International Journal of Pharmaceutical Research and Applications
Volume 7, Issue 3 May-June 2022, pp: 1674-1679 www.ijprajournal.com ISSN: 2456-4494

Formulation And Evaluation Of Immediate Release Folic Acid Tablet's By Direct Compression Method

Syed.GouseFiroz*, G.Dileep[1], P. DurgaPrasad[1], K.Uday basker[1], G.Gopi[1], T.Vijay kumar[1], J.N. Suresh Kumar[2],
Narasaraopeta institute of pharmaceutical sciences, Narasaraopet, andhra pradesh, india

Submitted: 01-06-2022 Revised: 14-06-2022 Accepted: 16-06-2022

ABSTRACT
Immediate release tablets are those tablets which disintegrate and release the drug rapidly once it enters GIT. Recently immediate release tablets have started gaining popularity and acceptance as a drug delivery system, mainly because they are easy to administer and lead to better patient compliance. They are also a tool for expanding markets, extending product life cycles and generating opportunities. Folic acid is a water-soluble vitamin. The present work involves the formulation development, optimization and in vitro evaluation of immediate release Folic Acid tablets. To minimize critical process parameters and since folic acid is moisture and heat sensitive, direct compression method was selected for the formulation of immediate release Folic Acid tablets. Tablets were prepared containing 40% overages using cross Croscarmellose sodium, Crosspovidone, pre- gelatinized starch and sodium starch glycolate as disintegrants since tablets containing 10% overages failed to meet the desired specifications.
During the course of study, it was found that the formula G8 containing pregelatinized starch as disintegrantsexhibited acceptable disintegration time, percentage drug content per tablet and in vitro drug release. This formula was scaled up in two batches out of which one was film coated. Later they were subjected to stability studies after packing in amber colored PVC-PVDC blister packing which showed acceptable results. so at last it was concluded that immediate release folic acid tablets containing 40% overages can be prepared using direct compression which met the requiredSpecifications.
Keywords- Immediate release tablets; Folic Acid; Croscarmellose sodium; Crosspovidone pre-gelatinized starch; sodium starch glycolate

I. INTRODUCTION TO IMMEDIATE RELEASE TABLETS[1,2]

An immediate release dosage form allows a manufacturer to extend market exclusivity, while offering patients a convenient dosage form or dosage regimen,

The need for new oral drug delivery system continues, due to poor patient acceptance for invasive methods, need for exploration of new market for drugs and coupled with high cost of disease management. Developing new drug delivery techniques and utilizing them in product development is critical for pharma companies to survive this century Release their medication with no special rate controlling features, such as special coatings and other techniques.

Recently immediate release tablets have started gaining popularity and acceptance as a drug delivery system, mainly because they are easy to administer, has quick onset of action is economical and lead to better patient compliance. They are also a tool for expanding markets, extending product life cycles and generating opportunities.

Folic acid[3,4,5]

Folic acid (also known as vitamin B, or folacin) are forms of the water-soluble vitamins. Folic acid is itself not biologically active, but its biological importance is due to tetrahydrofolate and other derivatives after its conversion to dihydrofolic acid in the lived Absorption of folic acid by the body is facilitated by enzymes associated with the mucosal cell membrane. More specifically, absorption primarily occurs in the mucosa of the upper intestine, known as the jejunum and duodenum. Insufficient folic acid in the diet and the inability to absorb folic acid can cause anemia or birth defects, namely, anencephaly and spine bifida, the latter resulting in brain development abnormalities. Anencephaly and spine bifida are caused by neural tube defects and the frequency of these defects can be greatly decreased by supplementing the diets of pregnant women with folic acid. The discovery of the importance of

International Journal of Pharmaceutical Research and Applications
Volume 7, Issue 3 May-June 2022, pp: 1674-1679 www.ijprajournal.com ISSN: 2456-4494

folic acid stemmed from a finding that women from lower socioeconomic backgrounds gave. Birth to infants with neural tube defects at a higher rate than women who were well off and presumably had a well-rounded diet. Because of the difference in bioavailability between supplemented folic acid and the different forms of folate found in food, the dietary folate equivalent (DFE) system was established. 1 DFE is defined as 1 µg (microgram) of dietary folate, or 0.6 µgof folic acid supplement.

II. MATERIALS AND METHODS

Materials

Folic acid was obtained from EMVISO corporation, Gujarat. while Crosspovidone, pre-gelatinized starch and sodium starch glycolate were obtained from our college drug store All other chemicals were of analytical grade.

