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Research Article

FORMULATION AND EVALUATION OF ACECLOFENAC FAST DISSOLVING TABLETS

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ABSTRACT
The purpose of this study was to develop fast dissolving tablets of Aceclofenac using different concentration superdisintigrents.Fast dissolving tablets of Aceclofenac were prepared by wet granulation technique using sodium starch glycolate together with Polyplasdone xl-10 as superdisintegrants.The porous granules were then compressed in to tablets. These tablets were evaluated for drug content, weight variation, friability, hardness, wetting time and Dispersion time.
All the formulations showed low weight variation with dispersion time less than 90 seconds and rapid *in vitro* dissolution. The drug content of all the formulations was within the acceptable limits. The optimized formulation showed good release profile with maximum drug being released at all time intervals. It was concluded that fast dissolving tablets with improved Aceclofenac dissolution could be prepared by wet granulation of tablet. The dispersion time and dissolution parameter (t50% andt80%) decreased with increasing the concentration of Polyplasdone xl-10.

KEYWORDS: Fast dissolving tablet, Aceclofenac, wet granulation , super disintegrant, wet granulation, dispersion time

INTRODUCTION
Many patients find it difficult to swallow tablets and hard gelatin capsules and thus not comply with prescription that results in high incidence of non-compliance and ineffective therapy.[1]Orodispersible tablets are gaining prominence as new drug delivery systems. This dosage[2] forms dissolve or disintegrate in oral cavity within a minute without the need of water or chewing.[3] According to European Pharmacopoeia, the ODT should disperse/disintegrate in less than three minutes[4]. Orodispersible tablets are not only indicated for people who have swallowing difficulties, but also are ideal for active people.[5] Their growing importance was underlined recently when European Pharmacopoeia adopted the term "Orodispersible tablet" as a tablet that to be placed in the mouth where it disperses rapidly before swallowing and which disintegrates in less than 3 min.[6] Several platform technologies based on fast disintegrating dosage forms have been developed, such as freeze-dried tablets (Zydis®), compressed fast-disintegrating tablets (Orasolv®, Durasolv®,Wowtab®, Flash Dose®) and fast-dissolving films (Listerine® Pocketpacks).The ZydisTM dosage form was developed by Scherer; it dissolves within 3–5 s in the oral cavity.[7,8,9]Products on the market include Zyprexa® Zydis®, Maxalt-MLT® and Romeron® SolTabs®. This dosage form is produced by freeze-drying aqueous drug/ excipient suspension/solutions within blister packs.[10] The final product is a dried, sponge-like tablet in a special peel off blister pack.[11].Major disadvantages of the Zydis® technology is the time-consuming freeze-drying process, the limitation to low dose drugs, the poor mechanical properties and moisture sensitivity. Other marketed fast-disintegrating dosage form technologies are based on conventional tabletting method. The OrasolvTM technology is based on an effervescent mixture and taste-masked coated or microencapsulated drugs.[12]. The ShearformTM technology is made of saccharides such as sucrose, dextrose, lactose and fructose.[13]. The compression force used for such tablets is relatively low. The

resulting tablets are soft, friable and highly moisture sensitive.[14,15] Aceclofenac,(2-[2-[2-(2,6-dichlorophenyl)aminophenyl]acetyl]oxyacetic acid), a nonsteroidal anti inflammatory drug NSAID) has been indicated for various painful indications and proved as effective as other NSAIDs with lower indications of gastro-intestinal adverse effects and thus, resulted in a greater compliance with treatment[18]. Aceclofenac is practically insoluble. For poorly soluble orally administered drugs, the rate of absorption is often controlled by the rate of dissolution.[19] In the present study, an attempt was made to develop mouth dissolving tablets of aceclofenac and to investigate the effect of different concentration of super detergents on the release profile of the drug in the tablets.

MATERIALS AND METHODS

Aceclofenac was gifted from (Aristo pharma mumbai), croscarmellose sodium and Sodium starch glycolate was gifted (signet chemical mumbai), manitol, menthol, magnesium, stearate, and sodium saccharine purchased from S.D Fine Chem. Mumbai.

Method

Formulation of mouth dissolving tablets of Aceclofenac The fastdissolving tablets of aceclofenac were prepared using the sodium starch glycolate and Polyplasdone xl-10 as super disintegrants, mannitol as a diluent, sodium saccharin as sweetening agent, alcoholic solution of PVP (10%w/v) as binder and magnesium stearate with talc as a flow promoter.

