Formulation and In-Vitro Evaluation of Gastroretentive Effervescent Tablets of Famotidine Using Abelmoschus Esculentus GUM and HPMC as A Rate Retarding Polymers

E. DIVYA*, B.NAGAMANI Y. RAMALAKSHMI, B.RENUKA, P.UMADEVI
Viswanadha Institute of Pharmaceutical Sciences Visakhapatnam, Andhrapradesh.

Abstract: **The present research work was aimed to develop the controlled release gastro retentive effervescent tablets in order to overcome the incomplete drug release from the drug delivery system above the absorption zone leading to poor bioavailability of the drug. Famotidine effervescent tablets were prepared by using *abelmoschus esculentus* (okra gum), HPMC K 4M, HPMC K100M in different ratios employing wet granulation method. Process and formulation parameters were optimized and the formulated effervescent tablets were evaluated for hardness, friability, weight variation test, swelling index, *in-vitro* buoyancy studies, content uniformity, *in-vitro* dissolution studies. Famotidine effervescent tablets were prepared, the optimized formulation (F3) containing (drug: *abelmoschus esculentus*). This shows swelling index (98.25%), content uniformity (98.78%) and effervescent tablets remained buoyant for 12hrs. The percentage of *in-vitro* drug release (96.36± 0.06) had better dissolution profile with desired controlled action. *Abelmoschus esculentus* as a natural polymer was simple and cost-effective technique.**

Keywords: **Famotidine, *Abelmoschus Esculentus*, Effervescent tablets, H_2- receptor antagonist**

INTRODUCTION

Oral drug delivery systems are one of the most widely used drug delivery systems that shows many advantages over others. The most widely discussed advantages of oral drug delivery systems are They are easy to administer, formulations are mostly flexible, They are available at reasonable cost, They can be easily transported and can be easily started,They show greater patient compliance.(1,2,3) Control drug delivery systems are great importance in the administration of drugs with narrow absorption window in the upper most part of the intestine. Some of the drugs with narrow absorption index are ciprofloxacin, levodopa, furosemide, riboflavin, chlordiazepoxide HCl and cimetidine. The drugs that should be acted locally are also given in these systems are acetohydroxamic acid, chlorpheniramine maleate that are mostly used in the treatment of Helicobacter pylori infections which needs a local action.(4)

Gastro Retentive Drug Delivery Systems: Gastro retentive dosage forms are drug delivery systems which remain in the stomach for an extended period of time and allow both spatial and time control of drug liberation. Basically, a gastro retentive system swell following ingestion and is retained in the stomach for a number of hours, while it continuously releases the incorporated drug at a controlled rate to preferred absorption sites in the upper intestinal tract. Their application can be advantageous in case of drugs absorbed mainly from the upper part of GIT or are unstable in the medium of distal intestinal regions.(5) *Abelmoschus Esculentus* (Okra Gum)*: Abelmoschus Esculentus* popularly known as Okra belongs to the family Malvaceace that has been grown in all soil types and it is among the heat and Drought tolerant vegetable. It is a hydrophilic polysaccharide made up of galactose, Rhamnose and galacturonic acid. Okra gum has been evaluated as a controlled release agent, Binder. When extracted in water it produces a highly viscous with slimy appearance. Due to its highly viscous nature, it has been employed as a retarding polymer. The mucilaginous component in the okra helps in the ulcer treatment by providing a protective coating within the digestive tract, which speeds up the healing process of peptic ulcers. (6) The phytochemicals of okra have been studied for their potential therapeutic activities on various chronic diseases, such as type-2 diabetes, cardiovascular, and digestive diseases, as well as the antifatigue effect, liver detoxification, antibacterial, andchemo-preventive activities.(7)

MATERIALS

DRUG PROFILE OF FAMOTIDINE: [8]

Famotidine is a competitive histamine H_2 receptor antagonist that works to inhibit gastric acid secretion commonly used to treat duodenal ulcers, benign gastric ulcers, gastro esophageal reflux disease and Zollinger-Ellison syndrome.

Okra (*Abelmoschus esculentus* [9] (L,) is a plant grown in the tropics, sub-tropics and warmer areas of the temperate zones for its immature seed pods which are consumed as a vegetable. It is used in controlled release and sustained release formulations. Used as a thickening agent and stabilizing agent. Used as a Binder, Bio-adhesive, Suspending agent.

