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# Formulation and Characterization of Mouth Dissolving Tablet of Metoclopramide Hydrochloride

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## ABSTRACT

Metoclopramide hydrochloride is an anti-emetic, act by blocking $D_2$ receptors in the Chemoreceptor trigger zone (CTZ), and antagonize chemotherapy induced vomiting. In the present study an attempt has been made to prepare Mouth Dissolving Tablets (MDTs) of Metoclopramide HCl for use in specific population *viz*. pediatrics, geriatrics and patients experiencing difficulty in swallowing tablet. Mouth Dissolving Tablets containing Metoclopramide HCl were prepared by direct compression method using various superdisintegrants like Sodium Starch Glycolate (SSG), Crosscarmellose Sodium (CCS), Crospovidone (CP), LHPC-11 and Doshion P 544D in three different concentrations i.e. 5, 7.5, 10 mg. The slight bitter taste of the drug was masked using sweetener and flavour which also enhanced the mouth feel of tablet. The initial compatibility studies between the drug and excipients were carried out using DSC and FT-IR Spectra. The blend was examined for various pre-compression parameters like angle of repose, density, compressibility index, etc. The formulated tablets were evaluated for hardness, friability, *in-vitro* disintegration time, drug content, etc. The hardness of the tablets was in range of 3-5 kg/cm$^2$. The percentage friability of the tablets was less than one. Weight variation test results showed that the tablets were deviating from the average weight within the permissible limits of ±7.5%. Drug content uniformity study results was found to be 99-100%. Batch F15 containing Doshion P 544D (10 mg) showed better disintegrating character along with the immediate release (100.09% within 6 minutes). There was no drastic change in result of tablets of an optimized batch at the end of one month accelerated stability study. It was concluded that the *in-vitro* drug release was influenced greatly by the concentration of superdisintegrants and Doshion P 544D was found to be better suited for the formulation of mouth dissolving tablets of Metoclopramide HCl compared to other superdisintegrants used in the study.

## KEYWORDS

Metoclopramide HCl, Superdisintegrants, Mouth Dissolving Tablet, Direct Compression Method.

## INTRODUCTION

Patient compliance, high-precision dosing, and manufacturing efficiency make tablets the solid dosage form of choice. The concept of mouth dissolving drug delivery system emerged from the desire to provide patient with more conventional means of taking their medication.

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It is difficult for many patients to swallow tablets and hard gelatin capsules. Hence they do not comply with prescription, which results in high incidence of non-compliance and ineffective therapy. In some cases such as motion sickness, sudden episodes of allergic attacks or coughing and unavailability of water, swallowing conventional tablets may be difficult. Particularly the difficulty is experienced by pediatric and geriatric patients. Such problems can be resolved by means of ***Mouth Dissolving Tablet***[1] (MDT). When MDT

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put on tongue, this tablet disintegrates instantaneously, releasing the drug, which dissolves or disperses in the saliva. Some drugs are absorbed from the mouth, pharynx and esophagus as the saliva passes down into the stomach. In such cases, bioavailability of drug is significantly greater than those observed from conventional tablet dosage form.

Metoclopramide hydrochloride is a derivative of p-amino benzoic acid, which is a commonly prescribed drug for the management of gastrointestinal disorders such as gastric stasis, gastro esophageal reflux (GERD) and for the prevention of chemotherapy induced emesis. In general, emesis is preceded with nausea and such condition it is difficult to administer drug with a glass of water, hence it is beneficial to administer this drug as mouth dissolving tablets and this type of dosage form is appropriate to particularly pediatric and geriatric patients who experienced difficulties in swallowing tablet[2,3].

Metoclopramide HCl stimulates motility of the upper GI without stimulating gastric, pancreatic or biliary secretions which shows the Metoclopramide HCl acts as an anti-emetic. It has more permanent effect on upper G.I.T, increases gastric peristalsis while relaxing the pylorus and the first part of duodenum. Its mode of action is unclear. It seems to sensitize tissues to the action of acetylcholine. The effect of Metoclopramide on motility is not dependent on intact vagal innervations, but it can be abolished by anticholinergic drugs.

The antiemetic properties of metoclopramide appear to be a result of its antagonism of central and peripheral dopamine receptors. Dopamine produces nausea and vomiting by stimulation of the medullary chemoreceptor trigger zone (CTZ), and Metoclopramide blocks stimulation of the CTZ by agents like l-dopa or apomorphine which are known to increase dopamine levels or to possess dopamine-like effects. Metoclopramide also abolishes the slowing of gastric emptying caused by apomorphine.

The principle of the present investigation is to develop and characterize rapidly disintegrating tablets, which disintegrates in the oral cavity in a matter of second without the need of water. This helps in improving clinical effects through pre-gastric absorption, leading to an increase in bioavailability of the drug and quick onset of pharmacological action and for patient compliance[4,5,6].

