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Effect of Super Disintegrants on the Release of Satranidazole from Fast Dissolving Tablets.

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ABSTRACT

Objective of this study was to formulate directly compressible fast dissolving tablets of Satranidazole with sufficient mechanical integrity,and content uniformity and to show the effect of different concentrations and different combinations of superdisintegrants such as crospovidone and croscarmellose sodium on dissolution rate. Tablets were evaluated for weight variation, hardness, friability, drug content, and in vitro drug release. Other parameters such as wetting time, water absorption ratio and invitro dispersion time were also evaluated. Based on the results obtained, formulation F7 containing equal proportions of crospovidone and croscarmellose sodium is selected as the optimized formulation.

Keywords: fastdissolving, superdisintegrant, satranidazole

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INTRODUCTION

Oral drug delivery is the most widely accepted route of drug administration. But conventional oral dosage forms like tablets and capsules bear certain drawbacks such as difficulty in swallowing in the case of pediatric and geriatric patients, need of water for ingestion, slower onset of action of drug and inconvenience to patients suffering from nausea and vomiting. To overcome these drawbacks, fast dissolving tablets have emerged as an alternative. The basic approach used in their formulation is the use of superdisintegrants. These provide instantaneous disintegration of tablet after placing on the tongue, thereby releasing the drug in the saliva. The bioavailability of some drugs may be increased due to absorption of drugs in the oral cavity and also due to pregastric absorption of saliva containing dispersed drug that passdown into the stomach. Satranidazole is an antibacterial and antiprotozoal drug.It belongs to nitroimidazole group of drugs . It is chemically 1(1-methyl -5-nitroimidazol-2-yl) -3 methylsulfonylimidazolidin -2 –one. The objective of the present study is to prepare orodispersible tablets of Satranidazole by incorporating superdisintegrants,thereby enhancing the dissolution. The study also aim to investigate the effect of varying concentrations of superdisintegrants used in the formulation. The tablets were prepared using direct compression technique. The advantages of direct compression include it is a simple process and cost effective [1-15].

MATERIALS AND METHODS

Materials

Drug Satranidazole was obtained from Alkem pharmaceuticals,Mumbai. All the excipients used were of analytical grade.

Preformulation study

Micromeritic properties like bulk density, tapped density, Carr's index, Hausner's ratio and angle of repose of the powder blend were determined. Drug excipient compatibility was checked by FTIR (Figure 1).

Preparation of FDTS by Direct Compression Method

Fast dissoving tablets were prepared by direct compression method. Drug along with superdisintegrants croscarmellose sodium (F1 –F3) and crospovidone (F4-F6) alone(5%,7.5%and10%) and in 1 : 1combination(F7) with other excipients like diluent,lubricant, glidant,sweetners and flavour were mixed in double lined polyethylene bags after passing through #40. Weight of the tablets was adjusted to 170mg.The blend was then compressed into tablets.

Evaluation of Tablets

Weight variation test

To study variation in weight ,20 tablets of each formulation were weighed using an electronic balance and test was performed according to the official method.

Hardness and friability

For each formulation ,the hardness and friability of 6 tablets were determined using Monsanto hardness tester and Roche friabilator respectively.

Drug content determination

For finding drug content, 10 tablets were weighed &aliquot of powder equivalent to100mg of drug was taken.It was then dissolved in 6.8 pH buffer. Solution was filtered and suitably diluted. Using U.V visible spectrophotometer drug content was measured at 319nm.The amount of STZ was estimated using standard calibration curve of the drug.

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In vitro dispersion time

In vitro dispersion time was determined by dropping a tablet in a measuring cylinder containing 6ml of 6.8 pH buffer solution(simulated saliva). Randomly selected 3 tablets from each formulation. In vitro dispersion time is expressed in seconds.

Wetting time

Two circular shaped tissue papers were placed in a small petridish.10ml of aqueous amaranth solution was added to the petridish. A tablet was carefully placed in the petridish. The time taken for water to reach the upper surface of the tablet was noted as the wetting time.Test was carried out in triplicates for each formulation.

