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RESEARCH PAPER

PREPARATION AND CHARACTERIZATION OF LORNOXICAM SOLID SYSTEMS USING CYCLODEXTRINS FOR IMPROVED BIOAVAILABILITY

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The specific objectives of the investigation was to enhance the dissolution rate and bioavailability of the NSAID (lornoxicam), by Cyclodextrin complexation and to study the complexation of the selected NSAID with α-CD, β-CD and HP-β-CD. The DSC, SEM, and XRD studies indicated a reduction in crystallanity and partial amorphization of the lornoxicam because of the formation of inclusion complexes with cyclodextrins. Drugs formed inclusion complexes with β-CD, HP-β-CD, and α-CD at a 1:1 M ratio in solution. The complexes formed were quite stable. The solubility and dissolution rate of all the anti inflammatory drugs studied were markedly enhanced by complexation with α-CD, β-CD and HP-β-CD. Studies concluded that all ternary systems, showed significantly better dissolution parameters than that of the corresponding binary systems.

Key words: Lornoxicam, Cyclodextrins, Complexation, Dissolution rate, Binary systems, Ternary system.

INTRODUCTION

A number of modern drugs are poorly soluble in water and aqueous fluids. As such their absorption and bioavailability often require an improvement or an increase in the dissolution rate and efficiency (Noyes and Whitney, 1897). When poor availability is caused by dissolution rate limited absorption, improvements in the dissolution rate characteristics of the dosage form usually result in an increase in the rate and extent of the drug absorption. The major advantage of this approach is its relative accessibility and the fact that by keeping the molecular structure of the drug intact, no need will arise to conduct new and very expensive clinical studies. Many approaches have been used by researchers to enhance *in vitro* dissolution properties of poorly soluble drugs including solid dispersion (Rascnack and Muller 2002; Vijaya Kumar and Mishra 2006; Ye *et al* 2007; Malleswara Rao *et al* 2008; Patil et al, 2009; Sachan and Pushkar 2011; Patel *et al* 2015) and complexation (Miajaya *et al* 1995; Loftsson and Brewster, 1996; Endo *et al* 1997; Dahiya and Tayde 2013).

NSAIDs belong to Class II category under Biopharmaceutics Classification System (BCS) *i.e.* they are inherently highly permeable through biological membranes, but exhibit low aqueous solubility (Galia *et al* 1998). As such their oral bioavailability and efficacy are severely limited by their poor aqueous solubility and dissolution. They need enhancement in solubility and dissolution rate for improving their oral