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Formulation and Development of Oro-Dispersible Tablet of Domperidone by Using Direct Compression Technique

[1*]Hapse SA, [1]Bhagat BV, [2]Mane AV, [3]Kadam SD

[1]PDVVPF's College of Pharmacy, Ahmednagar (MS)
[2]Sun Pharmaceutical and Research Centre, Mumbai (MS)
[3]HSBPVT'S GOI, College of Pharmacy Kashti, Shrigonda, Ahmednagar (MS)

ABSTRACT

The purpose of above study was to develop oro-dispersible tablet of Domperidone using direct compression technique. The tablets were prepared using lactose and magnesium stearate with two different level of disintegrant. The super-disintegrant used in the study were sodium starch glycolate and cross-carmellose sodium. The total nine formulations were evaluated for weight variation, thickness, hardness, friability, wetting time, disintegration time. Depending upon cumulative drug release, in vitro disintegration time, wetting time results one best formulation F3 was selected for stability studies for 3 months. Overall formulation F3 was found to be best formulation by direct compression method.

Key words: Domperidone, direct compression method, superdisintegrant, orodispersible tablets, Cross-carmellose sodium, Sodium starch glycolate.

Corresponding author

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INTRODUCTION

Oro-dispersible tablet can be defined as a dosage form for oral administration, which when placed in mouth, rapidly dispersed or dissolved and can be swallowed in form of liquid. These dosage forms dissolve or disintegrate in the oral cavity within a matter of seconds without the need of water or chewing. These are useful for pediatric, geriatric and also dysphagia patients, leading to improved patient compliance. Domperidone is an antiemetic drug chemically known as 1, 3-dihydro-5-chloro-1(1-(2, 3-dihydro2-oxo-1H-benzimidazole-1-yl) propyl)-4-peridinyl)-2H-benzimidazole-2-one. The drug is act by an inhibition of the dopaminergic receptor. Domperidone does not cross blood brain barrier. Domperidone also prescribed for the treatment of gastro paresis a stomach motility condition. The bioavailability of Domperidone is about 90% in intramuscular and 13 to 17% in oral. The low systemic bioavailability of Domperidone is likely due to first pass hepatic metabolism and gut wall metabolism % and significantly affected by the presence of food. The elimination half-life of Domperidone is reported to be 7.5 hours following IV administration of 10mg.

MATERIAL AND METHODS

Domperidone was a gift from wockhardt (Aurangabad, India), corsscarmellose sodium used was analytical reagent procured from loba chemie, Mumbai and sodium starch glycolate obtained from Man pharmaceutical limited. Lactose, Magnesium stearate and Talc were purchased from the S.D. fine Chem. Ltd. Mumbai.

Preparation of domperidone oro-dispersible tablet

All the materials were passed through 80 # screens prior to mixing. Domperidone, cross carmellose sodium, sodium starch glycolate and other excipients were mix using a glass mortar and pestle. All the material were directly compressible, so this uniformly mix blend was compressed in to tablet using concave face round tooling on 8 station single rotary lab-press tablet compression machine. The composition of the batches is as shown in table no 1.

Table No.1 Formulation of Domperidone Oro-dispersible tablet

Ingredients	Batch code								
	F1	F2	F3	F4	F5	F6	F7	F8	F9
Domperidone	10	10	10	10	10	10	10	10	10
Sodium starch glycolate	12	18	24	12	18	24	12	18	24
Cross carmellose sodium	15	15	15	18	18	18	21	21	21
Lactose	254	248	242	251	245	239	248	242	236
Magnesium stearate	3	3	3	3	3	3	3	3	3
Talc	6	6	6	6	6	6	6	6	6
Total (mg)	300	300	300	300	300	300	300	300	300

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Evaluation of Domperidone Oro-Dispersible Tablet [4, 6]

Diffrential Scanning Calorimetry (DSC)

DSC analysis was performed using Netzsch DSC 204, Tokyo, Japan. The sample were heated in a sealed aluminium pans at a rate of 10^0 C per min in a 30 to 300^0 C temperature under nitrogen flow of 40 ml/min. shown in fig. 1

Fourier Transform Infrared (FTIR) Spectroscopy

The study was carried out to determine the molecular structure serving as an identification test to ascertain the purity of molecule. FTIR spectra were obtained on Shimadzu FTIR Model 8400-S spectrometer. The Spectra was recorded as a dispersion of the sample in Potassium Bromide in IR disk (2 mg sample in 200 mg KBr) with the scanning range of 400 to 4000 cm-1 and the resolution was 1 cm -1 shown in fig. 2.

