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Evaluation of Compression Force on the Dissolution Profile of Paracetamol Tablets

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Abstract: The aim of this research is to study the effect of varying compression force on the dissolution profile of prepared Paracetamol tablets. Paracetamol, Lactose, Microcrystalline cellulose, Starch and Magnesium stearate were purchased from Central Drug House (P) Ltd., New Delhi. All the chemicals were supplied as "required no purification before use". Results and Conclusion: The five batches (F1-F5) of Paracetamol tablets prepared with different compression force (1,2,4,6,8 tonnes) respectively using wet granulation technique showed varying dissolution profile in range from 17.47-78.15%. Batch F3 prepared with 4 tonnes of compression force showed maximum release of 78.15% and F5 with 8 tonnes of compression forceshowed minimum release of 17.47% after 180 mins.

Key words: Oral Dosage Forms · Tablets · Pharmaceutical Excipients · Binders · Wet Granulation · *In-Vitro* Dissolution

INTRODUCTION

Oral dosage forms are the most common methods of drug delivery. Among the oral dosage forms Tablets and capsules are predominantly used. Tablets are widely used and are more popular as compared to capsules [1-3]. Tablets are defined as the solid unit dosage forms containing medicaments with or without excipients such as binders, diluents, lubricants etc. and prepared either by molding or compression. Tablets are manufactured either by wet or dry granulation or by direct granulation [1,4].

Granulation process is defined as the one in which primary powder particles by adhering to one another form larger, multiparticle entities called granules having a size range of 0.2-0.4 mm. This technique is used in order to improve the flow and compressibility of powders and it also prevents the segregation of the blend components. Granulation technology can be classified into two types: Wet granulation and Dry granulation [5]. Wet granulation is the process of adding a liquid solution to powders forming a damp mass which is further kneaded and screened to form granules [6,7]. Bindersareused in the wetgranulation method to impartcohesiveness and structural strength to the powdered materials. Agoodbinderensures that the tablets remainintact after the compressionand can with stand handling and packaging processes during transportation. Examples of commonlyusedbindersarestarch,gelatin,sugar,methyl-cellulose, microcrystallinecellulose,polyethyleneglycol etc [7-9]. In dry granulation process granules are formed without using a liquid solution. It is used when the product to be granulated is sensitive to moisture and heat [6].

Preparation of granules and tablets: Paracetamol tablets were prepared by wet granulation method as per the formulation chart in Table 1. All the ingredients were accurately weighed. Paracetamol, Lactose and Microcrystalline cellulose (MCC) were mixed properly in a mortar pestle. Starch paste was separately prepared and this solution was used in the granulation process to form granules. Further Magnesium stearate was added to

Table 1: Composition of Paracetamol tablets

S.No.	Ingredients	Quantity taken
1.	Paracetamol	1.25 g
2.	Lactose	0.75 g
3.	Microcrystalline cellulose (MCC)	0.5 g
4.	Poly vinyl pyrollidine (PVP)	10%
5.	Magnesium stearate	0.1%

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the granules. These granules batches were then compressed with varying compression force (1,2,4,6,8 tonnes) to form F1-F5 batches of tablets respectively [10-13].

Preparation of Calibration Curve of Paracetamol: 100 mg of Paracetamol powder was accurately weighed and transferred to 100 ml volumetric flask. 10 ml of Phosphate buffer (pH 7.4) was added to it and shaken for few minutes. Further the volume was made upto 100 ml using phosphate buffer to prepare Stock solution. This stock solution was then filtered and different concentrations were prepared from it. The absorbances of prepared solutions were measured at 247 nm using UV spectrophotometer [14,15].

Dissolution: Dissolutionof different batches of Paracetamoltabletswas carried out in Phosphatebuffer (pH7.4,37±0.5°C) with a bath volume 900 ml. At appropriate time intervals, 5ml sample was withdrawn, filtered and was replenished with the same volume of fresh medium. The filtered samples were suitably diluted and analyzed using UV Spectrophotometer at 247nm [14,15].

RESULTS AND DISCUSSION

Paracetamol tablets were prepared by Wet granulation method. Calibration curve of Paracetamol was prepared in phosphate buffer (pH 7.4) as shown in figure 1. The R^2 value was found to be 0.998.

The results of dissolution study suggest that % drug release of all the batches after 180 mins. was in range from 17.47-78.15%. % drug release of F3 batch (78.15) prepared with 4 tonnes of compression force after180 mins. was found to be maximum while that with batch F5 (17.47%) prepared with 8 tonnes of compression force was minimum among all the 5 batches. Figure 2 and Table 2 summarize the % drug release from all the batches of Paracetamol tablets.

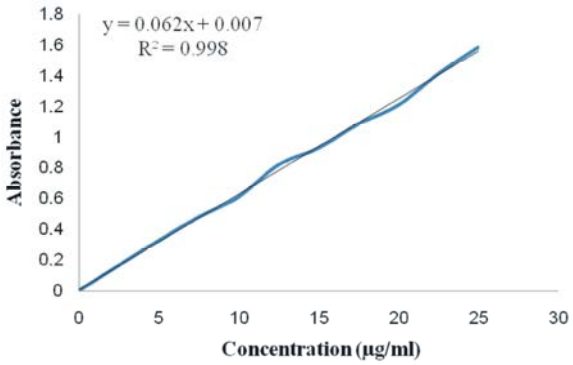

Fig. 1: Calibration curve of Paracetamol

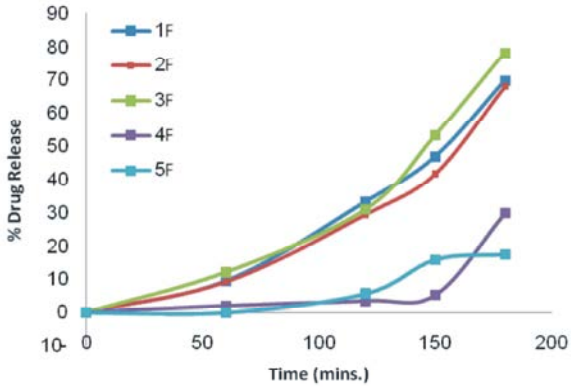

Fig. 2: % Drug release of Paracetamol tablets prepared by varying compression forces

CONCLUSION

It is concluded from the research work that varying the compression forces used for wet granulation of Paracetamol tablets shows difference in the release characteristics. % drug release of different batches after 180 mins.was in range from 17.47-78.15%. F3 batch (prepared with 4 tonnes of compression force) showed maximum release of 78.15% after 180 mins. while F5 batch (prepared with 8 tonnes of compression force) showed minimum release of 17.47%.

Table 2: % Drug release of Paracetamol tablets prepared from varying compression forces

	% Drug Release				
Time(mins)	F1	F2	F3	F4	F5
0	0	0	0	0	0
60	9.45	9.17	12.10	1.92	0
120	33.2	29.39	30.91	3.43	5.64
150	46.89	41.72	53.26	5.18	15.9
180	69.77	68.05	78.15	29.74	17.47

Conflict of Interest: Authors have no conflict of interest.

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