Water absorption ratio

Weight of the tablet before placing on the tissue paper was noted (Wb).Weight after complete wetting was also taken (Wa). Water absorption ratio was, then calculated according to the following equation.

In vitro dissolution studies

In vitro dissolution studies were performed by USP XXIII apparatus II(Electrolab TDT-06T). Dissolution medium was 900 ml phosphate buffer with a pHof 6.8 kept at37± 1 ^{o}C.One tablet from each formulation and conventional tablet were added to each flask. Rotation speed of paddle was set at 50 r.p.m. Samples of 5ml were withdrawn for a period of 15 minutes at regular intervals. After appropriate dilution the samples were analysed for Satranidazole using UV Spectrophotometer at 319 nm.The study was conducted in triplicate.

$$R = \frac{Wa - Wb}{Wb} \times 100$$

Table 1: Evaluation of Tablet Hardness, Friability, Weight Variation &Drug Content

Test.	F1	F2	F3	F4	F5	F6	F7
Weight variation	Passes	Passes	Passes	Passes	Passes	Passes	Passes
Hardness	3.91± 0.61	3.11± 0.08	3.05± 0.90	3.54± 0.06	3.08± 0.10	3.07± 0.41	3.33± 0.61
Friability	0.22	0.72	0.88	0.35	0.55	0.58	0.46
Drug content	99.32± 0.01	98.98± 0.09	99.17± 0.23	98.65± 0.26	99.78± 0.61	98.76±0.88	99.14± 0.02

Table 2: Determination of Invitro Dispersion Time, Wetting Time and Water Absorption Ratio.

Test	FI	F2	F3	F4	F5	F6	F7
Invitro dispersion time (sec)	15.33	14.88	12.65	14.32	12.10	12.09	11.02
Wetting time (sec)	10.43	9.21	9.16	10.16	9.11	9.08	7.1
Water absorption ratio	49.93	51.78	58.90	48.71	50.66	57.91	61.67
Disintegrationtime	12.43	13.43	10.87	12.68	11.01	10.87	9.26

Table 3: In Vitro Dissolution Of Formulation F1- F7 And Conventional Formulation

Time In min.	conventional formulation (F0)	F1	F2	F3	F4	F5	F6	F7
2	11.61	34.45	37.82	35.33	30.06	33.92	39.15	40.86
4	12.13	43.61	40.93	41.81	31.67	35.43	42.13	45.03
6	14.57	45.43	44.61	47.55	39.61	38.77	47.34	50.4
8	22.21	49.77	50.67	52.70	41.62	42.21	50.29	58.98
10	39.87	53.60	54.74	57.44	50.39	52.82	52.63	60.89
12	42.33	60.78	62.58	67.04	58.89	59.61	60.76	69.41
15	56.39	66.56	68.21	69.89	62.11	65.32	66.45	72.67

