International Journal of Trend in Scientific Research and Development (IJTSRD)
Volume 4 Issue 1, December 2019 Available Online: www.ijtsrd.com e-ISSN: 2456 – 6470

Formulation Development and Evaluation of Oral Fast Dissolving Films of Metaclopromide HCL

Zeenath Ruhy

Assistant Professor, Department of Pharmaceutics,
Mother Teresa College of Pharmacy, N.F.C Nagar, Ghatkesar, Medchel, Telangana, India

ABSTRACT

Metaclopromide-HCl is an Anti-emetic used to treat nausea, vomiting and to increase gastric motility. The present work aimed at preparing oral fast dissolving films of Metaclopromide-HCl with the purpose of developing a dosage form for a very quick onset of action, which is very convenient for administration, without the problem of swallowing and using water. Oral fast dissolving films of Metaclopromide-HCl were prepared using HPMC (E5, E15) polymers as film forming agents and polyethylene glycol-400 as plasticizer by solvent casting method. FTIR showed that there is no interaction between drug and excipients. Dissolution of prepared fast dissolving oral films of Metaclopromide-HCl was performed using USP type II apparatus in pH 6.8 phosphate buffer medium at 50 rpm with temperature being maintained at 37±0.5º C. The films prepared were evaluated for various parameters like thickness, drug content uniformity, weight variation, disintegration time, folding endurance and *in vitro* drug release and were showed satisfactory results. In conclusion, development of oral fast dissolving oral films using HPMC polymer gives rapid drug delivery and rapid onset of action.

KEYWORDS: *Oral fast dissolving films, Metaclopromide, HPMC*

How to cite this paper: Zeenath Ruhy "Formulation Development and Evaluation of Oral Fast Dissolving Films of Metaclopromide HCL" Published in International Journal of Trend in Scientific Research and Development (ijtsrd), ISSN: 2456-6470, Volume-4 | Issue-1, December 2019, pp.847-852, URL: www.ijtsrd.com/papers/ijtsrd29702.pdf

IJTSRD29702

INRODUCTION

One of the most crucial routes of administrating a drug with high credit to obtain a systemic effect is the oral administration for its simplicity, comfortability by producing no pain compared with the systemic administration and other remarkable benefits over the other routes[1]. However, it also comes with disadvantages in case of certain dosage forms as capsules and tablets, as problems of swallowing especially for children and infants and for elders leading to incompliance and disadherence to the treatment [2]. This was proved by evidence that approximately 35% of the population showed dysphasia and troubles with swallowing as an example, people with sea/ motion sickness, hiccups, gagging and obstruction of the esophagus pathway will be force to search for other alternatives which favor the systemic drug delivery such as fast dissolving medication [3]. Oral fast-dissolving film is new drug delivery system developed on the basis of the Transdermal patch [4]. It consists of a very thin oral strip, which is simply placed on the tongue or oral mucosal tissue, instantly wet by saliva; the film rapidly hydrates and adheres onto site for rapid disintegration and release [5].The objective of the present study was to develop Oral fast dissolving films (OFDFs) of Metaclopromide- HCl as Anti-emetic and to provide a convenient means of administration to those patients suffering from nausea and vomiting and to increase gastrointestinal motility.

MATERIALS AND METHODS

Metaclopromide- HCl was obtained as a gift sample from Aurobindo Ltd., HPMC E5, E15 was used as polymers, PEG 400, Ascorbic acid, and Aspartame is obtained from SD Fine Chemicals.

Formulation of Metaclopromide-HCl oral fast dissolving films

The procedure of making of Metaclopromide HCl ODF

All materials were weighed. Some polymers are dissolved in distilled water. Then left in for 10 minutes to swell. Drug is dissolved in distilled water, then added aspartame and ascorbic acid. The solution was stirred until all the material is completely dissolved. Drug substance solution is added to the base polymer. PEG 400 was added to the polymer solution while stirring. The solution was left in at room temperature to remove air bubbles. After the air bubbles disappear, the solution was poured into a mold 9 cm x 10 cm until blended. Film dried at 40°C in the drying cabinet for 24 hours. After drying, the film removed from the mold carefully and cut the size of 2 cm x 3 cm [6]. The components of the formulation were shown in Table 1.