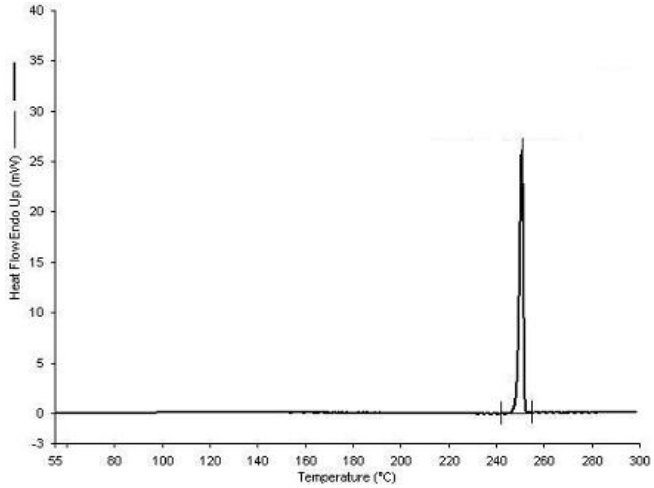

Fig. No 1 Differential Scanning Calorimetry of Pure Domperidone.

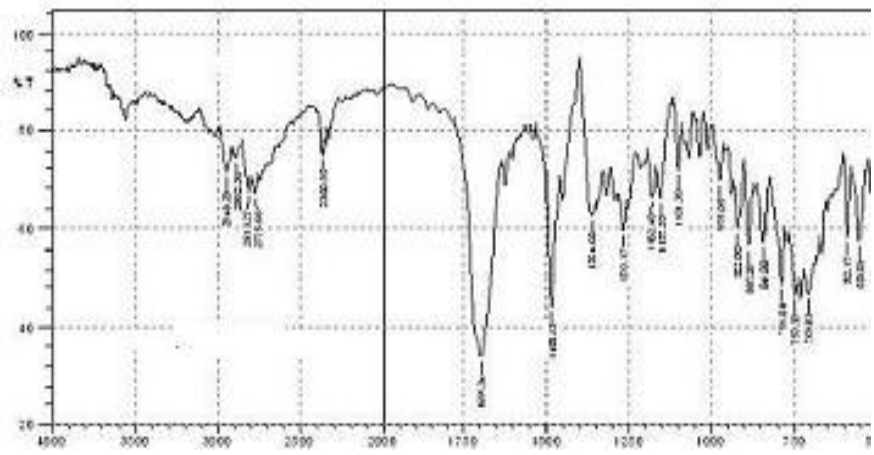

Fig. No 2 FTIR Spectroscopy of Pure Domperidone.

Uniformity of weight

The weights were determine with in ± 1 mg by using sartorious balance (Model- CP-224 S) weight control is based on a sample of 20 tablets. Determinations were made in triplicate.

Tablet hardness

The hardness of tablet was determine by diametral compression using a dial type hardness taster (Model no-1101, shivani scientific Ind.). A tablet hardness of about 3-4 kg/cm^2 is consider adequate for mechanical stability. Determinations were made in triplicate.

Tablet thickness

Tablet thickness can be measure using a simple procedure. Eight tablets were taken and there thickness was measure using vernier caliper. The thickness was measure by placing tablet between two arms of the vernier caliper.