Blending and tableting

Tablets containing 250 mg of Aceclofenac are prepared by wet granulation method and the various ingredients used in the study are shown in Table 1. The drug, diluents, super disintegrants and sweetener are passed through sieve # 60.All the above ingredients were properly mixed with 10%pvp to obtain coherent mass. The wet granules were dried at 60 ^{0} c for 1hour in hot air oven. Then dried granules were mixed with Talc and magnesium stearate. The powder blend was compressed in to tablets on twelve station rotary punch-tableting machine (Karnavati, Rimek Mini Press- 2) using 10.3 mm concave punches set. The final weight of tablets was kept at 250 mg. The hardness of tablets was taken between 3 and 4.6 kg/cm$^{2.}$

EVALUATION OF FORMULATED TABLETS

Hardness

The crushing strength of the tablets was measured using a Monsanto hardness tester (Sheetal Scientific Industries, Mumbai, India). Three tablets from each formulation batch were tested randomly and the average reading noted.

Friability

Ten tablets were weighed and placed in a Roche friabilator (Electrolab, India). Twenty pre-weighed tablets were rotated at 25 rpm for 4 min. The tablets were then deducted and reweighed and the percentage of weight loss was calculated. The percentage friability of the tablets was measured as per the following formula,

Percentage friability = Initial weight – Final weight x 100 Initial weight

Weight Variation

Randomly, twenty tablets were selected after compression and the mean weight was determined. None of the tablets deviated from the average weight by more than ±7.5% (USPXX).

Drug content

Twenty tablets were weighed and powdered. An amount of the powder equivalent to 100mg of aceclofenac was dissolved in 100ml of pH 7.4 phosphate buffer, filtered, diluted suitably and analyzed for drug content at 274 nm using UV-Visible spectrophotometer (UV 160- Shimadzu, Japan .

In vitro dispersion time

In vitro dispersion time was measured by dropping a tablet in a 10ml measuring cylinder containing 6ml of buffer solution simulating saliva fluid (pH7.4).

Dissolution Study

In vitro release of Aceclofenac from tablets was monitored by using 900 ml of SIF (USP phosphate buffer solution, pH 7.4) at 37±0.5° and 75 rpm using programmable dissolution tester [Paddle type, model TDT-08L, Electrolab, (USP), India]. 5ml Aliquots were withdrawn at one minute time intervals and were replenished immediately with the same volume of fresh buffer medium. Aliquots, following suitable dilutions, were assayed spectrophotometrically (UV-1700, Shimadzu, Japan) at 274 nm.

Thickness

Thickness of tablet was determined by using vernier caliper.

Wetting time

A piece of tissue paper (12cmx10.75cm) folded twice was placed in a Petri dish (Internal Diameter=9cm) containing 9ml of buffer solution simulating saliva pH 7.4. A tablet was placed on the paper and the time taken for complete wetting was noted. Three tablets from each formulation were randomly selected and the average wetting time was noted. The results are tabulated in Table.

RESULTS AND DISCUSSION

Firstly pre-formulation study has been performed, drug excipients (1:1) mixture of (drug: super disintegrants) compatibility study by using IR spectrophotometer (Model-Spectrum Rx, Perkin Elmer) has been studied. There are no any changes in functional groups of the drug. The powder mixture shows good flow properties. As the material was free flowing (angle of repose value <30º and Carr's index <15) tablets obtained were of uniform weight (due to uniform die fill), with acceptable variation as per IP specifications i.e., below 7.5%. Drug content was found to be in the range of 98-102%, which is within acceptable limits. Hardness of the tablets was found to be about 3 to 4.6 Kg/cm². Friability below 1% was an indication of good mechanical resistance of the tablets. Water absorption ratio and wetting time, which are important criteria for understanding the capacity of disintegrants to swell in presence of little amount of water were found to be within the range . In present study all the formulations *in vitro* dispersion within (= 90 sec), which fulfills the official requirement (= 3 min). . It is observed that dispersion time of formulationsF1 to F5 decreased (from 90 to 32 sec), by increasing level of Polyplasdone xl-10 because of its rapid capillary activity and pronounced hydration with little tendency to gel formation. Dissolution process of the tablet depends on wetting followed by disintegration of the tablet. The measurement of wetting time may be useful as another confirmative test for the evaluation of fast dispersible tablet. Wetting time of various formulations. Significant decrease in wetting time from 144 sec to 49 sec observed by increasing level of Polyplasdone xl-10. In-vitro dissolution study was performed for all formulations, It is observed that optimized formulation (F5) revealed that more than 80 % drug was released within 5 min.

CONCLUSION

It was concluded that fast disintegrating tablets of Aceclofenac can be successfully prepared using selected superdisitegrants in order to improve disintegratntion/dissolution of the drug in oral cavity and hence better patient compliance and effective therapy.