Table1: Formulation of Metaclopromide-HCl oral fast dissolving films

CODE	DRUG (mg)	HPMC E5 (mg)	HPMC E15 (mg)	PEG-400 (mg)	Ascorbic Acid (mg)	Aspartame (mg)
FA	95.70	500	-	-	-	-
FB	95.70	450	-	-	-	-
FC	95.70	400	-	-	-	-
FD	95.70	350	-	-	-	-
F1	95.70	300	-	0.113	10	50
F2	95.70	-	300	0.113	10	50
F3	95.70	250	50	0.113	10	50
F4	95.70	200	100	0.113	10	50
F5	95.70	150	150	0.113	10	50
F6	95.70	100	200	0.113	10	50
F7	95.70	50	250	0.113	10	50

Drug = Metaclopromide-HCl, PEG = Propylene glycol
From the above formulations the first FOUR Formulations (FA, FB, FC, and FD) are designed to optimize the concentration of polymer to use for the preparation of films.

Evaluation oral fast dissolving films Metaclopromide HCl
Organoleptic characteristics
Organoleptic characteristics oral fast dissolving films Metaclopromide hydrochloride observed homogeneity, colour, smell and texture seen visually [7].

Uniformity of weight and thickness of the film
For the evaluation of the weight of the film, six sheets of film from every result of the formula is taken and weighed one by one then standard deviation were determined. The film thickness was measured at the centre and four corners, calculated the average and standard deviation [8].

Folding endurance:
The number of folds i.e. how many times the film being folded at same place that required to disrupt the film sample or developing a noticeable cracks, this is known as folding endurance. This term provide an indication of film brittleness, that a strip has been subjected to this test through film folding at same point repeatedly for many times until a noticeable crack was detected, the values are stated [9].

Content uniformity of Metaclopromide hydrochloride in Film
One sheet of film dissolved with phosphate buffer pH 6.8 in a flask of 25 ml, 0.5 ml of the solution is then diluted with phosphate buffer pH 6.8 to 10 ml. Levels of Metaclopromide hydrochloride content is determined by spectrophotometry at a wavelength of 270 nm [10].

Disintegration time
Films were put in each tube of the basket, and then the tool is run by using the medium of pH 6.8 phosphate buffer solution temperature of 37 ± 0.5°C. Disintegration time was observed in each film. Film said to be destroyed when no longer film is left in the basket [11].

***In vitro* Dissolution test**
The dissolution test performed with type-two dissolution apparatus, rotational speed 50 rpm, dissolution medium pH 6.8 phosphate buffer 900 ml of 37 ± 0.5°C. A film was put in dissolution apparatus. 2 ml solution was taken at the second 15, 30, 45, 60, and 90. The same medium was replaced with 2 ml so that the volume remained. Absorption solution is calculated at the maximum wavelength [12].

RESULTS AND DISCUSSION

FTIR Studies of Optimized Formula:

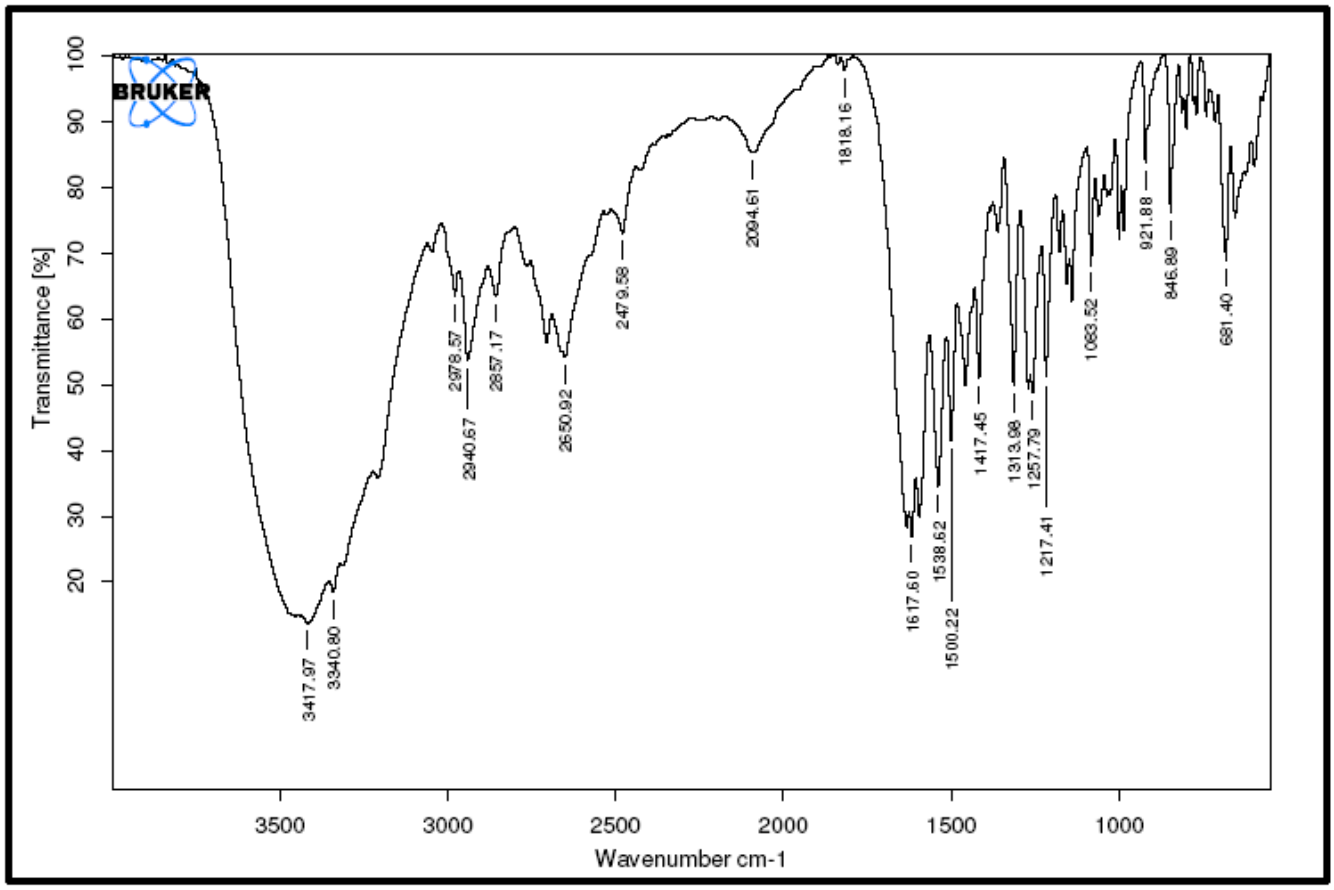

Fig.1: FTIR result of Metaclopromide HCl

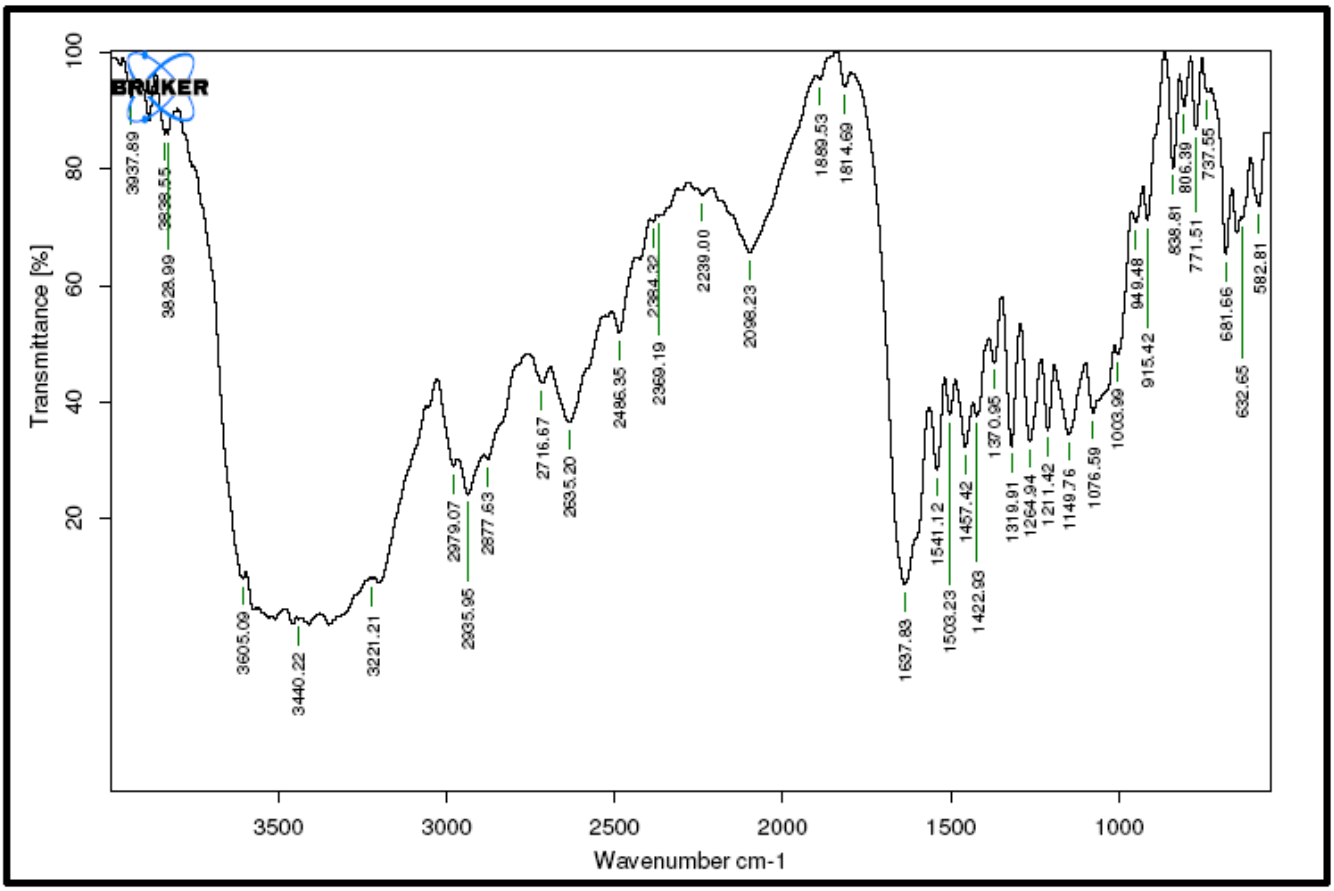