## MATERIALS AND METHODS

### MATERIALS

The materials used were: Metoclopramide HCl (obtained as a gift from Cadila Pharmaceutics, India), Avicel pH 112 (Accent microcell industries, India), Mannitol (Shandong, china), Sodium starch glycolate, Croscarmellose sodium, Crospovidone, Doshion P 544 D (A.M.K Chemicals, India), LHPC-11 (Alembic Pharmaceuticals, India), Aspartame (Shinosweet, China), Dry Orange Flavour (International flavor and fragrance (IFF), India).

### DRUG- EXCIPIENT COMPATIBILITY STUDY[7,8,9]

#### Drug- Excipient Compatibility Study by FT-IR

Fourier-transform infrared **(**FT-IR) spectra were obtained using an FT-IR spectrometer (Shimadzu 8400S, Japan). The compatibility of Metoclopramide with various excipients individually and combine in physical mixture were previously ground and mixed thoroughly with potassium bromide, an infrared transparent matrix, at 1:5 (Sample:KBr) ratio, respectively. The KBr discs were prepared by compressing the powders at a pressure of 5 tons for 5 min in a hydraulic press. Forty scans were obtained at a resolution of 4 $cm^{-1}$, from 4000 to 400 $cm^{-1}$

#### Drug- Excipient Compatibility Study by DSC

The DSC study was carried out using DSC-60 (Shimadzu, Tokyo, Japan). The instrument comprises of calorimeter, flow controller, thermal analyzer and operating software. The samples (drug and excipients) were heated in sealed aluminum pans under air flow (30 ml/min) at a scanning rate of 20°C/min from 50 to 300°C. Empty aluminum pan was used as a

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reference. The heat flow as a function of temperature was measured for the samples.

## PREPARATION OF MDT OF METOCLOPRAMIDE HCl

Tablets were prepared by direct compression method. Metoclopramide HCl and all the intra-granular ingredients were weighed and individually passed through 40 # mesh respectively as per batch formula and mixed geometrically. Above blend was lubricated with magnesium stearate & talc (which were passed through # 40mesh). The blend ready for compression was compressed in tablet using 10/32" FBE punch in tablet compression machine.

density, Tapped density, Carr's index and Hausner's ratio.

## EVALUATION OF TABLETS

### Appearance

Twenty tablets of each formulation were taken to check any discoloration or surface roughness in the tablet formulation.

### Weight Variation Test

To study weight variation twenty tablets of the formulation were weighed using a Reptech electronic balance and the test was performed according to the official method[13].

Table 1: Composition of Different Batches of Mouth Dissolving Tablet of Metoclopramide HCl

| Ingredients | F1 | F2 | F3 | F4 | F5 | F6 | F7 | F8 | F9 | F10 | F11 | F12 | F13 | F14 | F15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Metoclopramide HCl | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Avicel pH 112 | 101 | 98.5 | 96 | 101 | 98.5 | 96 | 101 | 98.5 | 96 | 101 | 98.5 | 96 | 101 | 98.5 | 96 |
| Mannitol | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| Sodium Starch Glycolate | 5 | 7.5 | 10 | | | | | | | | | | | | |
| Cross Carmellose Sodium | | | | 5 | 7.5 | 10 | | | | | | | | | |
| Crospovidone | | | | | | | 5 | 7.5 | 10 | | | | | | |
| LHPC-11 | | | | | | | | | | 5 | 7.5 | 10 | | | |
| Doshion P 544 D | | | | | | | | | | | | | 5 | 7.5 | 10 |
| Aspartame | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| Dry orange flavor | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Magnesium stearate | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Talc | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Total weight | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 |

## EVALUATION PARAMETERS

## EVALUATION OF POWDER BLEND[10,11,12]

The powder blend of formulation batches of API were evaluated for Angle of repose, Bulk

### Hardness

The hardness of three tablets was determined using the Monsento type hardness tester and the average values were calculated[14].

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**Thickness and Diameter**

The thickness and diameter of the tables was determined by using Digital vernier calipers. Three tablets were used, and average values were calculated.

**Friability**

The friability of twenty tablets was measured using Roche friabilator for 4min at 25rpm for 100 revolutions. Accurately weigh twenty tablets placed into Roche friabilator for 100 revolutions than dedust the tablets and weigh[15].

$$\% \text{ Friability} = (W_0 - W) * 100 / W_0$$

**Drug Content**

Tablet containing 5mg of drug was dissolved in 50ml of phosphate buffer pH 6.8 taken in volumetric flask. The drug was allowed to dissolve in the media. The solution was filtered, 10ml of filtrate was taken in 100ml volumetric flask and diluted up to mark with phosphate buffer pH 6.8 (10mcg/ml) and analyzed spectrophotometrically at $\lambda_{max}$273 nm[16].