Tablet friability

The friability of tablet was measure in a roche friablator (Camp-bell Electronics, Mumbai) tablets of a known weight (W_0) or a sample of 20 tablets are dedusted in a drum for a fixed time (100 Revolution) and weighed (W) again. Percentage friability was calculated from the loss in weight as given in equation as below. (The weight loss should not be more than 1%. Determination was made in triplicate).

$$\% \, Friability = \frac{W0 - W}{W0} x100$$

Wetting time

The wetting time of the tablet can be measure using a simple procedure. Five circular tissue papers of 10 cm diameter are placed in a Petri dish with a 10 cm diameter.10 mm of water containing Eosin water soluble dye is added to Petri dish. A tablet is carefully place on the surface of tissue paper. The time required for water to rich upper surface of tablet is noted as wetting time.

In-vitro disintegration test

The test was carried out on 6 tablets using tablet disintegration taster ED-20 (Electrolab, Mumbai, India) distilled water at 37 ^{0}C±2^{0}C was used as a disintegrating media and the time in second taken for complete disingration of tablet with no palable mass remaining in the apparatus was measure in second.

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In-vitro dissolution study

The release rate of Domperidone from orodispersible tablet was determine using United State Pharmacopoeia (USP) XXIV dissolutation testing apparatus II (Paddle method). The dissolutation test was performed using 900 ml of 0.1 N HCL (pH 1.2), at 37±0.5^{0}C and 50 RPM. A sample (10 ml) of the solution was withdrawn from the dissolution test apparatus at 5, 10, 15, 20, 25 and 30 min. Samples were replaced with fresh dissolution medium of same quantity. The samples were filter through 0.45μ membren filter. The absorbance of this solution was measured at 284 nm using a shimadzu UV-1700 UV/Vis double beam spectrophoto meter. Cumulative percentage of drug release was calculated using an equation obtain from standard curve and graph plotted % drug release against time as fig. No. 3

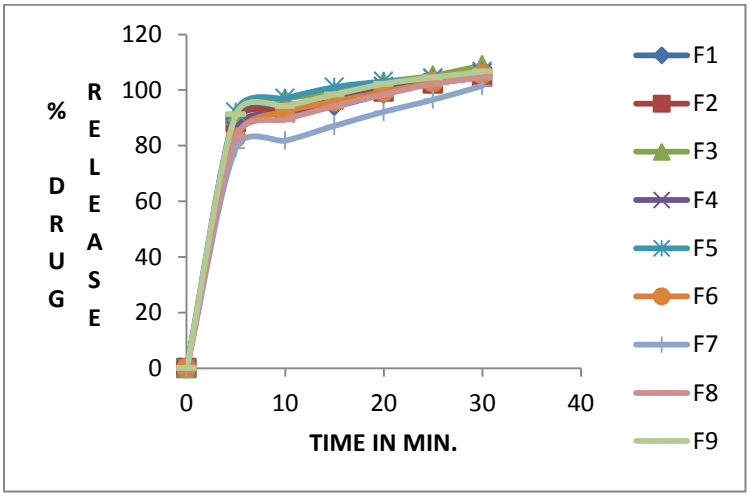

Fig. No 3 Drug release profile of Domperidone Oro-dispersible tablets from various batches.

Accelerated stability study of best batch (F3) [7-9]

In order to determine the change in in-vitro release profile on storage, stability study of batch F3 was carried out at 40^{0}C in a humidity chamber having 75 % RH. Samples were withradrawn after 3 months and evaluated for change in in-vitro drug release pattern, wetting time and disintegration time and observation noted as given in table No.3 and drug release pattern is plotted which is as given in fig. 4

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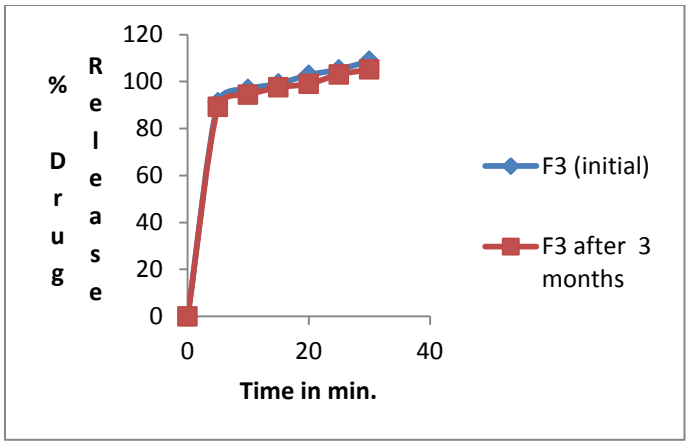

Fig. No 4 Drug release profile of Domperidone Oro-dispersible tablets before and after stability study of best batch F3.

