



# Asian Journal of Research in Biological and Pharmaceutical Sciences

Journal home page: [www.ajrbps.com](http://www.ajrbps.com)

<https://doi.org/10.36673/AJRBPS.2021.v09.i03.A15>



## FORMULATION AND EVALUATION OF PIROXICAM FAST DISINTEGRATING TABLETS

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### ABSTRACT

The present study is to formulate and evaluate piroxicam fast disintegrating tablet to ensure the drug is delivered to fast to attain quick onset of action. Fast disintegrating tablets of piroxicam were prepared with methyl cellulose and microcrystalline cellulose as polymers and the tablets were evaluated for their properties.

### KEYWORDS

Methyl cellulose, Microcrystalline cellulose and Piroxicam.

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### INTRODUCTION

In the pharmaceutical formulation, the fast disintegrating tablet can be defined as solid dosage form that can disintegrate into smaller granules, which slowly dissolve in mouth. A fast disintegrating or dissolving system or tablet can be defined as a solid dosage form that can disintegrate or dissolve within 30 seconds in the oral cavity resulting without administration of water or solution or suspension. Orodispersible tablet has to be placed in oral cavity where it disperses rapidly before swallowing.

Most fast dissolving tablet include substance to mask bitter taste of active ingredients. Faster the dissolution, quick absorption (only in ionised form of drug) and quick onset of action. It also known as mouth dissolving tablet, melt in mouth dissolving tablet, orodispersible tablet, rap melt, porous tablet,

quick dissolving tablet. Some tablet are designed saliva within a few seconds and so called true dissolving tablet.

It is produced by lyophilising of the drug in a matrix consisting of gelatin. It is insoluble in water and poor gastro intestinal absorption and bioavailability.

## **MATERIAL AND METHODS**

Piroxicam – Fine chemie, Methyl cellulose- Fine chemie, Mannitol- Fine chemie, Talc - Fine chemie, Magnesium stearate- Fine chemie, Microcrystalline cellulose- Fine chemie, Sacharrin- Fine chemie.

### **Formulation development and evaluation**

#### **Preparation of standard solution**

The standard stock solution of piroxicam as prepared by accurately weighing and transferring, 10mg of API to 100ml of volumetric flask. Then 2ml of the solution was added to 10ml volumetric flask and the final volume was made up with distilled water to get final standard stock solution (20ug/ml) was further diluted with distilled water to obtain 05- 25ug/ml piroxicam solutions.

#### **Calibration curve for piroicam**

The dilution were made from standard stock solution to get concentration of 2, 4, 6, 8, 10 and 12ug/ml respectively. These solution were scanned in the range of 355nm. The calibration curve plotted between absorbance values against concentration.

#### **Comptability**

A Physical mixture (1:1) of drug and polymer was prepared and analysed by FITR. The IR spectrum of the physical mixture was compared with those of pure drug and polymer and matching was done to detect any appearance of peaks.

#### **Formulation of piroxicam tablets**

##### **Preparation of powder blend**

Accurately weighed quantities of the ingredients were passed through sieve no-60 and mixed, Talc and magnesium stearate were added as gildant and mixed well. The powder was then evaluated for its flow properties.

##### **Evaluation of power blend**

###### **Angle of repose**

The angle of repose is related to the free flowability properties of particulate materials. It is the maximum angle between the surface of a pile of powder and horizontal plane. It is determined by using funnel method. The blend was passed through

a funnel that can be raised vertically until a maximum height (h) was obtained. The radius of the heap (r) was measured as angle of repose ( $\theta$ ) was calculated using the formula:

$$\theta = \tan^{-1}(h/r).$$

###### **Bulk density**

It is the amount of powder by weight that is present in a defined volume. It was determined by pouring the blend in to a graduated cylinder. The bulk volume (V) and weight of the powder (M) was calculated using the formula.

$$\rho_b = M/V$$

###### **Tapped density**

The measuring cylinder containing a known mass of blend was tapped for a particular period of time. The minimum volume ( $V_t$ ) occupied in the cylinder and the weight (M) of the blend was measured. The tapped density ( $\rho_t$ ) was calculated by using the following formula.

$$\rho_t = M/ V_t$$

###### **Compressibility index**

It is the simplest way for measuring the free flow of powder. In a free-flowing powder, such interactions are less significant. Therefore the known volume of powder is filled in graduated cylinder and repeatedly tapped for particular period of time.

$$I = (V_b - V_t / V_o) \times 100$$

Where,

$V_b$  is the bulk volume and

$V_t$  is tapped volume.

###### **Compression of dissolving tablets**

These prepared powder blend was mixed with magnesium stearate and talc compressed using 12 mm punch by tablet compression machine.