**Wetting Time**

The method was applied to measure tablet-wetting time. A piece of tissue paper folded twice was placed in a small petridish (i.d = 6.5 cm) containing 6 ml of water, a tablet was put on the paper, and the time for complete wetting was measured. Three trials for each batch were performed and standard deviation was also determined[17].

***In-Vitro* Disintegration Study**

The process of breakdown of a tablet into smaller particles is called as disintegration. The *in vitro* disintegration time of a tablet was determined using disintegration test apparatus as per I.P. specifications. Place one tablet in each of the 6 tubes of the basket. Add a disc to each tube and run the apparatus using pH 6.8 (simulated saliva fluid) maintained at 37±1ºC as the immersion liquid. The assembly should be raised and lowered between 30 cycles per minute in the pH 6.8 maintained at 37±1ºC. The time in seconds taken for complete disintegration of the tablet with no palpable mass remaining in the apparatus was measured and recorded[18,19].

***In-Vitro* Drug Release Study**

*In vitro* drug release studies were carried out using USP XXIV dissolution apparatus II (Electrolab, TDT-06T, Mumbai, India). The tests were carried out in pH 6.8 buffer (900 ml) equilibrated at 37ºC±0.5 ºC. The paddles were rotated at 50 rpm. 10 ml aliquots of the dissolution medium were withdrawn and replaced with 10 ml of fresh dissolution medium at 3 minutes time interval. The collected samples were analyzed spectrophotometrically at 273 nm[20].

***In-Vitro* Drug Release Study in Simulated Saliva Fluid for Optimized Batch[44]**

*In vitro* drug release studies were carried out using USP XXIV dissolution apparatus II (Electrolab, TDT-06T, Mumbai, India). The tests were carried out in SSF medium (900 ml) equilibrated at 37ºC±0.5 ºC. The paddles were rotated at 50 rpm. 10 ml aliquots of the dissolution medium were withdrawn and replaced with 10 ml of fresh dissolution medium at 3 minutes time interval. The collected samples were analyzed spectrophotometrically at 273 nm[21].

**Evaluation of Taste by Panel**

The taste evaluation was done by panel testing. For panel testing 10 healthy human volunteers were selected and requested to taste all formulation by keeping in mouth till they disintegrated and rank it on a scale of perception ranging from 0-4. (0 = good, 1 = tasteless, 2 = slightly bitter, 3 = bitter, 4 = very bitter)

**STABILITY STUDIES OF OPTIMIZED TABLETS[22]**

The stability studies of the optimized tablets were carried out at 40°C temperature and 75 % relative humidity (accelerated stability) in stability chamber for one month. Tablets were withdrawn at the end of month and evaluated for physical appearance, hardness, drug content and *in-vitro* release.

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## RESULT AND DISCUSSION

### Drug- Excipient Compatibility Study by FT-IR

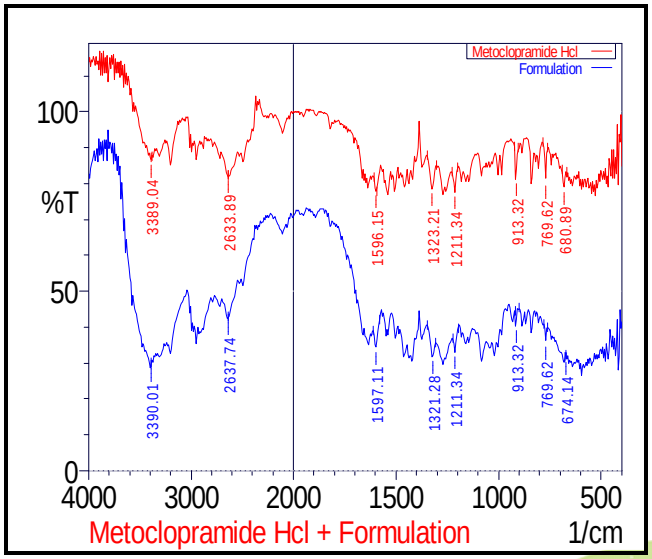


Figure 1: Comparisons of FT-IR Spectra of (A) Drug and (B) Mixture of Drug and other Excipients

In FTIR study, shift of peaks observed as a result of physical interaction between Metoclopramide HCl and excipients. But it does not show any well-defined interaction between Metoclopramide HCl and excipients. It was indicated that drug (Metoclopramide HCl) is compatible with the components.