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Table 1: Formulae Used in the Preparation of Tablets

Ingredients (mg)	A1	A2	A3	A4	A5
Aceclofenac	100	100	100	100	100
Sodim starch glycolate	12.5	25	12.5	25	12.5
polyplasdone xl 10	-	-	12.5	12.5	25
Talc	4	4	4	4	4
Magnesium stearate	2	2	2	2	2
Menthol	5	5	5	5	5
Sodium saccharine	10	10	10	10	10
Mannitol q.s.mg	250	250	250	250	250
All formlations contains alcoholic solution of PVP (10%w/v) as binder					

Table 2: Physical Characteristics Of Fast Dissolving Tablet Formulation

Batch	In vitro dispersion time (s)	**Wetting time (sec)**	**Hardness (n=10) kg/cm2**	Thickness (mm)	**Weight variation**	**Friability (%)**	Drug content (%) n = 4
F1	90 ± 3	144	4.1 ±0.43	3.85 ±0.03	Pass	0.89 ±0.07	97.04±0.7
F2	65 ±4	103	3.8 ±0.24	3.45 ±0.02	pass	0.65±0.12	98.12 ±0.3
F3	53 ±3	87	4.3 ±0.22	3.45 ±0.03	pass	0.34 ±0.02	102.6±0.1
F4	46 ±1	61	4.2 ±0.12	3.64 ±0.08	pass	0.67 ±o.11	97.98±1.4
F5	32 ±2	49	4.6±0.15	3.84±0.06	pass	0.77±0.06	99.89±1.2

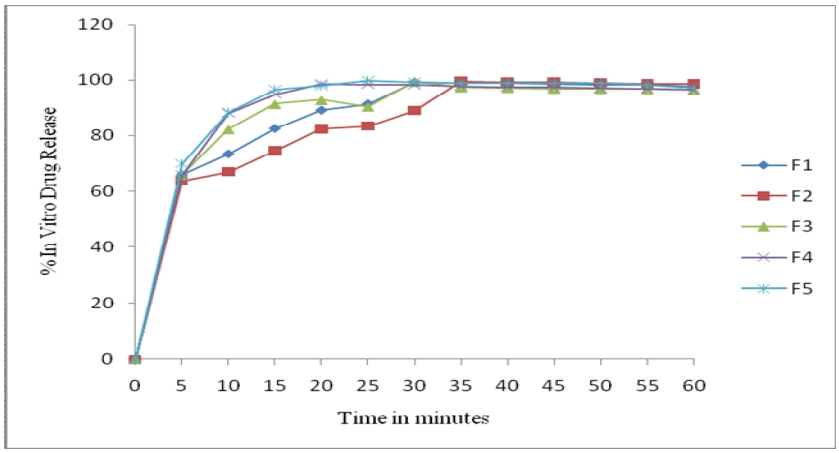

Fig 1: Graph showing *in vitro* release of 5 batches

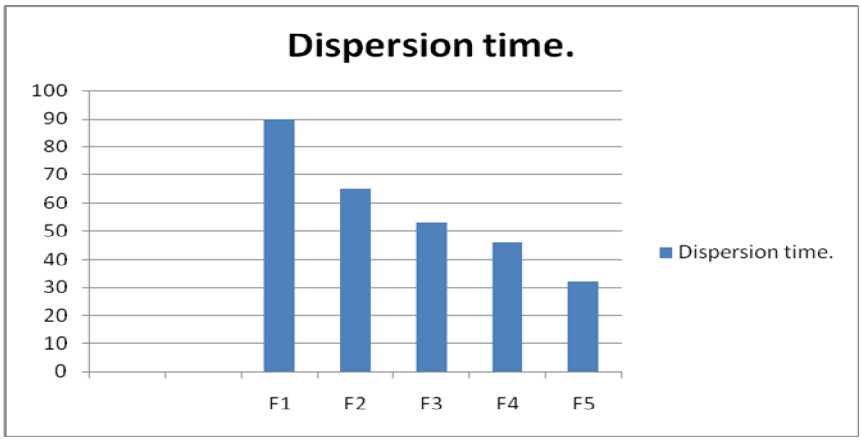

Fig 2: Showing Dispersion Time

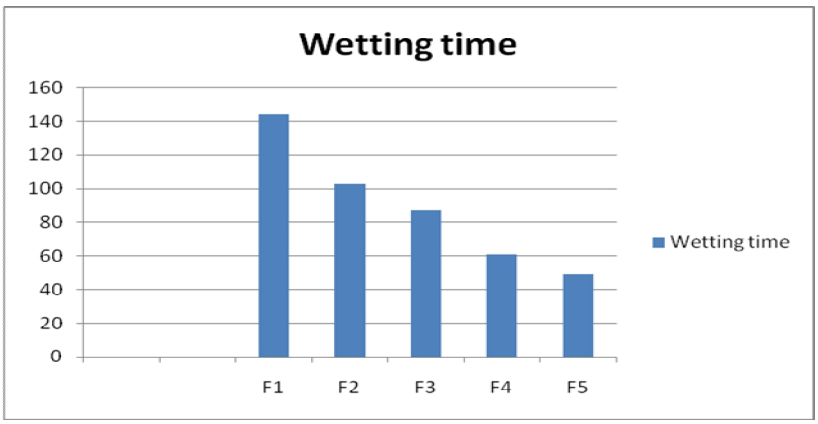

Fig 3: Showing Wetting Time

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