RESULT AND DISCUSSION

In the present study Domperidone oro-dispersible tablet were prepared by using corsscarmellose sodium and sodium starch glycolate in different concentration proportion as superdisintegrant. A total number of 9 formulations were prepared by direct compression technique. The results of tablets were evaluated for uniformity of weight, thickness, hardness, friability, wetting time, disintegration time as shown in table no 2.

Table No.2 Evaluation of Domperidone Oro-dispersible tablet

Batch code	Weight variation (%)	Thickness (mm)	Hardness (kg/cm^2 n=10	Friability (%)	Wetting time (sec)	Disintegration time (sec)
F1	300±2.98	4.1	3.2	0.38	40	38
F2	299±1.32	4.2	3.7	0.40	39	29
F3	301±2.62	4.1	3.4	0.37	34	23
F4	299±1.54	4.5	3.5	0.39	38	28
F5	301±1.45	4.3	3.8	0.32	42	32
F6	300±3.01	4.2	3.1	0.36	39	30
F7	298±1.45	4.0	3.6	0.31	38	29
F8	299±1.37	4.2	3.8	0.35	41	32
F9	300±2.42	4.3	3.7	0.34	40	30

It is clear that the dissolution of Domperidone has improved considerable in formulation F3 as compared to other formulations. Fig 3 show the cumulative percentage of Domperidone release from formulated tablet with different concentration of corsscarmellose sodium and sodium starch glycolate. The tablet of the batch F3 showed good dissolution efficiency and rapid dissolution. The study shows that the dissolution rate of Domperidone can be enhance to a great extent by direct compression technique with the addition of superdisintegrant which give quick release from emesis.

Table No.3 Comparison of parameter for batch F3 initial and after 3 month

Parameter	Batch F3 Initial	Batch F3 after 3 month
Wetting time	34	38
Disintegration time	23	26

CONCLUSION

Direct compression method can be considered as an important method for the formulation of oro-dispersible tablets of Domperidone. The rank order for the best three formulation is F3>F4>F2.

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REFERENCES

[1] Chnag R, Guo X, Burnside B and Couch R. Pharm Tech North Am 2000; 12: 52-58.
[2] Seager H. J Pharm Pharmacol 1998; 50: 375-82.
[3] Singh SK, Mishra DN, Gassal R, Soni P. Asian J Pharm Clin Res 2009; 2(4): 54-62.
[4] Indian pharmacopoeia 4th ed, Ministry of Health and Family Welfare, Govt. of India. The controller of publication New Delhi. 1996: A-54.
[5] Tripathi KD. Essential of Medical Pharmacology, 7th ed, Jaypee Punlisher Ltd. Delhi.2008; pp: 639.
[6] Lachman L, Lieberman A and Kinig JL. The Theory and Practice of Industrial Pharmacy, 4th ed, Verghese Publishing House, Bombay, 1991, 67-68.
[7] Swamy PA, Areefulla SH, Shrisand SB, Gandra S and Prashanth B. Ind J Pharm Sci 2007; 69 (6): 836-840.
[8] Malke S, Shidhaye S and Kadam VJ. Ind J Pharm Sci 2007; 69 (2): 211-214.
[9] Patel MM, Patel DM. Ind J Pharm Sci 2006; 68 (2): 222-226.
[10] Shid SL, Hiremath SP, Borker SN, Sawant VA, Shende VS, et al. J Global Pharm Tech 2010; 2 (1): 107-117.