### Drug- Excipient Compatibility Study by DSC

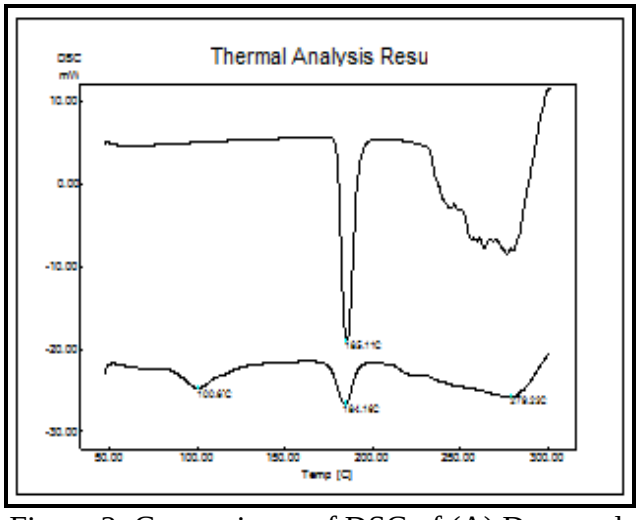


Figure 2: Comparisons of DSC of (A) Drug and (B) Mixture of Drug and other Excipients

DSC curves obtained for pure drug and physical mixture of all ingredients were shown in figure 2. Pure powdered drug showed a sharp melting endotherm at 185.1°C. DSC thermograms of physical mixture of drug and excipients showed the melting peak of the drug at 184.1°C. Presence of all peaks indicates that all ingredients are compatible with drug means there is no incompatibility between the selected ingredients.

### EVALUATION OF BLEND MIXTURES

The results of angle of repose of all F1 to F17 batches were found to be in the range of 26.22º to 29.98 º. All formulations showed the angle of repose within 30º, which indicated that they have good flow property.

Both loose bulk density (LBD) and tapped bulk density (TBD) for all the formulations varied from 0.57 gm/cm$^3$ to 0.63 gm/cm$^3$ and 0.67 gm/cm$^3$ to 0.73 gm/cm$^3$ respectively. The values obtained lies within the acceptable range and not large differences found between loose bulk density and tapped bulk density. This result helps in calculating the % compressibility of the powder.

This percent compressibility of powder mix was determined by Carr's compressibility index.

Table 2 shows result obtained for percentage compressibility. The percent compressibility for all the formulations lies within the range of 13.432 to 18.57. All formulations are showing good compressibility.

### EVALUATION OF FORMULATION BATCHES F1-F15

Hardness of the prepared tablets was found in range of 3.5-4.5 kg/cm$^2$ which was acceptable for mouth dissolving tablet. The prepared tablet formulations have shown 2.95±0.04 to 3.25±0.04 mm thickness and 149.93±0.45 to 150.35±0.48 mg of weight which were complied with standard limit. Percentage weight loss in the friability test was less than 1% in all the batches, which was an indication of good mechanical resistance of the tablets.

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Table 2: Data of Angle of Repose, Bulk Density, Tapped Density, Carr's Index and Hausner's Ratio

| Formulation Code | Angle of Repose (θ) | Bulk Density ($gm/cm^3$) | Tapped Density ($gm/cm^3$) | Carr's index | Hausner's ratio |
|---|---|---|---|---|---|
| F1 | 28.22º | 0.60 | 0.71 | 15.49 | 1.18 |
| F2 | 29.98º | 0.57 | 0.68 | 16.11 | 1.19 |
| F3 | 26.22º | 0.59 | 0.70 | 15.71 | 1.78 |
| F4 | 28.20 º | 0.61 | 0.72 | 15.27 | 1.19 |
| F5 | 26.15 º | 0.58 | 0.67 | 13.43 | 1.15 |
| F6 | 27.47 º | 0.60 | 0.71 | 14.28 | 1.18 |
| F7 | 27.12 º | 0.57 | 0.70 | 18.57 | 1.22 |
| F8 | 29.45 º | 0.59 | 0.68 | 13.23 | 1.15 |
| F9 | 27.62 º | 0.61 | 0.70 | 12.85 | 1.14 |
| F10 | 26.70 º | 0.58 | 0.68 | 14.70 | 1.17 |
| F11 | 27.22 º | 0.60 | 0.72 | 16.66 | 1.2 |
| F12 | 27.56 º | 0.61 | 0.70 | 12.85 | 1.14 |
| F13 | 26.45 º | 0.63 | 0.74 | 14.86 | 1.17 |
| F14 | 27.20 º | 0.59 | 0.70 | 15.71 | 1.18 |
| F15 | 27.31 º | 0.61 | 0.73 | 16.43 | 1.18 |

