Design and Evaluation of Press Coated Formulation of Aceclofenac and Comparison with Marketed Preparations.

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Abstract

The primary objective of the studies is to investigate whether compression coating could be used to produce tablets providing maximum drug plasma concentration 6 to 8 hours after an evening dose taken at approximately 22:00. Fast Dispersible core tablets containing Aceclofenac were prepared using superdisintegrants like Ac-Di-Sol, Crospovidone and Sodium starch glycolate through wet granulation method and evaluated for various parameters. Prepared press coated tablets were characterized for physical parameters, drug content, lag time, in vitro drug release characteristics. Aceclofenac formulation tablets of batch F4 containing combination Methocel K4M and Methocel K100M showed desired lag time along with drug release as compare to other formulations. The Comparative dissolution study of optimized formulation containing Aceclofenac was carried with marketed preparations also showed good results.

Keywords: Press coated Tablets, lag time, Aceclofenac.

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Introduction

The prepared press-coated tablets contained no drugs in the shell and the release of drug from internal core is presumed to commence, when the outer shell is removed by dissolution or erosion of the hydrophilic polymers on the core surfaces. Therefore, the desired lag time should be obtained which can be achieved by using different viscosity grade polymer and their combinations. Oral drug delivery is the most widely utilized route of administration among all the routes that have been explored for systemic delivery of drugs via pharmaceutical products of different dosage form. Oral route is considered most natural, uncomplicated, convenient and safe due to its ease of administration, patient acceptance and cost-effective manufacturing process *[1]*.

The scientific studies of biological rhythms clearly reveal that biological functions and processes are not static over time. Rather, they are variable in a predictable manner as rhythms of defined period *[2]*.

A Press coated drug delivery system is characterized by a lag time that is an interval of no drug release followed by rapid drug release. Press coated systems are basically time-controlled drug delivery systems in which the system controls the lag time independently of environmental factors depending on polymer used *[3]*.

NSAIDs are commonly used in these conditions to relieve pain and inflammation and to improve mobility, and are also used in the management of a variety of other painful conditions The treatment goals for osteoarthritis, rheumatoid arthritis and ankylosing spondylitis are generally similar, and are to stop or reduce joint inflammation and pain, maintain or improve functioning and mobility, minimize disability, and prevent, delay or correct deformity *[4]*

Aceclofenac is an inflammatory site specific NSAID, as inflammation drastically increases its activity. As such, it is highly efficacious at sites of inflammation, and at the same time, is well tolerated in the rest of the body *[5]*

Materials and methods

Aceclofenac was given by Concept Pharmaceutical Aurangabad, India. Microcrystalline cellulose (Avicel PH101), Ac-Di-Sol, Sodium Starch Glycolate, Crospovidone (Maple Biotech Pvt Limited, Pune) was used as components of the core tablets. The coating components were Hydroxy Propyl Methyl Cellulose (Methocel K4M, K15M and K100M) obtained from Colorcon Asia Pvt Limited Verna, Goa. All other ingredients and reagents were of analytical grade and were used as received.

Result and Discussion

Identification by UV of Aceclofenac

The 0.002 % w/v solution of Aceclofenac was prepared in methanol and subjected for examination in the range of 220 nm to 370 nm on UV Spectrophotometer which showed highest absorption maxima at 274 nm.

Identification by FT-IR and DSC of Aceclofenac:

FT-IR spectroscopy and DSC was carried out to check the compatibility between drug and excipients.

Formulation of Press Coated Tablets

The press-coating techniques have been applied for formulation of press coated tablets containing Aceclofenac in Core. Aceclofenac fast dispersible core tablets were prepared

in seven formulations with varying concentration of three superdisintegrants: Croscarmellose Sodium (Ac-Di-Sol), Sodium starch glycolate and Crospovidone. MCC (Avicel) was used as diluents. Hydroxy Propyl Methyl Cellulose (Methocel K4M, K15M and K100M) used as coating agents.

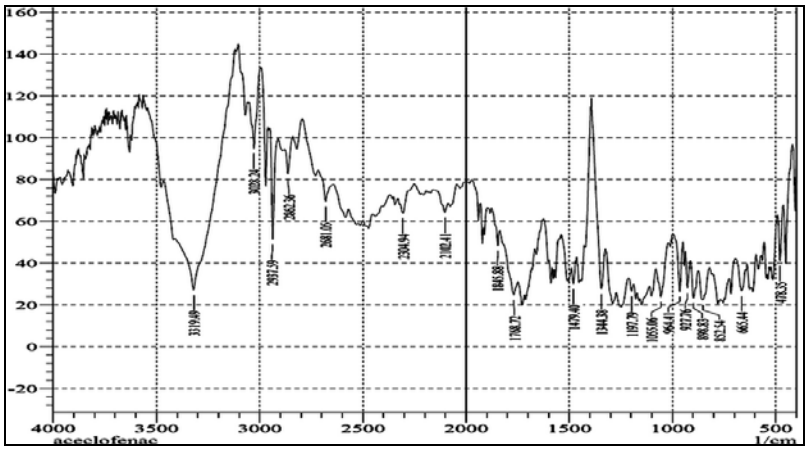


Figure No. 01: FTIR Spectra of Aceclofenac

All the characteristic peaks of Aceclofenac i.e. peaks for N-H stretching vibration, O-H stretching, C-H stretching, C-N stretching, C=O stretching, C=C stretching, O-H in plane bending and Aromatic C-Cl stretching were present in the pure drug shown in **Figure No. 01.**