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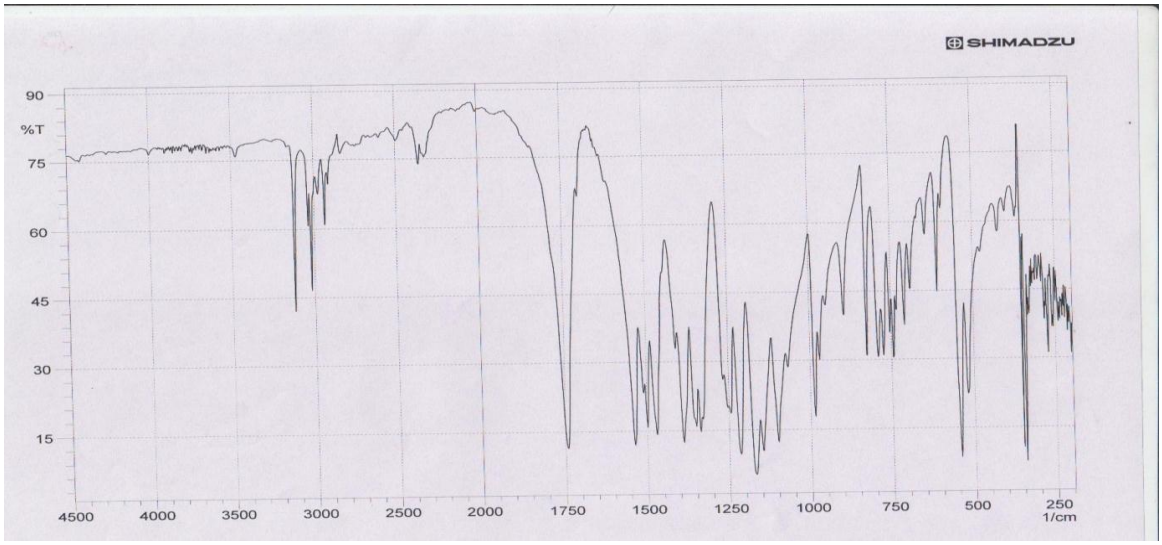
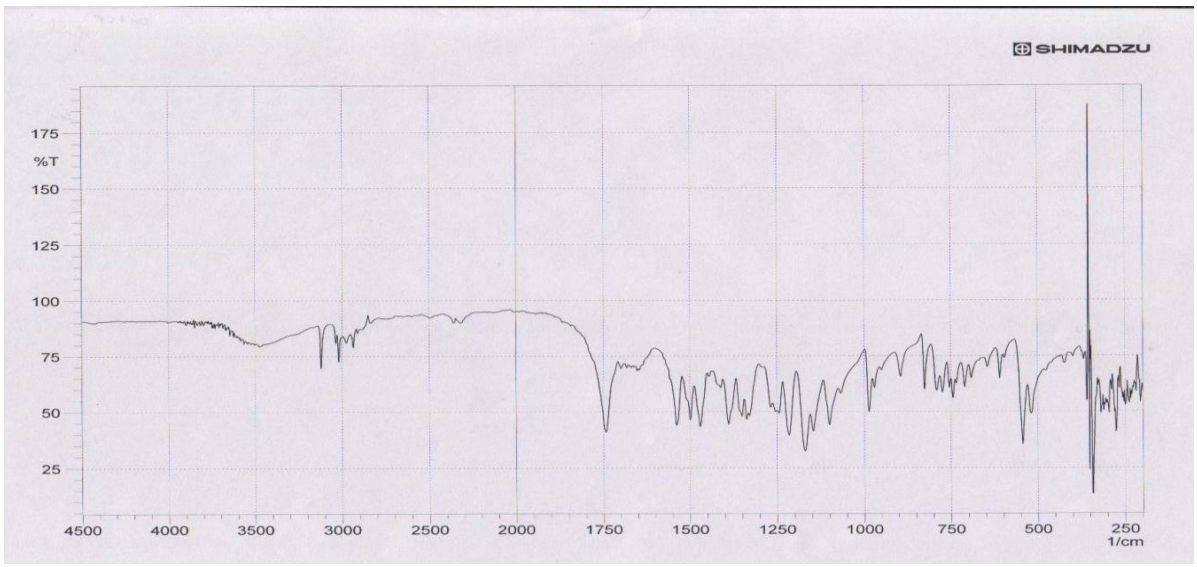
Figure 1: Fourier Transform Infrared Spectra of A) Satranidazole B) Satranidazole and Crospovidone C) Satranidazole and Croscarmellose