Table 3: Evaluation of batches F1 to F15

| BATCH | Hardness ($kg/cm^2$) n=5 | Uniformity of Thickness, n=20 | Friability (%) | Uniformity of Weight (mg), n=20 |
|---|---|---|---|---|
| F1 | 3.87±0.52 | 3.09±0.04 | 0.61 | 149.93±0.45 |
| F2 | 3.80±0.53 | 3.12±0.05 | 0.64 | 150.24±0.46 |
| F3 | 3.95±0.52 | 2.95±0.04 | 0.57 | 150.12±0.46 |
| F4 | 4±0.5 | 2.98±.03 | 0.52 | 150.12±0.46 |
| F5 | 4.2±0.4 | 2.97±0.03 | 0.56 | 150.14±0.46 |
| F6 | 4.6±0.42 | 2.98±0.04 | 0.52 | 150.39±0.49 |
| F7 | 4.4±0.3 | 2.94±0.06 | 0.64 | 150.21±0.48 |
| F8 | 4.6±0.4 | 2.97±0.04 | 0.54 | 150.16±0.46 |
| F9 | 4.2±0.42 | 2.96±0.03 | 0.44 | 150.23±0.46 |
| F10 | 3.98±0.4 | 3.05±0.06 | 0.47 | 150.23±0.46 |
| F11 | 4.2±0.4 | 3.2±0.04 | 0.54 | 150.10±0.46 |
| F12 | 4.2±0.42 | 2.98±0.04 | 0.57 | 150.15±0.46 |
| F13 | 4.5±0.4 | 3.1±0.05 | 0.49 | 150.35±0.48 |
| F14 | 4.6±0.43 | 3.2±0.04 | 0.63 | 150.11±0.46 |
| F15 | 4.4±0.45 | 3.25±0.04 | 0.57 | 150.15±0.46 |

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As seen from table 4, the uniformity of drug content revealed the tablets to contain Metoclopramide HCl equivalent to Metoclopramide between 99.07±0.4 to 99.8±0.4 of the labeled claim. Wetting time which is an important criteria for understanding the capacity of disintegrants to swell in the presence of little amount of water was found to be in the range of 15±2.1 to 34±1.8 sec. All formulations disintegrated rapidly *in-vitro* within 12±2.2 to 24.33±2.08 sec. Amongst the prepared formulations, F9 and F15 was found to have the minimum disintegration time of 12±2.2 sec. All the 20 volunteers reported the taste of tablet as sweet which indicated that slightly bitter taste of drug was masked.

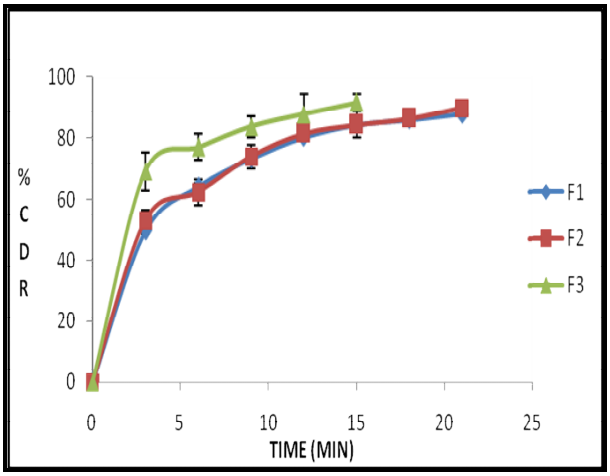


Figure 3: *In-vitro* Drug Release of F1-F3 in Phosphate Buffer pH 6.8

Table 4: Result of Evaluation of Tablet Parameters batches F1 to F15

| BATCH | Drug Content (%), n=3 | Wetting Time (sec), n=3 | *In-vitro* Disintegration Time (sec), n=6 | Taste Evaluation* | % Cumulative drug release |
|---|---|---|---|---|---|
| F1 | 94.9±0.4 | 30±2.4 | 24.33±2.08 | 0 | 88.10±0.7 |
| F2 | 99.2±0.2 | 26±2.2 | 23.6±2.70 | 0 | 90.12±1 |
| F3 | 99.07±0.4 | 20±2.1 | 13±2.44 | 0 | 92±2.8 |
| F4 | 99.29±0.4 | 21±2.1 | 14.8±2.9 | 0 | 93.91±0.9 |
| F5 | 99.5±0.3 | 18±1.8 | 12.8±2.4 | 0 | 91.87±1.9 |
| F6 | 99.07±0.4 | 20±2.3 | 12±2.35 | 0 | 99.45±3.4 |
| F7 | 99.7±0.4 | 23±2.2 | 16.2±2.8 | 0 | 91.11±1.4 |
| F8 | 99.5±0.4 | 18±1.7 | 13±2.4 | 0 | 94.13±2 |
| F9 | 99.2±0.4 | 15±2.1 | 11±2.26 | 0 | 98.23±1.4 |
| F10 | 99.4±0.4 | 34±1.8 | 30±2.8 | 0 | 87.74±2.4 |
| F11 | 99.2±0.4 | 29±2.1 | 22±2.37 | 0 | 90.76±3.5 |
| F12 | 99.7±0.4 | 25±2.1 | 18±2.51 | 0 | 91.30±1.2 |
| F13 | 99.6±0.4 | 19±2.4 | 14±2.6 | 0 | 97.89±0.8 |
| F14 | 99.2±0.4 | 20±1.9 | 12.4±2.2 | 0 | 99.67±1.7 |
| F15 | 99.8±0.4 | 16±2.0 | 12±2.2 | 0 | 100.09±0.9 |