PREFORMULATION STUDIES

Construction of Calibration Curve of Famotidine in 0.1N HCl Solution

10 mg of famotidine was weighed and dissolved in 2ml of methanol in a 10ml of volumetric flask and then made up to the volume with 0.1 N HCl. It gives 1000µg/ml concentrated primary stock solution. From this stock solution aliquots 0.1ml, 0.2ml, 0.3ml, 0.4ml, 0.5ml were pipetted out into a series of 10ml volumetric flasks and make up to the volume with 0.1N HCl in order to get a concentration within the Beer's range from 10-50µg/ml. The absorbance of prepared drug solution was measured at 280nm using UV spectrophotometer against an appropriate blank.

FORMULATION DEVELOPMENT

Extraction of *Abelmoschus Esculentus* Gum (Okra Gum) [10]250mg of okra pods were washed and dried at room temperature¸ After drying these are sliced horizontally into 1 inch pieces and 1.5ml of dis. water was added And then heated at 60^0C. The mixture was filtered and aqueous extract was subjected to further treatment with acetone. The precipitate was separated and dried and dried powder was sieve no 22 and further stored in a tight container.

Preparation of Effervescent Tablets [11,12]

Effervescent tablets of Famotidine were prepared by using different polymer concentrations. The tablets were formulated by Wet granulation method.

Preparation of Granules : Acid Granules

The required quantity of drug and excipients such as polymer (okra gum or HPMC K4M, HPMC K100M), citric acid, micro crystalline cellulose was weighed and blended properly and then the blended mixture was passed through a sieve no # 40 to remove foreign particles. A damp mass was prepared by incorporation of starch solution in a drop wise manner and then wet screening was carried out through the sieve no # 40 to obtain granules. The obtained granules were dried in a hot air oven at 60^0c for 1 hr to remove moisture content.

Base Granules

The required quantity of drug and excipients such as polymer (okra gum or HPMC K4M, HPMC K100M), sodium bicarbonate, micro crystalline cellulose was weighed and blended properly and then the blended mixture was passed through a sieve no # 40 to remove foreign particles. A damp mass was formed by incorporation of starch solution in a drop wise manner and then wet screening was carried out through the sieve no # 40 to obtain granules. The obtained granules were dried in a hot air oven at 60^0c for 1 hr to remove moisture content.

Preparation of Tablets : To the prepared acid and base granules magnesium stearate and talc were added and passed through the sieve no# 40 to filter the fines. About 15% fines were added to the granules and the tablets were compressed on 12mm round shaped die.

Table No:1 Formulation Table of Famotidine Effervescent Tablets

Ingredients (mg/tablet)	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12
Famotidine	40	40	40	40	40	40	40	40	40	40	40	40
Abelmoschus Esculentus gum	1.25	2.5	3.75	5	-	-	-	-	-	-	-	-
HPMC K4M	-	-	-	-	25	50	75	100	-	-	-	-
HPMCK100M	-	-	-	-	-	-	-	-	25	50	75	100
Microcrystalline Cellulose	238.75	237.5	236.5	235	215	190	165	140	215	190	165	140

Sodium Bicarbonate	120	120	120	120	120	120	120	120	120	120	120	120
Citric acid	60	60	60	60	60	60	60	60	60	60	60	60
Magnesium Stearate	15	15	15	15	15	15	15	15	15	15	15	15
Talc	25	25	25	25	25	25	25	25	25	25	25	25
Starch (2%)	q. s	q. s	q. s	q. s	q. s	q. s	q. s	q. s	q. s	q. s	q. s	q. s
Total weight	500	500	500	500	500	500	500	500	500	500	500	501

The above table presents twelve different formulations (F1–F12) of Famotidine tablets, each containing 40 mg of the active pharmaceutical ingredient (API), Famotidine. The formulations vary mainly in the type and concentration of polymers used as release-modifying agents, which include *Abelmoschus esculentus gum*, HPMC K4M, and HPMC K100M. Other excipients remain consistent across all formulations. The formulations aim to optimize gastric retention and sustained drug release, which are crucial for treating acid-related disorders

EVALUATION STUDIES : Tablets were subjected to [13 – 17] , Weight Variation Test Hardness, Friability ,Content Uniformity ,*In vitro* Buoyancy Studies ,Determination of Swelling Index and Drug Release Kinetics.

