Research Article

Formulation and Evaluation of Controlled Release Ketoprofen Microspheres

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ABSTRACT

Microspheres are well accepted technique to control the drug release from the dosage form to improve bioavailability, reduce absorption difference in patients, reduce the dosing frequency and adverse effects during prolong treatment. The main objective of the present study was to prepare and evaluate ketoprofen microspheres by solvent evaporation method, with water insoluble polymers using as carrier for oral administration in view to achieve oral controlled release of the drug and to protect the gastric mucous membrane from drug irritation. Ketoprofen is potent NSAID having anti-inflammatory, Analgesic, antipyretic properties. It is readily absorbed from the gastrointestinal tract and peak plasma concentrations occur about 0.5–2 h after a dose, but it causes a certain irritation in the gastrointestinal mucous membrane and possesses a bitter taste and aftertaste. The half-life in plasma is about 2–3 h. Preformulation studies, compatibility studies and *In-vitro* Dissolution Studies are carried out. The controlled drug delivery systems are designed to achieve more effective therapies by eliminating potential for both over and under dosing and maintenance of drug concentration within a desired range, fewer administrations, optimal drug use and increased patient compliance.[3] Ketoprofen is potent NSAID having anti-inflammatory, Analgesic, antipyretic properties, and is used in the treatment of rheumatoid arthritis, osteoarthritis, and ankylosing spondylitis.

Keywords: Microspheres, Ketoprofen, Eudragit.

INTRODUCTION

The main objective of the present study was to prepare and evaluate ketoprofen microspheres by solvent evaporation method, with water insoluble polymers using as carrier for oral administration in view to achieve oral controlled release of the drug and to protect the gastric mucous membrane from drug irritation or to mask its unpleasant taste.

EXPERIMENTAL

Preformulation studies on the obtained sample of drug for identification including colour tests, solubility analysis, melting point determination and compatibility studies by FTIR were performed.

Preparation of microspheres of Ketoprofen

Ketoprofen microspheres were prepared by Solvent evaporation method using different quantities of Eudragit RS and Eudragit RL polymers. Approximately 1.0, 2.0, 3.0 g or mixture of both were accurately weighted and dissolved in 27 ml of acetone with mechanical stirrer. A 1g quantity of the powdered ketoprofen and 100 mg of magnesium stearate were then dispersed in the polymer solution. The resultant milky white dispersion was poured into a vessel containing a mixture of 270 ml liquid paraffin and 30ml of n-hexane and stirred for 3 hours at 1000 rpm or until the acetone was completely evaporated[2].

Following removal of the acetone, the resultant microspheres were collected by vacuum filtration after which they were washed four times with 25 ml of n-hexane

and dried at room temperature (25 ^{0}C) for 24 hrs

Table 1: Formulation for Ketoprofen containing Eudragit microspheres

F. code	Ketoprofen (g)	Eudragit(RS)	Eudragit RL(g)	Magnesium Stearate (mg)	Acetone (ml)	Stirring Speed (rpm)
F_1	1	1	-	100	27	1000
F_2	1	2	-	100	27	1000
F_3	1	3	-	100	27	1000
F_4	1	-	1	100	27	1000
F_5	1	-	2	100	27	1000
F_6	1	-	3	100	27	1000
F_7	1	1	0.5	100	27	1000
F_8	1	0.5	1	100	27	1000
F_9	1	0.75	0.75	100	27	1000

RESULTS AND DISCUSSION

In the present study, it was aimed to prepare microspheres formulation of Ketoprofen using a biodegradable and non-biodegradable polymer as a carrier for oral administration to extend the period of the dosage form.

The IR spectrum of pure drug and drug – polymer mixture revealed that there was no interaction between polymer and drug. The prepared microspheres were spherical with smooth surface and the percentage yield were very high (86.38-91.38) for all microspheres obtained. Bulk and tapped densities showed good packability and Carr's index results shown excellent compressibility. The entrapment efficiency was good for all the preparation, but was highest for F-9 formulation.

In-vitro release studies of Eudragit RL microspheres showed faster release pattern for all (F4 to F6) formulations with initial burst effect, which may be has a greater proportion of quaternary ammonium groups in their structure. As drug release rates were very slow and incomplete from Eudragit RS microspheres. Eudragit RS microspheres showed at initially very less release of drug from microspheres, compared to Eudragit RL microspheres.

Overall, the curve fitting into various mathematical models was found to be average and the *in-vitro* release of formulation best fitted into the Zero-order.

The stability studies of formulations F-9 indicate that 25 ^{o}C is a suitable temperature for storage of Eudragit RS / RL microspheres of Ketoprofen.

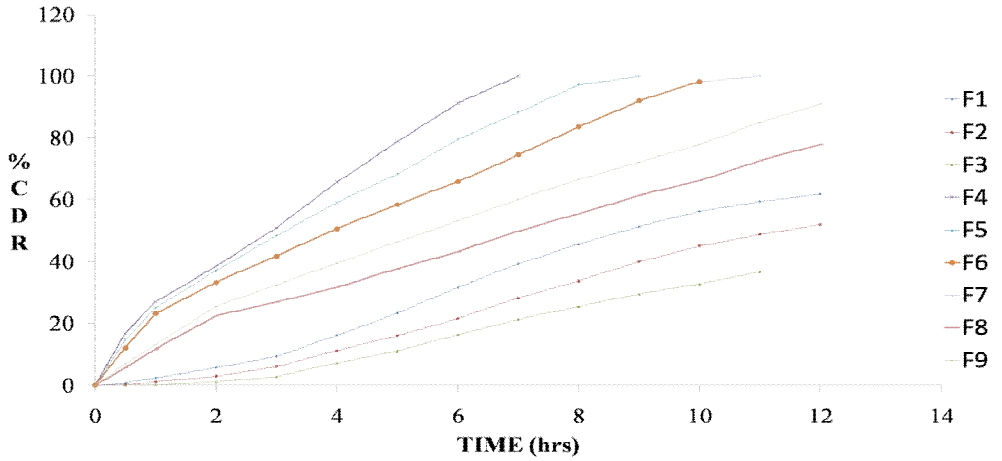

Fig. : Controlled release of Ketoprofen microspheres

CONCLUSION

From the results, concluded that prepared ketoprofen microspheres achieved controlled release of the drug and can protect the gastric mucous membrane from drug irritation. This method will give significant positive effect for the drug for better action.

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