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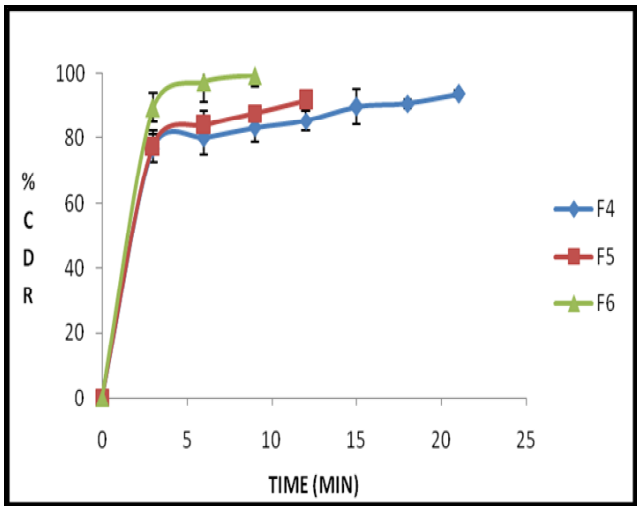


Figure 4: *In-vitro* Drug Release of F4-F6 in Phosphate Buffer pH 6.8

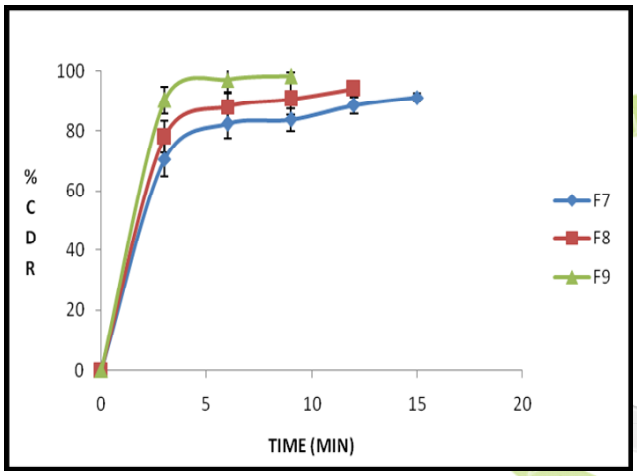


Figure 5: *In-vitro* Drug Release of F7-F9 in Phosphate Buffer pH 6.8

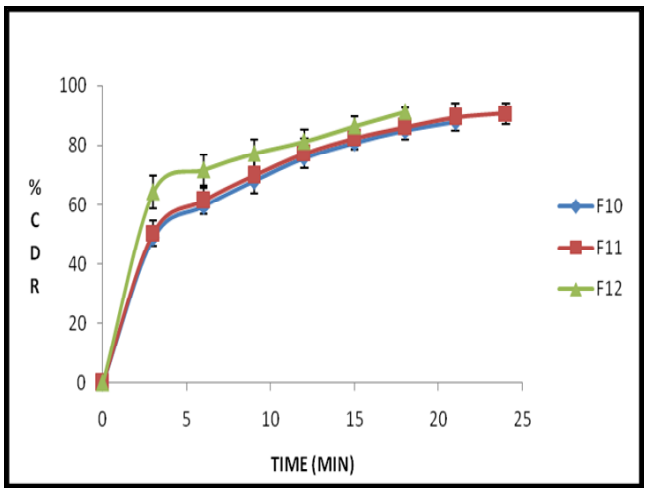


Figure 6: *In-vitro* Drug Release of F10-F12 in Phosphate Buffer pH 6.8

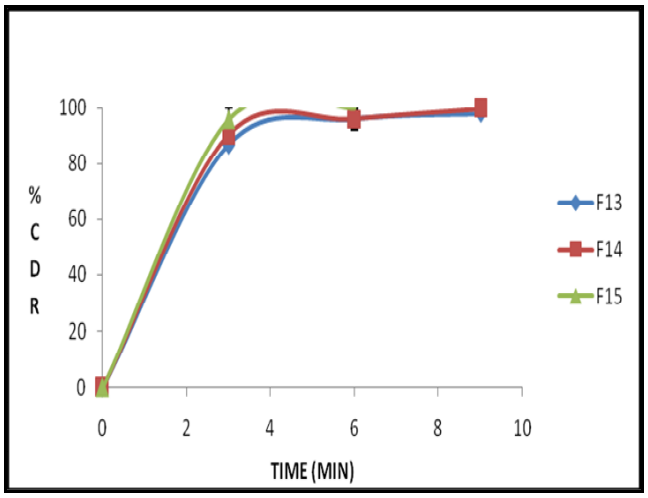


Figure 7: *In-vitro* Drug Release of F13-F15 in Phosphate Buffer pH 6.8

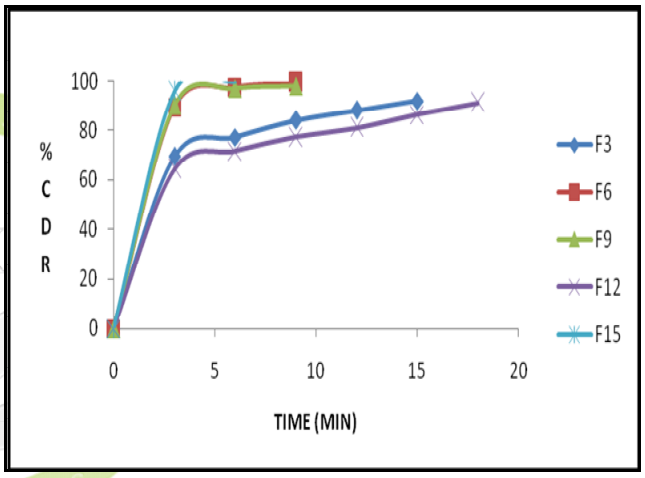


Figure 8: Comparatives Study of F3, F6, F9, F12, F15 in Phosphate Buffer pH 6.8

From the *in-vitro* drug release data, it was observed that batch F1, F2 and F3 containing Sodium Starch Glycolate (5, 7.5, 10 mg) as superdisintegrants has shown drug release within 30 minutes. Release rate of drug from the formulations F4, F5, F6 containing Crospovidone (5, 7.5, 10 mg) as superdisintegrants, batch F6 has shown drug release within 9 minutes was found to be faster than previous formulation. From the batch F7-F9 containing Croscarmellose Sodium (5, 7.5, 10 mg) as superdisintegrants, batch F9 has shown drug release within 10 minutes which has shown better release of drug. Release rate of drug from the formulations F10, F11, F12 containing LHPC-11 (5, 7.5, 10 mg) as superdisintegrants, batch F12 has shown drug