Preparation of immediate release folic acid tablets[6,7]

All the ingredients were accurately weighed as per formula G_1 to G_7 which is shown in Table 1 and were dispensed in clean polythene covers. Folic acid and disintegrants were sifted through sieve no-30. Mannitol and Lactose were passed through sieve no-20 while Magnesium stearate and Talc were passed through sieve no-40. All the ingredients were mixed thoroughly for 45 min. All the materials were directly compressible so this uniformly mixed blend was compressed into tablets using concave face round tooling on a Rimek- rotary tablet machine.

Evaluation of immediate release folic acid tablets

Thickness:

Thickness was measured using calibrated vernier calipers. Six tablets of each formulation were picked randomly and thickness was measured individually and average thickness was reported.

Weight Variation [8]

The USP weight variation test was run by weighing 20 tablets individually. The average weight was calculated and compared with the individual tablet weight. The tablet meet the USP test, if not more than 2 tablets are outside the percentage limit and if no tablet differs by more than 2 times the percentage limit.

Hardness Test[9,10]

Hardness of tablets was tested using Monsanto hardness tester. The tester consists of a barrel containing a compressible spring held between two plungers. The lower plunger is placed in contact with the tablet and a zero reading is taken. The upper plunger is than forced against a spring by turning a threaded bolt until the tablet fractures, and then the force of fracture was recorded. In all the cases average of six determinations were taken.

Friability[11,12]

Previously weighed 10 tablets were taken in a Roche friabilator and the friability was checked at 25 rpm for 4 minutes. Then the tablets were dusted and reweighed and the percentage of powder eroded during 4 minutes was recorded. Friability was than calculated using the following equation.

$$F = \frac{W_{(initial)} - W_{(final)}}{W_{(initial)}} \times 100$$

Where, $W_{(initial)}$ = Initial weight of tablet

$W_{(final)}$ = Final weight of tablet

Disintegration Time [13,14]

The disintegration time was determined using disintegration test apparatus at 37 °C +2° C. A tablet was placed in each of the six tubes of the apparatus and one disc was added to each tube. The time taken for complete disintegration of the tablet with no palpable mass in the apparatus was noted.

In-vitro dissolution study [15]

The release rate of diphenhydramine from immediate release tablets was determined using United State Pharmacopoeia (USP) XXIV dissolution testing apparatus II (paddle method). The dissolution test was performed using 500 ml of distilled water, at 37± 0.5°C and 50 rpm. A sample (10 ml) of the solution was withdrawn from the dissolution apparatus 5, 10, 5,20,25, 30,35,40 and 45 minutes. The samples were replaced with fresh dissolution medium of same quantity. The samples were filtered through a 0.45 u membrane filter. Absorbance of these solutions was measured at 283 nm using a Shimadzu UV-1601 UV/Vis double beam spectrophotometer. Cumulative percentage of drug release was calculated using an equation obtained from a standard curve.

Limit: Not less than 75% of labeled amount of folic acid was dissolved in 45 min.

III. RESULTS AND DISCUSSION

In the present study, various formulations of immediate release folic acid tablets were prepared by direct compression. The use of super disintegrants for preparation of immediate release tablets is highly effective and commercially feasible. These super disintegrants accelerate disintegration of tablets by virtue of their ability to absorb a large amount of water when exposed to an

International Journal of Pharmaceutical Research and Applications
Volume 7, Issue 3 May-June 2022, pp: 1674-1679 www.ijprajournal.com ISSN: 2456-4494

aqueous environment. The absorption of water results in breaking of tablets and therefore faster disintegration. This disintegration is reported to have an effect on dissolution characteristics as well. Flow properties of the powder, resistance to particle movement can be judged from the angle of repose. Based on angle of repose it was observed that G_4 showed excellent flow properties than the rest of formulations. Carr's index of the prepared blends falls in the range of 10.54 to 18.08 % and Hausner's factor values were in the range of 1.11 to 1.22. Based on the results obtained we can conclude that G_4, showed excellent flow. Disintegration time is very important for immediate release tablets as it assists swallowing and also plays a role in increasing drug absorption, thus promoting bioavailability. Disintegration time of prepared tablets was within the range (Table 2). Invitro drug release study the prepared tablets were done using phosphate buffer pH-6.8, at 37 ± 0.5°c from the results it was observed that G_4 showed maximum drug release of 93.20% which was higher than other formulations.