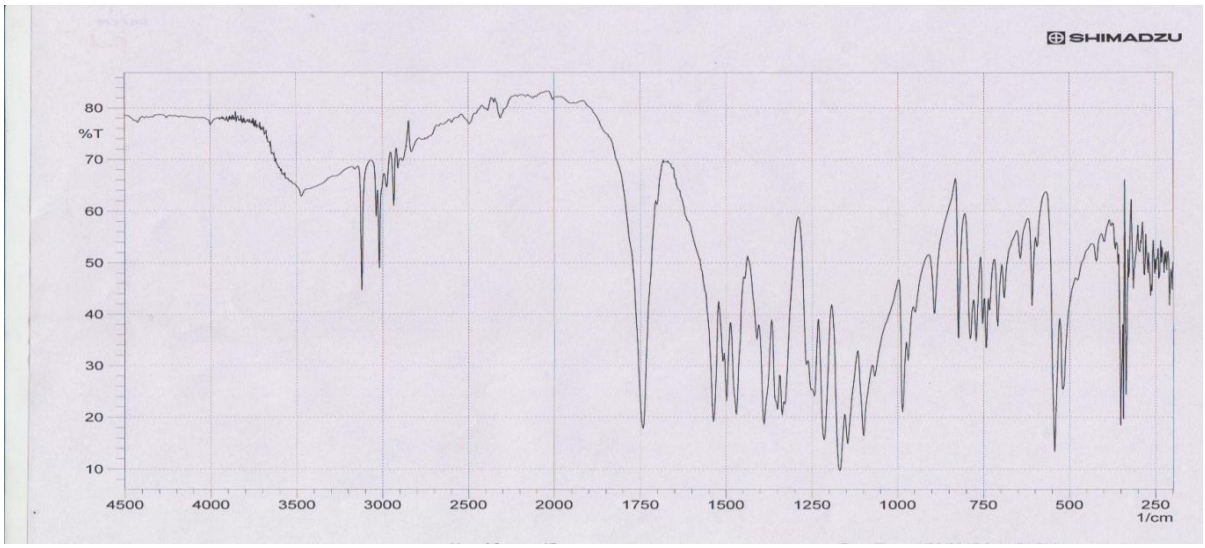


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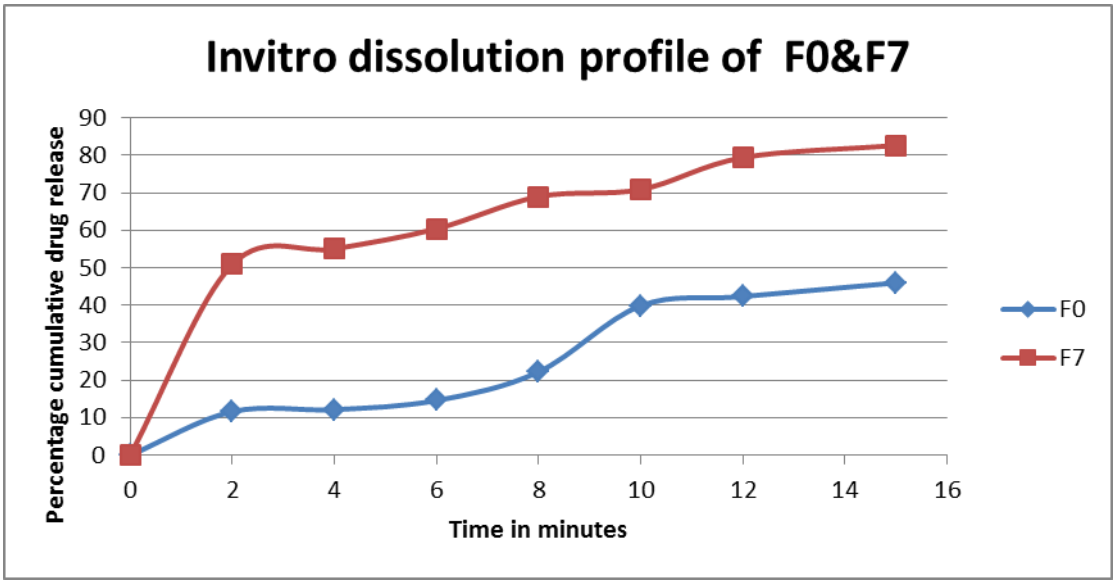
Figure 2: In-vitro Dissolution Profile Of Formulation F7 And Conventional Tablet.