RESULTS

Pre formulation studies of Drug/API Characterization

Physical Properties : Various organoleptic properties of Famotidine were given below

• Physical Nature: Amorphous powder

•	Colour:	white to yellow colour
•	Odour:	Odorless
•	Melting point:	The melting point of famotidine was found to be 164.5^{0}C.
•	Solubility:	solubility of famotidine was found to be in acidic medium.

Solubility: The solubility studies of Famotidine were carried out in various solvents by using various descriptive terminologies specified in Indian Pharmacopoeia.

Table No.2: Solubility Profile of Famotidine in Various Solvents

S. No	Solvents	Solubility(mg/ml) ± SD
1.	Water	0.1±0.02
2.	0.1 N HCl	2.684 ±0.01
3.	pH 6.8 phosphate buffer	0.654 ±0.01
4.	pH 7.4 Alkaline buffer	0.321 ±0.01

Note: All values were expressed as mean ± SD, n=3, SD=standard deviation

The table presents the solubility of Famotidine in various solvents, including water, 0.1 N HCl, pH 6.8 phosphate buffer, and pH 7.4 alkaline buffer and mostly soluble in acidic conditions (0.1 N HCl) and least soluble in water and alkaline pH.

Partition Coefficient

Partition coefficient of Famotidine in 1-Octanol: water and 1-Octanol- 0.1N HCl .

Table No.3: Partition Coefficient of Drug in Various Solvent Systems

Solvent Systems	Log P Values ± SD
1-Octanol: water	1.63±0.05
1-Octanol:0.1N HCl	6.76 ±0.32

Note: All values were expressed as mean ± SD, n=3, SD=standard deviation

Pre compression parameters of Famotidine Effervescent Tablets

Table No 4: Precompression parameters

Formulation	Bulk Density (gm/cm^3)	Tapped density (gm/cm^3)	Angle of repose(θ^0)	Carr's index (%)	Hausner's ratio

F1	0.52 ±0.05	0.60 ±0.02	27.14 ±0.01	13.88 ±0.73	1.15 ±0.02
F2	0.53 ±0.02	0.63 ±0.01	29.14 ±0.02	14.51 ±0.48	1.16 ±0.01
F3	0.57 ±0.03	0.66 ±0.03	25.14 ±0.04	13.63 ±0.45	1.15 ±0.02
F4	0.52 ±0.07	0.61 ±0.02	27.14 ±0.03	14.75 ±0.34	1.17 ±0.04
F5	0.58 ±0.06	0.68 ±0.04	28.38 ±0.02	14.70 ±0.64	1.16 ±0.07
F6	0.54 ±0.02	0.60 ±0.02	29.26 ±0.05	14.28 ±0.73	1.15 ±0.05
F7	0.52 ±0.05	0.49 ±0.05	27.14 ±0.01	13.33 ±0.07	1.16 ±0.03
F8	0.49 ±0.02	0.62 ±0.06	29.37 ±0.02	14.03 ±0.08	1.16 ±0.02
F9	0.54±0.03	0.62±0.03	25.15±0.04	13.23±0.32	1.15±0.02
F10	0.23±0.02	0.62±0.02	26.34±0.02	14.76±0.45	1.16±0.02
F11	0.56±0.07	0.56±0.06	28.13±0.05	13.56±0.65	1.15±0.04
F12	0.42±0.05	0.52±0.04	29.23±0.03	14.28±0.56	1.16±0.05

Note: All the values are expressed as mean ± SD, n=3

All formulations show good flowability and compressibility, making them suitable for direct compression tablet formulation. F3 and F9 exhibit the best flow properties with lower angles of repose and Carr's Index values.

Differential Scanning Calorimetry (DSC)