Table 1: Formulae for Preparation of Immediate release Folic acid Tablets With 10% and 40% Overages

S.NO	INGREDIENTS	G_1	G_2	G_3	G_4	G_5	G_6 10% Overage	G_7 10% Overage
1.	Folic Acid(40 %overages)	7mg	7mg	7mg	7mg	7mg	5.5 mg	5.5 mg
2.	Microcrystalline Cellulose pH 101	———	———	———	———	———	91.8 mg	————
3.	Microcrystalline Cellulose pH 102	91mg	91mg	91mg	91mg	92mg	———	91.8 mg
4.	Lactose	20mg	20mg	20mg	20mg	22.3mg	20 mg	20 mg
5.	Di calcium phosphate	24.3mg	24.3mg	24.3mg	24.3mg	25mg	25 mg	25 mg
6.	Magnesium stearate	1.5mg	1.5mg	1.5mg	1.5mg	1.7mg	1.5 mg	1.5 mg
7.	Colloidalsilicon dioxide	1.2mg	1.2mg	1.2mg	1.2mg	2mg	1.2 mg	1.2 mg
8.	Croscarmellosesodium	5mg	--	--	--	--	5 mg	5 mg
9.	Crosspovidone	--	5mg	--	--	--	——	———
10.	Sodium starch glycolate	--	--	5mg	--	--	——	——
11.	Pre-gelatinized Starch	--	--	--	5mg	--	——	———
	Total Tablet Weight	150mg	150mg	150mg	150mg	150mg	150 mg	150 mg

IV. CONCLUSION:

Considering some important parameters like disintegration time (2.53 min), percentage drug content per tablet (112.85%),in vitro drug release (93.20%) and cost factor G_4 containing pre-gelatinized starch as disintegrant was selected as the best formulation. It was also observed that direct compression was the best suitable method used for producing immediate release folic Acid tablets since it is cost effective and less time consuming. Based on all the above considerations these formulas can be subjected for bio availability studies and if it complies to all the requirement of those studies the same formula can be commercialized.

International Journal of Pharmaceutical Research and Applications
Volume 7, Issue 3 May-June 2022, pp: 1674-1679 www.ijprajournal.com ISSN: 2456-4494

Table 2: Evaluation of Post Compression Parameters

Formulation Code	Evaluation of post -compression Parameters						
	Hardness of tablets* (kg/cm²)	Friability of tablets* (%)	Weight variation (mg)	Percentage drug content per tablet* (%)	Drug content per tablet* (mg)	Thickness of tablets* (mm)	Disintegration time (min)*
G_1	4.3	0.789	1.892	111.92	5.600	2.53	3.53
G_2	4.4	0.854	1.76	109.95	5.490	2.54	3.53
G_3	4.7	0.590	1.10	111.02	5.501	2.56	4.18
G_4	4.5	0.545	1.05	112.85	5.642	2.55	2.53
G_5	4.9	1.276	2.19	107.69	5.385	2.54	6.48
G_6	4.8	0.644	1.54	80.06	4.003	2.55	3.17
G_7	4.7	0.628	1.43	82.34	4.117	2.54	3.31

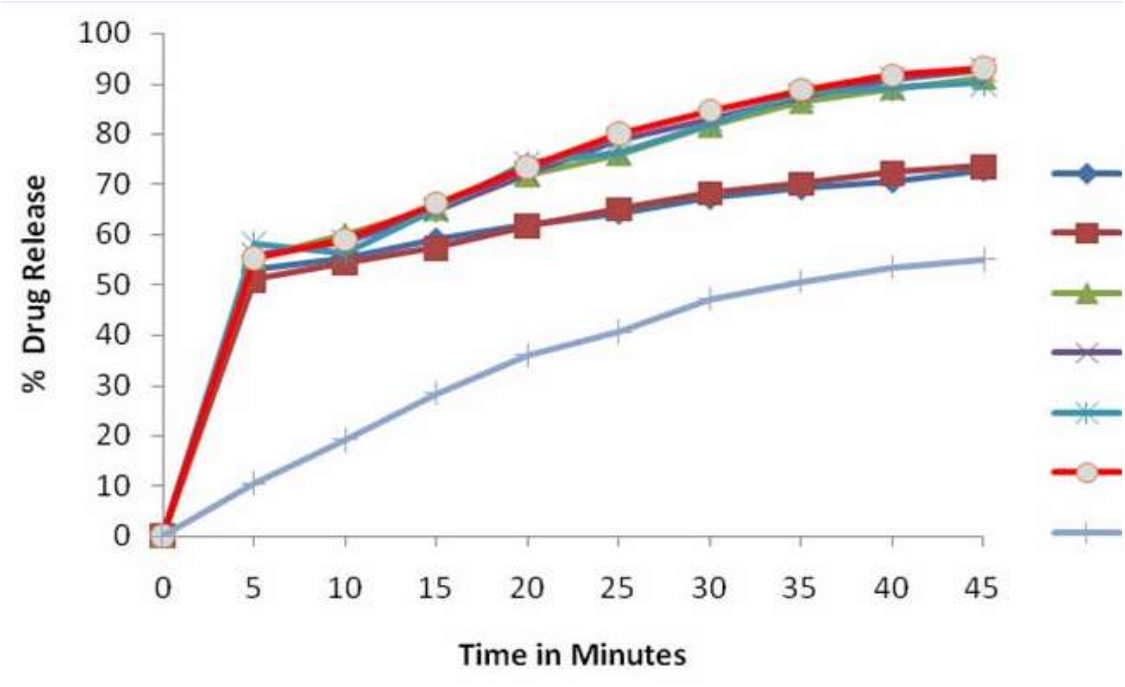
Table 3: In Vitro Drug Release Study of Various Formulations