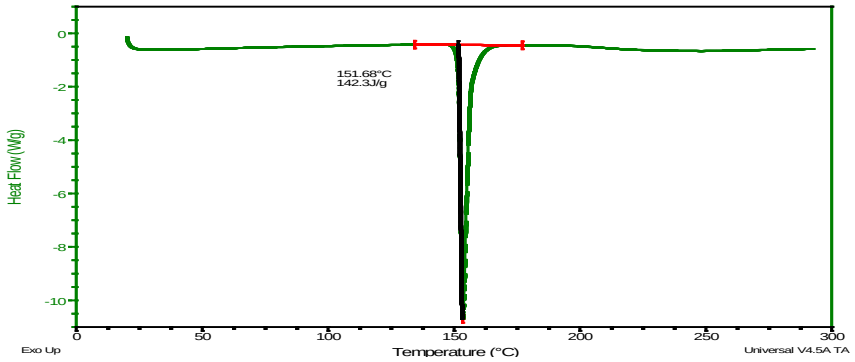
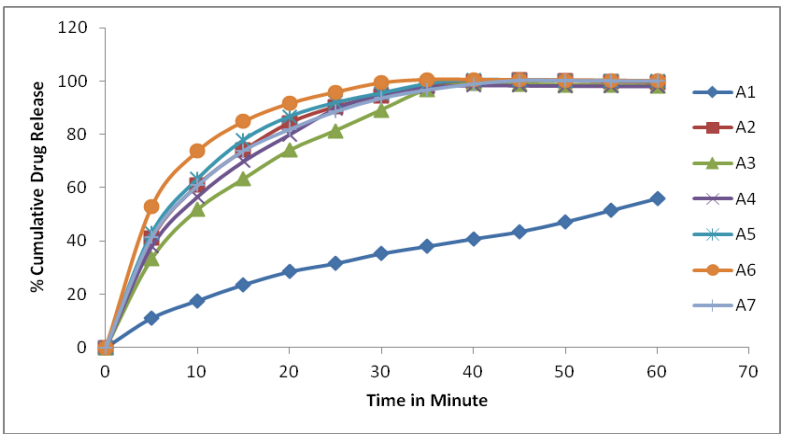


Figure No. 02: DSC Thermogram of Aceclofenac

The DSC Thermograms shows sharp endothermic peak at 151.68 ^{0}C corresponding to the melting point of Aceclofenac as shown in **Figure No. 02.**

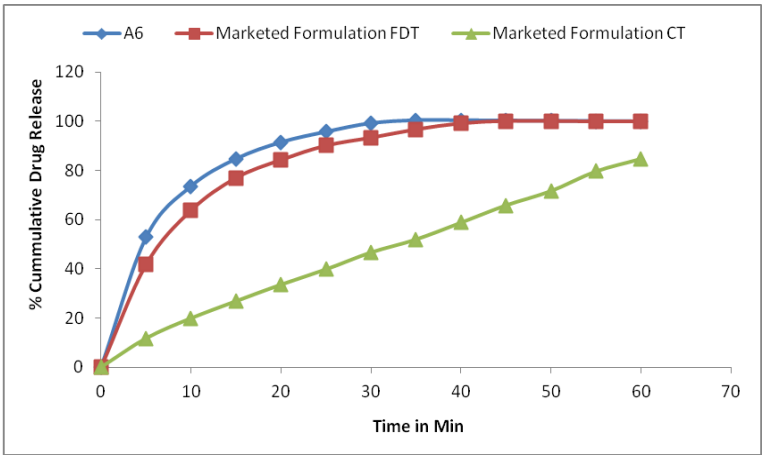
***In-vitro* Dissolution of core tablet and comparison with marketed preparation**

The percentage drug release of all the batches was found to be between **98.48 to 100.52 %** this was within the acceptable limits. *In vitro* dissolution studies of the prepared fast dispersible core tablets containing Aceclofenac were performed in pH 6.8 phosphate buffer using USP paddle apparatus Type –II. The tablets showed not less than 90 % drug release in 20 minutes. Comparative dissolution profile of all Batches (A1 to A7) is given in **Graph No.01.**



Graph No. 01: In vitro drug release profile of all Batches (A1 to A7)

The Comparative dissolution study of optimized A6 batch containing Aceclofenac was carried out with marketed fast dispersible tablet (FDT) of Aceclofenac 100mg and with Aceclofenac 100 mg Conventional tablets (CT). The results of *In vitro* drug release study of optimized (A6) batch of Aceclofenac with marketed fast dispersible tablet (FDT) and Conventional tablets (CT) in pH 6.8 phosphate buffer were shown **Graph No. 02.**



