavailability. Solid dispersion technology can be applied to increase the dissolution rate of highly lipophilic drugs thereby improving their bioavailability [5-8]. Usually, solid dispersions are two-component systems consisting of a hydrophilic carrier in which the drug is incorporated. The drug is incorporated in the hydrophilic carrier may be molecularly dispersed or may occur as Nano crystals or amorphous nanoparticles. The improved dissolution rate of the drug can be ascribed to (i) an increased solubility of the drug because of its amorphous state or small particle size (Kelvin’s law) [9-12] (ii) an increasing surface area available for drug dissolution because of the small size of the drug particles [13, 14] and (iii) an improved wetting of the drug caused by the hydrophilic carrier [15, 16]. Meloxicam is a non-steroidal anti-inflammatory drug (NSAID). Meloxicam is sometimes used for the treatment of acne, because of its anti-inflammatory properties. Meloxicam is used for relief of symptoms of arthritis, primary dysmenorrhea, fever, and as an analgesic, especially where there is an inflammatory component. Meloxicam is a core medicine, which is a list of minimum medical needs for a basic health care system [17]. Meloxicam has been associated with a lower risk of Parkinson’s disease, and may delay or prevent it. The analgesic, antipyretic, and anti-inflammatory activity of NSAIDs appears to be achieved mainly through inhibition of COX-2, which would be responsible for unwanted effects on platelet aggregation and the gastrointestinal tract [18]. However, the role of the individual COX iso forms in the analgesic, anti-inflammatory, and gastric damage effects of NSAIDs is uncertain and different compounds cause different degrees of analgesia and gastric damage [19].

MATERIALS

Meloxicam pure drug and mannitol was procured from Sehat Pharma Pvt. Ltd, Savgath, Himatnagar.

METHODS

SOLVENT EVAPORATION

METHOD

Meloxicam was dissolved in a solvent blend of methanol and dichloro methane (1:1) to get a clear solution in a 100ml round bottom flask. The excipient (mannitol) was then added and dispersed. The solvent in the mixture was removed by evaporation at 50°C under pressure while mixing the contents. The mass obtained was pulverized, mixed and passed through mesh no#60 and evaporates were prepared in various ratios of drug: excipient such as 1:1, 1:4 and 1:8.

MELT DISPERSION METHOD

Take meloxicam and mannitol in the proportion of 1:1 and melt together in a china dish. After melting mix thoroughly both ingredients. Then place china dish on ice bath for cooling, then so obtained damp mass is passed through mesh no #60.

SOLUBILITY OF SOLID DISPERSIONS:

Excess of solid dispersion was dissolved in the 30 ml of distilled water to get the super saturated solution with constant shaking for 24 hrs at ambient temperature until equilibrium was attained. 5 ml of the supersaturated solution filtered through Whatman filter paper No 1 and 1 ml of the filtrate was further diluted suitably with methanol and the absorbance was read measured. Solubility studies were performed for pure drug and solid dispersion from both hot melt method as well as solvent evaporation method [20]. The results are shown in Table 1.

DISSOLUTION TEST

Dissolution rate of Meloxicam was studied using USP II (paddleType) dissolution test apparatus. The quantity of dissolution medium was 900ml of
Solid dispersions of Meloxicam were prepared by solvent evaporation and hot melt dispersion method. It was found that dissolution rate of poorly soluble drug Meloxicam can be increased by forming into solid dispersions; solid dispersions demonstrated a higher dissolution rate than pure drug. The Meloxicam: mannitol S3 solid dispersion made by solvent evaporation method showed highest dissolution rate than the other formulations.

REFERENCES
15. Kawashima Y, Saito M, Takenaka H. Improvement of solubility


Source of support: Nil, Conflict of interest: None Declared