% Cumulative drug release*									
Formulations	**5 min**	**10min**	**15min**	**20min**	**25min**	**30min**	**35min**	**40min**	**45min**
G_1	55.35	59.96	65.11	71.80	76.00	81.61	86.37	89.03	**91.13**
G_2	56.04	58.41	64.98	72.16	78.80	82.88	87.51	90.81	**92.79**
G_3	58.18	55.99	65.00	74.31	76.19	81.95	87.87	89.01	**90.09**
G_4	55.28	59.03	66.25	73.42	80.17	84.67	88.79	91.77	**93.20**

International Journal of Pharmaceutical Research and Applications
Volume 7, Issue 3 May-June 2022, pp: 1674-1679 www.ijprajournal.com ISSN: 2456-4494

G_5	10.47	19.18	28.47	35.98	40.65	47.22	50.77	53.66	**55.10**
G_6	52.97	55.30	58.92	61.77	64.23	67.19	69.05	70.44	**72.69**
G_7	50.97	54.36	57.29	61.66	65.08	68.27	70.12	72.21	**73.57**

Figure 1: Dissolution Profile of Formulations



V. ACKNOWLEDGEMENTS:

The authors would like to express their gratitude to the management, teaching and non-teaching staff of Narasaraopeta institute of pharmaceutical sciences.

REFERENCES:

[1]. Allen LV, Nicholas GP, Howard CA. Ansel's pharmaceutical dosage forms & drug delivery systems. 8th ed. New Delhi: Lippincott Williams & Wilkins; 2005.

[2]. Rudman A. Guidance for industry-Immediate release solid dosage forms. ICDER 1995 Nov; 59(83): 48754-59.

[3]. Martindale- The extra pharmacopoeia. 30th ed. The Pharmaceutical Press;2005.

[4]. Physician's desk reference. 49th ed. Medical Economics; 1995.

[5]. Das UN. Folic acid says NO to vascular diseases.Nutrition 2003;19:686-692.

[6]. S.Shidhaye, S.Malke, V.Kadam, The Inter J Pedi Neo, 2008, 9,1,1-10.

[7]. R.M.M. Qalaji, P.E.R.Simons, K.J. Simons, AAPS Pharm SciTech, 2006, 7, 2, E1-E7.
[8]. S. Sharma, G.D.Gupta, Asian J Pharm, 2008, 70-72.
[9]. J. Madan, A.K. Sharma, R.Singh, Trop J Pharm Res, 2009, 8,1, 63-70.
[10]. Shishu, V.R.Kapoor, K.Preet, Indian J Pharm Edu Res, 2009, 43, 2, 150-155.
[11]. C.M.Setty, D.V.K.Prasad, V.R.M.Gupta, B.SA, Indian J Pharm Sci, 2008, 70, 180-185.
[12]. R.B.Parmar, A.H.Baria, H.M.Tank, S.D. Faldu, Int J of Pharm Res, 2009, 1, 3, 483-487.
[13]. C.P.Jain, P.S.Naruka, Int J of Pharm & Pharma Sci, 2009, 1, 1, 219-26.
[14]. M.K.Modasiya, L.Lala, B.G.Prajapati, V.M.Patel, D.A.Shah, Int J of Pharm Tech Res,2009, 1, 353-357
[15]. United States Pharmacopoeia. 27th revision and national formulary, 22nd ed. the official compendia of standards, Asian edition. Published by the board of trustees, 2000.