Fig.2: FTIR result of F2 formula

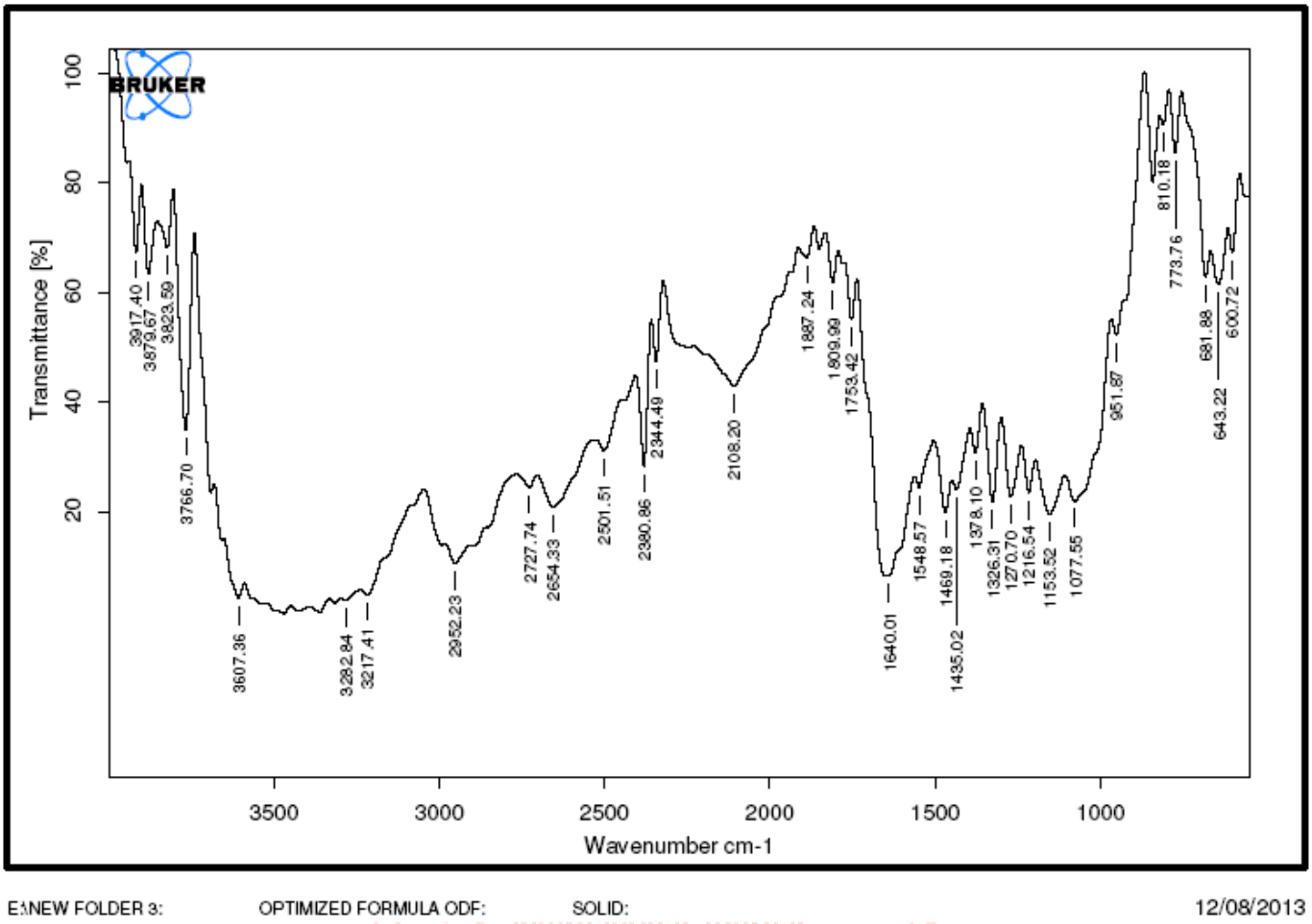

Fig.3: FTIR result of F3 formula

Table2: Absorption data for Metaclopromide-HCl in 6.8 PH phosphate buffer

Concentration (µg/ml)	Absorbance(nm) n=3
0	0
5	0.168
10	0.309
15	0.423
20	0.543
25	0.679