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release within 25 minutes. From the *in-vitro* drug release data, it was observed that batch F13, F14 and F15 containing Doshion P 544 D (5, 7.5, 10 mg) as superdisintegrants, batch F15 has shown drug release within 6 minutes which shown best result amongst other formulation batches.

## ACCELERATED STABILITY STUDY OF OPTIMIZED BATCH F15

Table 5: Accelerated Stability Study of Optimized Batch F15

| **Pack** | **PVDC – Alu Blister** | | | |
|---|---|---|---|---|
| **Condition** | 40˚C/75%RH | | | |
| **Batch No.** | F15 | | | |
| ***In – Vitro* Drug Release** | | | | |
| | **Phosphate Buffer pH 6.8** | | **SSF** | |
| **Time (Min)** | **Initial** | **1 month** | **Initial** | **1 month** |
| **0** | 0 | 0 | 0 | 0 |
| **3** | 95.82±4.5 | 94.97±3.6 | 93.21±3.2 | 93.01±4.1 |
| **6** | 100.09±1.3 | 99.89±0.8 | 99.74±1.8 | 98.96±1.2 |
| **Assay** | | | | |
| | 99.8±0.4 | 99.4±0.4 | 99.6±0.3 | 99.1±0.4 |
| ***In – Vitro* Disintegration Time (sec)** | | | | |
| | 12±1.5 | 12±0.78 | 14±0.92 | 13±0.56 |

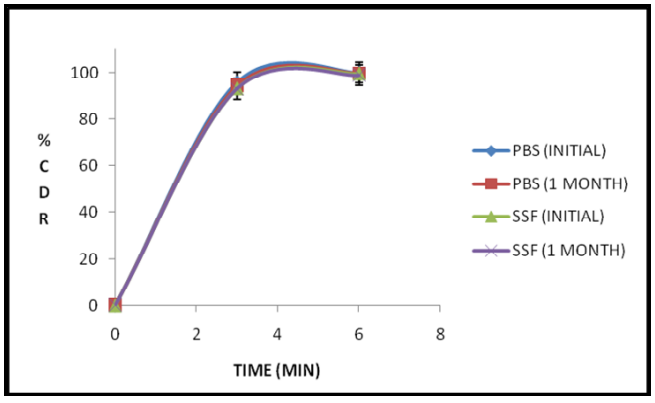


Figure 9: *In-vitro* Drug Release of Accelerated Stability Study of Optimized Batch F15