Graph No. 02: In vitro drug release profile of optimized (A6) batch of Aceclofenac with marketed fast dispersible tablet (FDT) and Conventional tablets (CT)

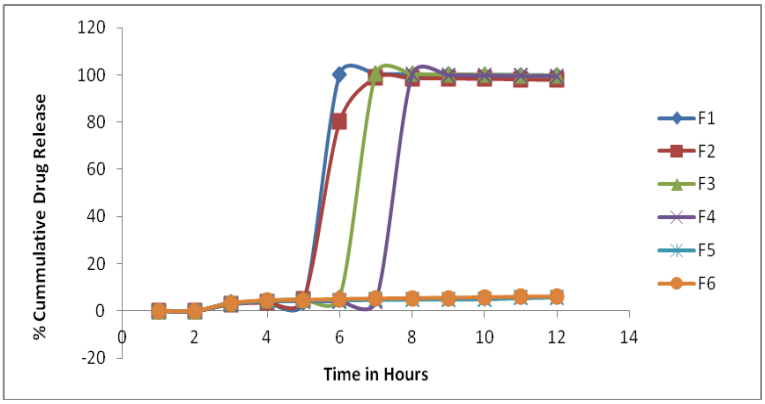
The marketed sample of fast dispersible tablet (Oace 100 FDT) containing Aceclofenac 100 mg showed 93.333 % of Aceclofenac release in 30 minutes and Aceclofenac 100mg Conventional tablets (CT) showed 46.691 % of Aceclofenac release when tested in 900 ml of pH 6.8 phosphate buffer Whereas **optimized (A6) batch of Aceclofenac** showed rapid release of 99.285 % at 30 minutes as shown in **Graph No.02.**

***In-vitro* Dissolution of press coated tablet and comparison with marketed preparation**

Dissolution profiles of the formulations F1 to F6 are shown in **Graph No. 03.**
Formulations F1 to F4 showed drug release after a predetermined off release period called as lag time; in both dissolution medium. The lag time was found in the range of 05 to 07 hours in different formulations, then after there was no release. The formulation F4 comparatively showed lag time (06 and 07 hours) in both dissolution media and

considered as optimized formulation, so the same formulation's dissolution profile was studied in buffer pH 1.2 for 02 hours followed by pH 6.8 phosphate buffer solution for next 10 hours.

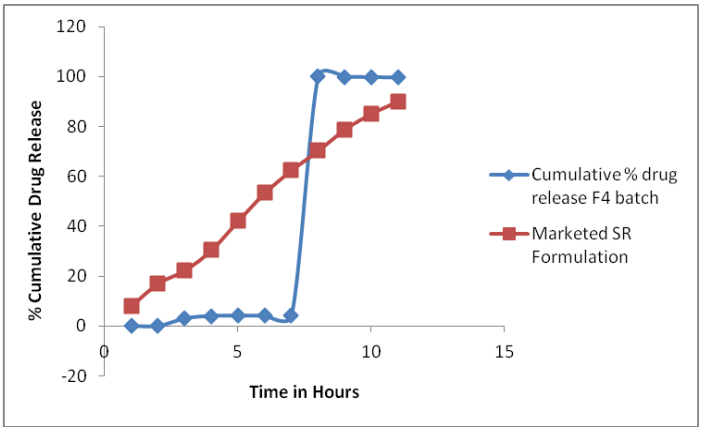
In case of formulation F4 showed a release in both the medium i.e. lags time of 06 and 07 hours in acidic and basic media respectively.



Graph No. 03: *In vitro* drug release study of formulations F1 to F6 in Phosphate buffer pH 6.8

The Comparative dissolution study of optimized F4 batch containing Aceclofenac was carried with marketed Aceclofenac SR tablets (Oace SR). The results of *in vitro* drug release study of optimized (F4) batch of Aceclofenac with marketed Aceclofenac SR tablets in pH 6.8 phosphate buffer.

The marketed sample of Sustained release tablets containing Aceclofenac showed 70.377 % of Aceclofenac release after 07 hours when tested in 900 ml of pH 6.8 phosphate buffer whereas **optimized (F4) batch of Aceclofenac** showed drug release of 99.991 % after 07 hours. (**Graph No. 04**)



Graph No. 04: *In vitro* drug release profile of optimized (F4) batch of Aceclofenac with marketed SR tablets

Summary and conclusion

Overall, the results suggest that press coated tablets of Aceclofenac containing superdisintegrants in core (croscarmellose sodium, crospovidone and sodium starch glycolate) can be successfully formulated. It was observed that all formulations were acceptable with reasonable limits of standard required for press coated tablets. The study reveals that HPMC used as coating polymers were effective in different concentration. The Comparative dissolution study of optimized formulation containing Aceclofenac core

and press coated tablets were carried with marketed preparations that showed better results.

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