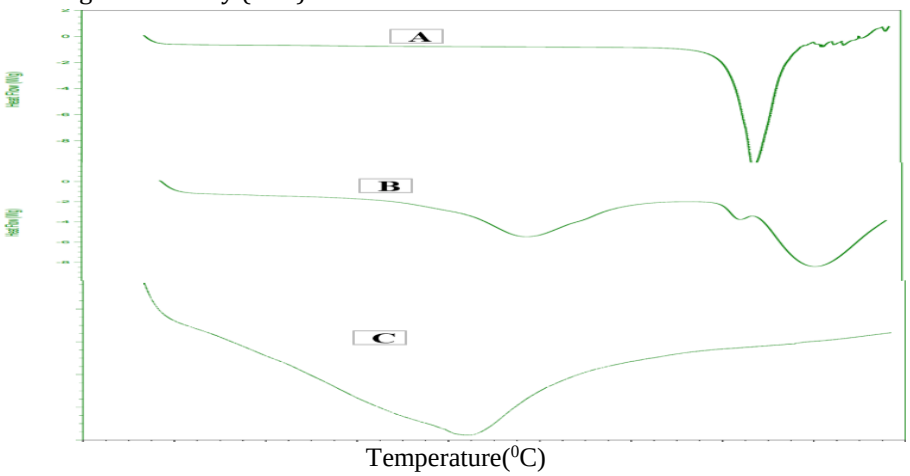

Figure No. 1: DSC thermograms of (A) Pure Famotidine, (B)Drug and Excipient Blend, (C) *Abelmoschus Esculentus.*

Fourier Transform Infra-Red Spectroscopy (FTIR) Studies

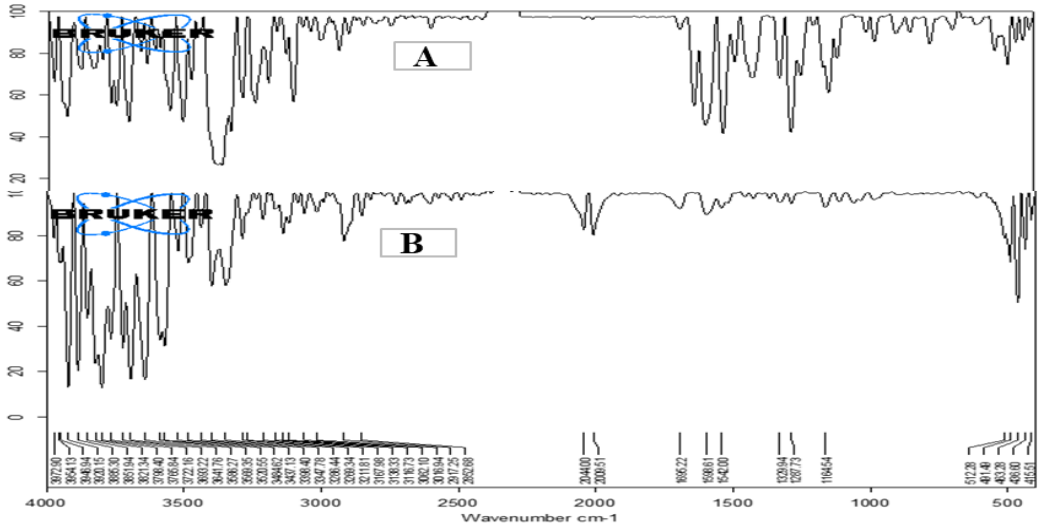

Figure No.2: FTIR Spectra of A) Pure Famotidine, (B) Drug and Excipient Blend

Table No.5: Interpretation of FT-IR of Pure Famotidine and Effervescent Tablets

Wave Number (Cm^{-1})		Functional group
Pure Famotidine	Drug and Excipient	
3365	3398	Carboxylic acid O-H stretch
2901	2917	Aliphatic Hydrocarbon C-H
1639	1695	C=O stretch
1598	1598	Imidazole ring C-N
1327	1329	C=C stretch
602	-	C-Cl stretch

Detection of wave length maxima of Famotidine

The wavelength maxima were found to be 280nm by using UV-Visible spectrophotometer.

Standard calibration curve of famotidine in 0.1 N HCl

Table No.6: Absorbance Values of Famotidine in 0.1N HCl

S. No	Concentration(µg/ml)	Absorbance at 280nm ±SD
1	10	0.2±0.04
2	20	0.48±0.10
3	30	0.67±0.11
4	40	0.88±0.02
5	50	1.2±0.01