## CONCLUSION

On the basis of the result of *in-vitro* disintegration time and *in-vitro* drug release, optimization of formulation was carried out. Amongst all formulation, batches F6, F14, F15 were shown good result of *in-vitro* disintegration time and *in-vitro* drug release. F6 has shown 99.45% drug release in 9 minutes, F14 has shown 99.67% drug release in 9 minutes but F15 has shown 100.09% drug release within 6 minutes which showed best result amongst all batches. This batch was selected for one month accelerated stability study. After completion of time duration of stability study, various parameters like physical appearance, hardness, drug content and *in-vitro* drug release were studied. There was no drastic change in result of tablets of an optimized batch at the end of one month accelerated stability study. It was concluded that the results obtained showed that the *in-vitro* drug release and other important parameters were influenced greatly by the concentration of superdisintegrants and Doshion P 544 D was found to be better suited for the formulation of mouth dissolving tablets of Metoclopramide HCl compared to other superdisintegrants used in the study. Formulated Metoclopramide HCl tablets disintegrated quickly in simulated saliva fluid. The presence of super disintegrating agent in the tablet was responsible for the quick disintegration and dissolution characteristics of the formulated tablets. This study clearly demonstrated that one could develop a quick disintegrating Metoclopramide HCl tablet by using a direct compression method. Such a method avoids the expensive techniques and produces tablets that can disintegrate faster with good mechanical strength.

## REFERENCES

1. Bhowmik D, Chiranjib B, “Fast Dissolving Tablet: An Overview”, Journal of Chemical and Pharmaceutical Research, 2009, 163-77.
2. Rang HP, Dale MM, Ritter JM, Moore PK, Pharmacology, Churchill Livingstone, Edinburgh, 5th Edition, 2003, ISBN0-443-07145-4.

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3. Tripathi KD, Essentials of Medicinal Pharmacology, Jaypee Brothers Medicinal Publishers (p) Ltd, New Delhi, 5th Edition, 2003.
4. Morrow GR, "Methodology and Assessment in Clinical Anti-emetic Research: A Meta-analysis of Outcome Parameters" British Journal of Cancer, Suppl. XIX, 1992, 66, S38- S41.
5. Http//drugbank.ca/drugs/DB01233.
6. Martindale, The Complete Drug Reference, Pharmaceutical Press, London, 35th Edition, 2007, (1), 1575-1579.
7. Anand V, Kandarapu R, "Preperation and Evaluation of Taste-Masked Orally Disintegrating Tablets of Prednisolone", Asian Journal of Pharmaceutical Science, 2007, 227-38.
8. Keny R, Desouza C, "Formulation and Evaluation of Rizatriptan Benzoate Mouth Dissolving Tablets", Indian Journal of Pharmaceutical Science, 2010, 79-85.
9. Kavitha P, Jayaprakash S, "Formulation and evaluation of flucloxacillin sodium dispersible tablets", International Journal of Pharmaceutical Biomedical Science, 2010, 1(3), 41-44.
10. Banker S, Rhodes C, Modern Pharmaceutics, Marcel Dekker Inc, 4th Edition, 2002.
11. Subhramanyam CVS, Textbook of Physical Pharmaceutics, Vallabh Prakashan, New Delhi, 2nd Edition, 2001.
12. Aulton ME, The Science of Dosage Form Design, Churchill Living Stone, 2nd Edition, 2002, 414-418.
13. Indian Pharmacopoeia, Ministry of Health and Welfare, Controller of Publication, 2007, 780-82.
14. Ahad H, Sreenivasulu R, "Novel Approach in Designing and In-Vitro Evaluation of Mouth Dissolving Tablets of Metoclopramide Hydrochloride", Scholar Research Library, 2011, 3(1), 201-207.
15. Shirsand S, Ramani R, "Novel Co-Processed Superdisuntegrants in the Design of Fast Dissolving Tablets", International Journal of Pharmaceutical and Bio Science, 2010, 1(1), 35-42.
16. Raju S, Reddy P, "Flash Release Oral Films of Metoclopramide Hydrochloride for Pediatric Use: Formulation and Evaluation", Journal of Chemical and Pharmaceutical Research, 2011, 3(4), 636-646.
17. Patel B and Patel J, "Formulation and Evaluation of Mouth Dissolving Tablets of Cinnazarine", International Journal of Pharmaceutical Science, 2010, 72(4), 522-525.
18. Yadav R, Ayyappan T, "Novel Melt Granulation Method using Sugars of Metoclopramide hydrochloride Orally Disintegrate Tablet", International Journal of Pharmatech Research, 2011, 3(1), 516-525.
19. Kalia A, Khurana S, "Formulation and Evaluation of Mouth Dissolving Tablets of Oxcarbezepine", International Journal of Pharmaceutical Science, 2007, 753-58.
20. Bhardwaj S, Jain V, "Formulation and Evaluation of Fast Dissolving Tablet of Aceclofenac", International Journal of Drug Delivery, 2010, 93-97.
21. Margareth RC, Raimar L, "Simulated Biological Fluids with Possible Application in Dissolution Testing", Dissolution Technologies, 2011, 15-28.
22. Chandira RM and Venkateswarlu BS, "Formulation Development and Evaluation of Fast Dissolving Tablets of Carvedilol", Journal of Chemical and Pharmaceutical Research, 2010, 196-210.

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