###### **Evaluation of tablet**

The prepared tablets were subjected for various quality control test in order to characterize them.

###### **Weight variation**

20 tablets were took randomly and weighed individually. Each weight of tablet was compared with the average weight for determination of weight variation.

###### **Friability**

20 tablets from each batch were took randomly and weighed. These preweighed tablets were subjected to friability testing using Roche friabilator for 100 revolutions. It is the tendency of a solid substance to break into smaller pieces under contact, especially

by rubbing. The plastic chamber revolving at 25rpm and dropping a tablet at height of 6 inches in each revolution. Tablets were removed, de-dusted and weighed again. The friability was calculated by using the following formula.

$$F = (W_0 - W) / W_0 \times 100$$

Where  $W_0$  is weight of the tables before and

$W$  is weight of the tablets after test.

#### Hardness

Five tablets from each batch were selected and hardness was measured using Monsanto hardness tester to find the average tablet hardness crushing strength.

#### Disintegration test

Disintegration time of the tablets was determined using disintegration test apparatus by employing water as test fluid.

#### Content uniformity

The drug content was determine by taking the powder equivalent to 10mg ,then it was dissolved in the distilled water and absorbance was taken against 335nm using a UV-Visible double beam spectrophotometer .

#### Thickness and diameter

The physical dimension of the tablet such as thickness and diameter is essential for consumer acceptance and tablet uniformity. The thickness and diameter of the tablets was measured by using vernier callipers. It is measured in mm.

#### Dissolution studies

The tablet samples were subjected to *in-vivo* dissolution studies using USP Type 2 dissolution apparatus at  $37 \pm 2^\circ\text{C}$  and 50rpm speed. As per the official recommendation of USFDA, 900ml of 0.1N HCL (2hrs) and pH 6.8 phosphate buffer (10hrs) was used as dissolution medium. Aliquot equal to 5ml was withdrawn at specific time intervals and the dissolution media volume was complimented with fresh and equal volume of blank media (0.1N HCL). The aliquot were filtered and scanned with UV Spectrophotometer at 335nm and amount of piroxicam released from the tablet samples are estimated.

#### Formulation

S.No	Constituents	F1(mg)	F2(mg)	F3(mg)	F4(mg)	F5(mg)
1	Piroxicam	20mg	20mg	20mg	20mg	20mg
2	Methyl cellulose	20mg	30mg	40mg	50mg	60mg
3	Microcrystalline cellulose	108mg	98mg	88mg	78mg	68mg
4	Saccharin	50mg	50mg	50mg	50mg	50mg
5	Mannitol	20mg	30mg	40mg	50mg	60mg
6	Talc	1mg	1mg	1mg	1mg	1mg
7	Magnesium Stearate	1mg	1mg	1mg	1mg	1mg

#### Angle of Repose

S.No	Angle of Repose	Type of Flow
1	<25	Excellent
2	25-30	Good
3	30-40	Fair
4	>40	Poor

#### Compressibility index

S.No	Compressibility index (per cent)	Flow character	Hausner ratio
1	1-10	Excellent	1.00-1.11
2	11-15	Good	1.12-1.18
3	16-20	Fair	1.19-1.25
4	21-25	Passable	1.26-1.34
5	26-31	Poor	1.35-1.45
6	32-37	Very poor	1.46-1.59
7	> 38	Very, very poor	> 1.60

## CONCLUSION

Fast disintegrating tablets of piroxicam were prepared with methyl cellulose and microcrystalline cellulose as polymers and the tablets were evaluated for their properties. The average weight variation was within the pharmacopoeia limit of 5%. The weight of all formulation was to be uniform with less standard deviation. The thickness was found to be 4mm. These hardness was found to be  $3.2 \pm 0.3$  to  $4 \pm 0.4 \text{ kg/cm}^2$ . The disintegration was between 3 – 4 mins. Friability was found to be in limit of  $0.1 \pm 0.1$  to  $0.3 \pm 0.2$ . The values are satisfactory within the IP limit 0.1-0.9%. From the dissolution studies, the percentage of drug release was found to be F1( 99.1%), F2 ( 99.5 %), F3( 99.1%), F4( 99.3%) and F5( 99.6%) at 60 minutes.

## ACKNOWLEDGEMENT

The authors wish to express their sincere gratitude to Department of Pharmaceutics, RVS College of Pharmaceutical Sciences, Sulur, Tamil Nadu, India or providing necessary facilities to carry out this research work.

## CONFLICT OF INTEREST

We declare that we have no conflict of interest.

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**Please cite this article in press as:** Kamaleshwari B *et al.* Formulation and evaluation of piroxicam fast disintegrating tablets, *Asian Journal of Research in Biological and Pharmaceutical Sciences*, 9(3), 2021, 102-106.