Note: All the values are expressed as mean ± SD, n=3, SD=standard deviation

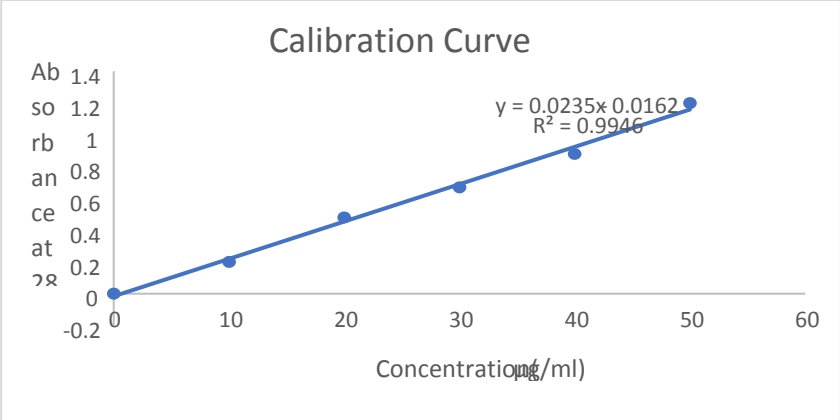

Figure No.3: Standard Calibration curve of Famotidine in 0.1 N HCl

Post Compression Evaluation Parameters of Famotidine Effervescent Tablets

Quality Control Parameters for Tablets

Tablet quality control tests such as weight variation, hardness, and friability, thickness, and drug release studies in different media were performed on the tablets.

Table No 7: Quality control parameters for the various prepared Tablets

Formulation	Hardness(kg/cm^2)	Weight Variation(mg)	Friability (%)	Content uniformity (%)
F1	4.77 ±0.1	250.38 ±0.02	0.37±0.04	85.15±0.11
F2	4.0 ±0.4	251.39 ± 0.04	0.73±0.54	90.62±0.45
F3	5.0 ±0.6	250.98 ± 0.06	0.52±0.52	98.78±0.64
F4	5.0 ±0.14	250.81 ±0.14	0.37±0.49	99.78±0.62
F5	39 ±0.12	251.47 ±0.12	0.62±0.40	99.56±0.53
F6	3.7±0.24	250.20 ±0.24	0.37±0.33	101.89±0.44

F7	4.2 ±0.12	250.45 ±0.12	0.37±0.53	82.6±0.19
F8	4.4 ±0.12	278.23 ±0.02	0.52±0.64	88.56±0.14
F9	3.8±0.11	223.12±0.03	0.53±0.47	90.23±0.18
F10	4.2±0.9	250.23±0.06	0.43±0.53	89.54±0.19
F11	4.5±0.7	231.45±0.04	0.45±0.32	92.34±0.46
F12	4.8±0.12	245.23±0.03	0.43±0.47	98.56±0.19

Note: All the values are expressed as mean ± SD, n=3, SD= Standard deviation.

Most formulations exhibit good hardness, friability, and uniformity, making them suitable for production.All the parameters such as weight variation, friability, hardness was found to be within limits.

Appearance The tablets were observed visually and did not show any effect such as capping, chipping and lamination.

Hardness The hardness of tablets was found to be in the range of 3.7±0.24 Kg/cm^2 to 5.0 ±0.14 Kg/cm^2.

Percentage friability Percentage friability of all formulations were found to be in the range of 0.37±0.33 to 0.7373±0.54. This indicates good handling property of the prepared tablets.

Weight variation

The pharmacopoeial limit for percentage deviation is ±5%. The weights of all tablets were ranged from 231.45±0.04 mg to 278.23 ±0.02mg

Table No 8: Swelling index, Floating lag time and Buoyancy time

Formulation	Swelling Index (%)	Floating lag time(sec)	Buoyancy time(hrs)
F1	85.20±0.02	30±0.12	8±0.18
F2	92.56±0.06	40±0.11	9±0.03
F3	98.25±0.05	35±0.22	12±0.15
F4	99.46±0.03	60±0.13	12±0.54
F5	50.25±0.04	30±0.17	6±0.48
F6	52.17±0.07	30±0.21	7±0.17
F7	63.45±0.08	30±0.24	7±0.24
F8	70.89±0.01	30±0.24	8±0.91
F9	72.23±0.04	60±0.13	8±0.71
F10	82.34±0.02	45±0.32	12±0.54
F11	90.24±0,01	50±0.13	12±0.17
F12	92.32±0.03	45±0.21	12±0.55

Note: All the values are expressed as mean ± SD, n=3, SD= Standard Deviation.

Buoyancy-Lag-Time: Buoyancy-lag-time of all formulations were found to be in the range of 30±0.12 sec to 60±0.13sec.