RESULTS AND DISCUSSION

The supplied drug passed various tests of identification and analysis.The pure drug Satranidazole and various excipients used in the preparation of ODT were characterized by FT-IR spectroscopy to know the compatibility. The FT-IR study did not show any possibility of interaction between the drug and the excipients. Studies on the flow properties of the powder showed that the blend has good flow. Formulations F1-F3 were prepared using crospovidone(5%,7.5%&10%), F4-F6 were prepared with croscarmellose(5%,7.5%&10%),and F7 was prepared using equal amounts of both superdisintegrants(5% + 5%). The tablets possessed good mechanical strength since the required force for fracture lies in the range of 3.05 to 3.91. Since the %weight loss after the friability test was found to be less than 1% ,tablets have good mechanical resistance. All the formulations passed weight variation test as the % deviation was found to be within the prescribed limit of±7.5%.

Drug content for all the formulations were in the range of 98.65 – 99.78% with low standard deviation.The results revealed that the method used for the preparation of ODT was reproducible.The wetting time of all the formulations varied between 7-11 secs. Invitrodispersion time varied between 11-16 seconds,while disintegration time lies between 9-14 seconds.Water absorption ratio ranged from 48 -62%.

In vitro dissolution profile indicated faster and maximum drug release from formulation F7 containing equal proportions of superdisintegrants. In other formulations,there was an increase in dissolution rate when the concentration of superdisintegrants increased from 5 -10%. All the formulations showed enhanced dissolution rate in 15 minutes when compared to conventional formulation.

CONCLUSION

The oral disintegrating tablets of Satranidazole with sufficient mechanical strength, shorter wetting time and enhanced drug release were achieved by employing suitable superdisintegrants and other excipients at optimum concentrations . The study revealed that the directcompression method of preparing ODT of Satranidazole was an effective method for enhancing the dissolution rate. It was shown that good results could be obtained by using a combination of superdisintegrants rather than using them separately.

REFERENCES

[1] B Venkateswarlu, B Pragati Kumar, Debjit Bowmik. IJRPB 2013;1(5):609-613.
[2] Chetan GP, Shivprasad HM. Asian J Biomed Pharm Sci 2012; 2(12): 69-72.
[3] Harish Chander, Sachin Kumar and Bineeta Bhatt. Der Pharmacia Sinica 2011;2(6):153-160.

[4] Konapure AS, Chaudhari PS, Oswal RJ, Kshirsagar SS, Antre RV and ChorageTV. Int J App Biol Pharm Technol 2011;2(1): 496-503.
[5] Neha Vishal Gandhi, SS Khadabadi , SS Angadi. IJPSR 2011;2(11):2983-2990.
[6] Mishra D. Indian Drugs 2006;43: 117-121.
[7] Modasiya MK, Lala II, Prajapati BG, Patel VM and Shah DA. Int J PharmTech Res 2009;1(2): 353-357.
[8] Neha Tomar, Mohit Tomar, Neha Gulati and Upendra Nagaich. Der Pharmacia Lettre 2012;4(5):1490-1494.
[9] Raghavendra NGR, Upendra K. Int J Pharm Pharm Sci 2010;Vol.2(2):70-74.
[10] Raju SA, Shobha M, Manjunath S. Asian J Chem 2002;14: 520-522.
[11] Reddy LH, Ghosh B and Rajneesh. Indian J Pharm Sci 2002;Vol. 64(4), 1-3.
[12] Sunada H, Yonezawa Y, Danjo K. Drug Dev Ind Pharm 1999;25(5), 571-581.
[13] Wankhede SB, Prakash A, Chitlange SS. Research J Pharm and Tech 2008;1: 441-443.
[14] Yunxia B.,Yorinobu Y., Kazumi D., Akinobu O. Chem Pharm Bull 1996;44: 2121-2127.