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## Mango Peel Pectin as a Carrier for Solid Dispersions

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**A** – research concept and design; **B** – collection and/or assembly of data; **C** – data analysis and interpretation; **D** – writing the article; **E** – critical revision of the article; **F** – final approval of article

### Abstract

**Objectives.** The present study describes the evaluation of pectin as a carrier for solid dispersion.

**Material and Methods.** Pectin was extracted from mango peel. Solid dispersions were prepared by using pectin to enhance the dissolution rate of the drug. Aceclofenac was used as the model drug.

**Results.** Solid dispersion containing pectin had comparatively less release of the drug as compared to lactose for a particular time period.

**Conclusion.** The slower release may be due to the solubility of pectin in an aqueous fluid and its swelling capacity. With that in mind, it can be used as a carrier to prepare solid dispersions (**Polim. Med. 2013, 43, 4, 231–233**).

**Key words:** mango peel pectin, solid dispersion, dissolution, lactose.

The solid dispersion technique was created by Chiou and Reigelman to enhance the dissolution rate of water insoluble drugs [1–4]. Solid dispersion is defined as a dispersion of one or more drug compounds in an inert carrier at solid state [1, 5]. They are prepared by employing various carriers such as polyethylene glycol 2000 (PEG 2000), hydroxypropyl methylcellulose acetate succinate (HPMCAS), hydroxypropyl methylcellulose (HPMC), poly(vinylpyrrolidone) (PVP) and PEG 4000 [5–9]. The different methods for preparing solid dispersion include solvent wetting, solvent evaporation, physical mixture, melting and kneading [6, 7]. Pectin is non-toxic, non-irritating, cost effective and abundantly available [10, 11]. Aceclofenac is a non-steroidal anti-inflammatory drug. It is a poorly water-soluble drug [12]. In the present study, pectin was extracted from mango peel. Pectin was used to prepare solid dispersions of aceclofenac using the solvent wetting method. Different ratios of drug and carrier were used. In various studies it has been concluded that as the concentration of superdisintegrants increases in a tablet, there was an increase in the swelling index proportionally [13, 14].

## Experimental Section

### Material Procurement

Aceclofenac was obtained as a gift sample from Cipla Ltd., Mumbai, India. Lactose, microcrystalline cellulose, magnesium stearate and talc were obtained from Rankem Ltd., New Delhi. Good quality mangoes were purchased from a fruit shop in Meerut, India.

### Isolation of Pectin from Mango Peel

Mango peels were taken and cut into small pieces. They were washed with water and soaked in a sufficient amount of water in a round-bottom flask. A small amount of citric acid was added to adjust the pH of the water to 4. Heating was done with continuous stirring by maintaining a temperature of about 90°C. Heating was done for one hour. The solution was filtered and the filtrate poured in acidified isopropanol. The precipitates of pectin were obtained. The precipitates were washed with isopropanol till no acidic ions remained. Powdered pectin was obtained in pure form and was stored in desiccators [15–18].

## Preparation of Solid Dispersion by Solvent-Wetting Method

Solid dispersions were prepared in 4 batches (Mango peel pectin – P1, P2; Lactose – L1, L2) by using two drug:carrier ratios (1:1, 1:2 w/w). The solid dispersions P1 and L1 contained 1:1 w/w, drug:carrier whereas P2 and L2 contained 1:2 w/w, drug:carrier ratios. The solvent-wetting method was used for preparing solid dispersions. A weighed amount of aceclofenac was dissolved in isopropyl alcohol. The required amount of pectin was placed in a mortar, then the drug solution was poured over the carrier. The solvent was removed by evaporation at room temperature. The solid mass obtained was sieved through sieve number 60 and stored in a desiccator for further use. The solid dispersion containing lactose was prepared in the same manner.

## Preparation of Tablets

Solid dispersions in 2 batches were: P1/L1, 200 and P2/L2, 300 mg. The amount of microcrystalline in the two batches was as: P1/L1, 194 and P2/L2, 94 mg. The preparation procedure for the tablets included mixing a weighed amount of the different ingredients and finally granules were prepared. Starch mucilage was used as granulating agent. The granules of the batch formulation were lubricated with 4 mg talc and 2 mg magnesium stearate. The granules were compressed to produce tablets using a Cadmach Punching Machine with a 10 mm punch and 0.5 ton pressure.