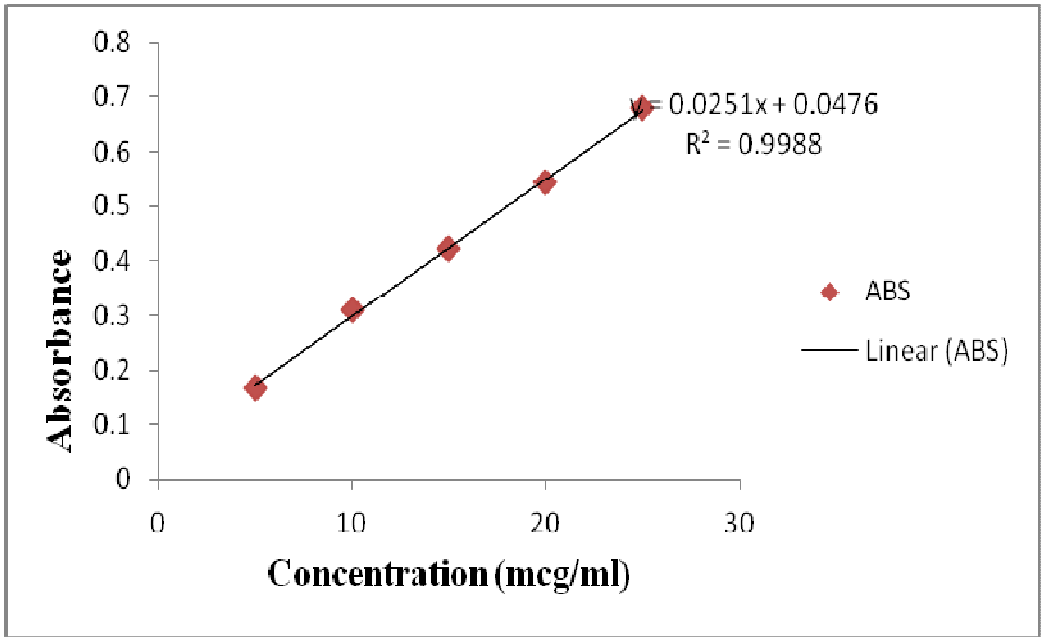

Figure 4: Standard graph of Metaclopromide HCl in pH 6.8 phosphate buffer

Table3: Thickness, folding endurance, weight, drug content, Disintegration times of oral fast dissolving films

code	Thickness (mm) n=5	Folding endurance n=3	Uniformity of weight n=5	Drug Content (%) n=3	Disintegration time (sec) n=3
F1	0.124 ± 0.012	85 ± 1.67	20.8 ± 0.56	101.07 ± 0.92	43 ± 0.93
F2	0.148 ± 0.024	120 ± 2.0	22.02 ± 0.67	100.94 ± 0.82	35 ± 0.26
F3	0.154 ± 0.017	165 ± 2.23	20.36 ± 0.61	101.17 ± 0.43	38 ± 0.29
F4	0.147 ± 0.021	173 ± 1.12	21.16 ± 0.49	100.47± 0.32	48 ± 0.78
F5	0. 143± 0.022	193 ± 1.87	17.26 ± 0.59	101.36± 0.87	50 ± 0.98
F6	0.137± 0.014	190 ± 1.56	19.92 ± 0.51	100.02 ± 1.03	33 ± 0.98
F7	0.150 ± 0.019	170 ± 2.45	18.36 ± 0.44	101.36 ± 0.78	42 ± 0.12

Thickness

The thickness of the prepared formulas was variable ranging from (0.124 ± 0.012 to 0.154 ± 0.017 mm). Minor standard deviation value would validate a study to be reproducible; therefore, the employed method can come with films of uniform thicknesses, resulting in content uniformity of the desired does. The results also showed that as the concentration of the used polymer increased the thickness of the prepared film increased. This may be attributed to the viscosity differences of polymeric solutions.

Folding endurance

Brittleness of the film was determined via the folding endurance. It measures the ability of the film to withstand rupture 21. Any formulated film has a folding endurance value, a value between 85 ± 1.67 to 193 ± 1.87 indicates an acceptable results. Table 2 shows the physicochemical parameters of MTC HCl fast dissolving films.

Uniformity of weight

The evaluation of the weight and thickness of film is important to determine the weight and thickness uniformity of dosage because it relates directly to the accuracy of dose dosage. The result of the uniformity of weight shown in Table 2.