## Tablet Parameters

The test parameters determined for tablets included weight variation (USP XXIV), tablet thickness (Vernier calipers), tablet hardness [Digital Force Gauge Hardness Tester (EL= 500N, Electrolab)], % friability (Roche Friabilator), drug content and dissolution studies. Drug content was evaluated by measuring absorbance using a 0.1 N HCl solution (pH 1.2) and measured at 275 nm wavelength (Shimadzu UV-2450, Japan). The dissolution study was performed in 900 ml of a 0.1 N HCl solution (pH 1.2) at  $37^{\circ}\text{C} \pm 0.5^{\circ}\text{C}$  by employing a paddle method with a stirring rate of 100 rpm (Lad India Disso 2000, India). Sampling was done by withdrawing 5 ml of the medium at a specified time interval and filtered. The concentration of the drug was estimated by UV spectrophotometry by analyzing the samples at 275 nm.

## Result and Discussion

The weight variations (mg) were 400.1 (0.10), 400.3 (0.12), 400.1 (0.11), 400.2 (0.12) for P1, P2, L1 and L2, respectively. This shows that the tablets prepared met

the pharmacopoeial (USP) standards. Hardness (Newton) were found to be 4.3 (0.17), 4.1 (0.12), 5.2 (0.12) and 5.1 (0.11) for P1, P2, L1 and L2, respectively. The percent friability for batch P1 and P2 were 0.06 (0.10) and 0.42 (0.08), respectively. For L1 and L2, the friability values were 0.04 (0.06) and 0.25 (0.09), respectively. Thickness (mm) ranged between 2.46 (0.01) and 2.47 (0.05) for the tablets prepared with pectin solid dispersion and between 2.47 (0.02) and 2.51 (0.03) for the tablet containing the lactose solid dispersion. Hardness test results showed that the tablets of solid dispersion consisting of lactose were harder than the tablets containing the solid dispersion of pectin. In the friability study, the tablets prepared from the solid dispersion containing pectin were more friable. The drug content

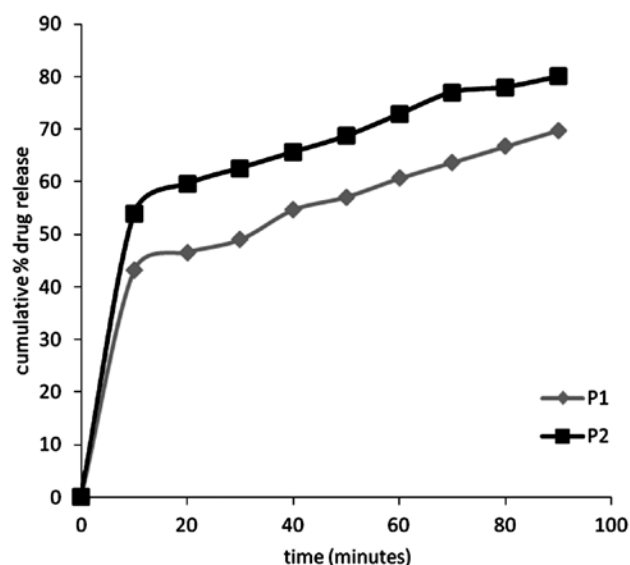


Fig. 1. Drug release from tablet containing solid dispersion prepared with mango peel pectin as a carrier

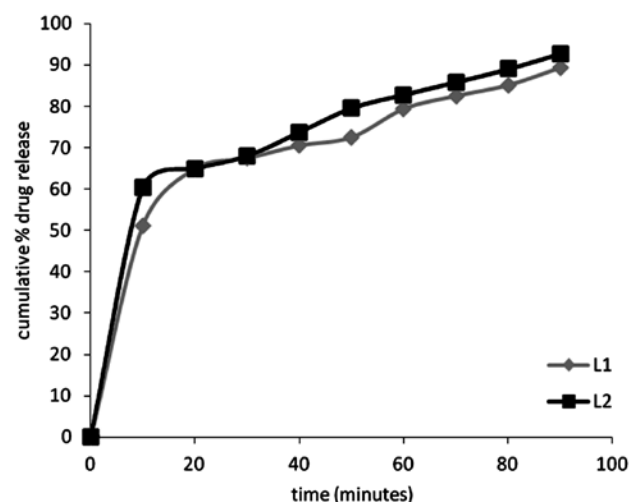


Fig. 2. Drug release from tablet containing solid dispersion prepared with lactose as a carrier

in all formulations was within the limits. By increasing the pectin content in the solid dispersion, there was an enhanced dissolution rate of the drug. Dissolution studies showed that batch P2, having a 1:2 w/w, drug:carrier ratio, possessed the best release (80.00%) in 90 minutes (Fig. 1). By contrast, batch L2 showed a % cumulative drug release of 92.72% (as given in Fig. 2).

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## Conclusions

Due to the good solubility and swelling capacity, mango peel pectin can enhance the dissolution rate of a poorly water-soluble drug and act as a good carrier for preparing solid dispersions.

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