Drug content

Assay of drug content proved a uniform distribution of the drug throughout each film; this distribution was lying within the specified standards of the US pharmacopeia, i.e., within 100-101 % (USP). Nevertheless, every film mimic the other films in the quantity of MTC, which represent how highly reproducible this technique is.

Disintegration time

The test come to show that the formula disintegrate *in-vitro* within one minute. As a result, high solubility of formulas containing these polymers in polar solvents, therefore such formula will show direct and rapid disintegration without forming gel residues, and ensuring fast matrix disintegration23.

***In vitro* Dissolution test**

Table4: *In vitro* drug releases for the formulations

Time (min)	Cumulative percentage drug release						
	F1	F2	F3	F4	F5	F6	F7
5	39.27±1.45	77.23±2.32	82.94±1.76	85.23±2.29	85.93±1.56	86.29±0.56	62.94±1.24
10	75.84±0.46	87.56±0.65	90.56±1.21	87.32±1.35	97.02±1.56	89.57±1.89	62.94±2.02
15	80.61±0.66	99.86±0.89	99.07±0.99	89.45±1.12	99.06±1.26	94.49±2.02	66.11±2.20
30	85.38±1.12	100.23±1.21	99.23±1.35	95.56±1.65	100.56±1.89	97.15±1.98	70.07±2.02
45	88.56±1.56	101.56±1.65	101.06±1.79	99.69±1.98	100.79±2.02	99.32±2.25	75.62±2.56
60	92±0.56	101.98±0.65	103.23±0.78	99.79±0.98	101.23±1.25	99.87±2.02	87.89±2.25
90	94.23±1.31	102.23±1.35	103.79±1.56	100.06±1.78	101.54±1.98	98.23±2.02	94.96±2.32
120	99.45±1.65	102.98±1.78	103.86±1.79	100.54±1.89	101.7±1.98	98.54±2.09	96.54±2.68

Data represents Mean ± Standard deviation, n =3

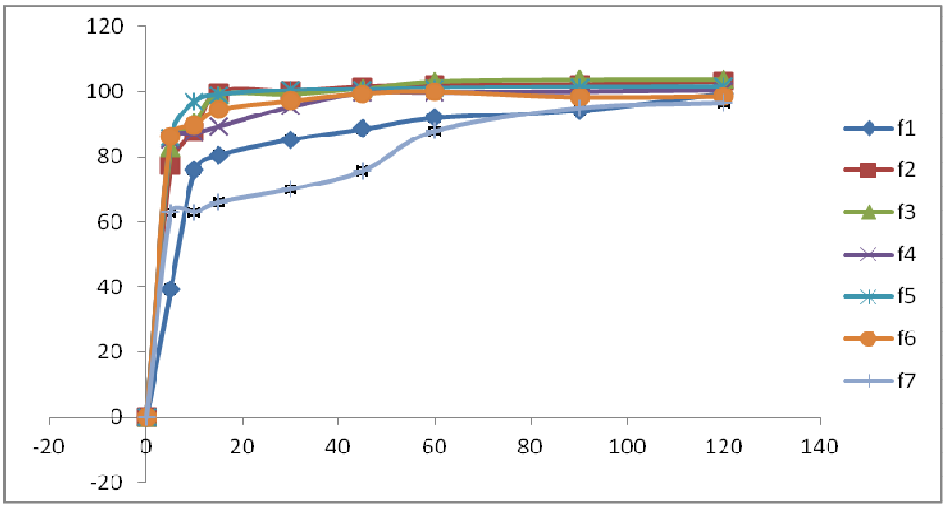

Fig. 5: Plot for *in vitro* drug release for F1 to F7 formulations

In vitro dissolution study of formulations F1, F2, F3, F4, F5, F6, F7 shown drug release of 80.61±0.66, 99.86±0.89, 99.07±0.99, 89.45±1.12, 99.06±1.26, 94.49±2.02, and 66.11±2.20% respectively within 15min. Among the formulations F2 and F3 showed good dissolution property. The result of *in vitro* drug release shown in Table 3.

CONCLUSION

Formulation of F2 and F3 of Metaclopromide HCl oral fast dissolving films shown better *in vitro* dissolution profile when compared with others. Finally the present investigation is concluded that oral fast dissolving film formulations can be a potential novel drug dosage form for pediatric, geriatric and also for general population, no interaction with drug and polymer.

ACKNOWLEDGEMENT

I express my sincere thanks to Aurobindo labs Hyderabad, India, for providing gift sample of drug. I am very thankful to Mr. L. Matsyagiri, Associate Professor, Swami Vivekananda Institute of Pharmaceutical Sciences, Vangapally, Yadagirigutta, Yadadri Bhongir-506286, Telangana, India, for his support for the study.

REFERENCES

[1] Patel D, Patel M, Upadhyay P, Shah N, Shah S, "A Review on Mouth Dissolving Film". Journal of Pharmaceutical Science and Bioscientific Research, 5; 2015: 266-273.

[2] Banarjee T, Ansari VA, Singh S, Mahmood T, Akhtar J, "A Review on Fast Dissolving Films for Buccal Delivery of Low Doses Drugs". International Journal of Life Sciences and Review, 1; 2015: 117-123.

[3] Nair V, Saudagar RB, Gondkar SB. "A Review on Fast Dissolving Sublingual Films for Systemic Drug Delivery". World Journal of Pharmacy and Pharmaceutical Sciences, 4; 2015: 342-361.

[4] Singh CK, Tiwari V, Shankar R, Mishra CP, Jain S, Jain S, "A short review on oral fast dissolving film containing cefpodoxime proxetil nanoparticle", World Journal of Pharmacy and Pharmaceutical Sciences. 5(1); 2015:1549-77

[5] Joshua JM, Hari R, Jyothish FK, Surendran SA, "Fast Dissolving Oral Thin Films: An Effective Dosage Form for Quick Releases", International Journal of Pharmaceutical Sciences, Review and Research, 38; 2016: 282-289.

[6] Julia Reveny, Juanita Tanuwijaya1, Astuti Remalya, "Formulation of Orally Dissolving Film Metoclopramide Using Hydroxy Propyl Methyl Cellulose and Polyvinyl Alcohol with Solvent Casting Method", International Journal of Chem Tech Research**,** 10(1); 2017: 316-321.

[7] Pondugula Sudhakara Reddy, Murthy KVR. "Formulation and Evaluation of Oral Fast Dissolving Films of Poorly Soluble Drug Ezetimibe Using Transcutol Hp". Indian Journal of Pharmaceutical Education and Research. 2018; 52(3):398-407.

[8] Nirmala D, Nandhini S, Sudhakar M. "Design and Evaluation of Fast Dissolving Oral Films of Zolpidem by Solvent Casting Method". Asian Journal of Pharmaceutical Research, 6; 2016: 67-71.

[9] Devi AS, Jyothi PN, Raju PC, Kumar PK, Prasad KA, Sultana SM. "Formulation and Evaluation of Fast Dissolving Oral Films of Fluoxetine Hydrochloride". Journal of Global Trends in Pharmaceutical Sciences, 7; 2016: 3394 –3400.

[10] Pawar, SV., and Junagade, MS., "Formulation and Evaluation of Mouth Dissolving Film of Risperidone", International Journal of Pharm. Tech Research, 2015; 8(6): 218-230.

[11] Iman Sabah Jaafar, "Formulation and *in vitro* Evaluation of Fast Dissolving Film of Metoclopramide Hydrochloride", International Journal of Chem Tech Research, 10(4); 2017: 26-38.

[12] Ali MS, Vijendar C, Kumar SD, Krishnaveni J, "Formulation and Evaluation of Fast Dissolving Oral Films of Diazepam". J Pharmacovigilance 4(3); 2016: 1-5.