Duration-of-Buoyancy: Duration-of-buoyancy of all formulations were found to be in the range of 11±0.17 hrs to >12±0.54hrs.

Swelling-Index : Swelling-Index of all formulations were found to be in the range of 52.17±0.07 to 99.46±0.03.

Characterization Studies of *Abelmoschus Esculentus*

Table No 9: Viscosities of 1% w/v dispersions of Abelmoschus Esculentus gum

S. No	Polymer	Viscosity of 1%w/v dispersion of polymer in 0.1 N HCl(cps)
1.	*Abelmoschus Esculentus*	228.78

Abelmoschus esculentus gum, with a viscosity of 228.78 cps, is suitable for Gastro-retentive systems (potential swelling and mucoadhesion).

Table No 10: Swelling Index of Abelmoschus Esculentus in 0.1 N HCl

S. No	Polymer	Swelling Index
1.	*Abelmoschus Esculentus*	5.0

In Vitro Drug Release Studies and It's Kinetics

Table No 11: *In-vitro* drug release studies of Effervescent Tablets Formulations and Reference

Time (hrs)	%Famotidine Release												
	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	Ref
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.5	10.15 ±0.12	14.54 ±0.02	9.42 ±0.08	9.22 ±0.04	21.43 ±0.01	15.15 ±0.14	10.14 ±0.12	8.53± 0.12	9.23 ±0.46	10.05 ±0.12	5.51± 0.2	4.32± 0.9	10.56 ±0.05
1	20.72 ±0.01	18.27 ±0.04	18.27 ±0.05	15.77 ±0.08	30.23 ±0.02	27.40 ±0.12	20.71 ±0.04	14.15 ±0.07	15.23 ±065	17.48 ±0.32	15.05 ±0.23	10.25 ±0.12	19.93 ±0.06
1.5	32.42 ±0.06	20.84 ±0.10	28.50 ±0.04	20.55 ±0.06	37.65 ±0.01	31.89 ±0.05	30.32 ±0.9	28.31 ±0.05	27.41 ±0.43	29.04 ±0.42	22.09 ±0.6	18.52 ±0.9	23.53 ±0.12
2	46.58 ±0.02	27.76 ±0.13	32.55 ±0.12	26.93 ±0.02	49.23 ±0.09	48.24 ±0.04	46.25 ±0.12	35.09 ±0.06	38.08 ±0.02	35.43 ±0.23	31.95 ±0.7	24.93 ±0.12	32.75 ±0.11
3	52.71 ±0.04	33.34 ±0.21	36.52 ±0.04	32.26 ±0.01	64.56 ±0.07	52.32 ±0.03	59.64 ±0.14	45.23 ±0.12	56.19 ±0.42	46.53 ±0.12	36.33 ±0.11	32.23 ±0.13	39.45 ±0.02
4	64.46 ±0.03	43.12 ±0.12	43.15 ±0.03	36.53 ±0.02	73.23 ±0.04	61.73 ±0.02	63.52 ±0.13	56.13 ±0.14	64.23 ±0.52	50.87 ±0.15	41.68 ±0.13	39.52 ±0.12	43.94 ±0.04
5	73.47 ±0.01	47.31 ±0.04	49.52 ±0.06	40.75 ±0.04	86.54 ±0.03	73.96 ±0.01	70.23 ±0.12	67.09 ±0.12	72.95 ±0.36	58.12 ±0.09	45.23 ±0.17	43.23 ±0.11	50.92 ±0.08
6	78.21 ±0.05	58.21 ±0.06	64.09 ±0.08	43.45 ±0.05	96.65 ±0.02	81.15 ±0.16	79.24 ±0.21	72.95 ±0.04	81.16 ±0.32	62.30 ±0.04	55.34 ±0.11	50.45 ±0.10	58.94 ±0.09
7	86.9 ±0.07	64.09 ±0.07	69.07 ±0.13	48.94 ±0.09	-	96.50 ±0.14	94.23 ±0.02	81.15 ±0.12	91.49 ±0.54	74.24 ±0.11	66.15 ±0.19	56.92 ±0.06	64.52 ±0.02
8	93.05 ±0.02	77.85 ±0.04	72.85 ±0.10	52.92 ±0.04	-	-	-	97.23 ±0.14	99.60 ±0.23	77.23 ±0.23	76.75 ±0.18	60.09 ±0.02	72.54 ±0.06
9	-	90.50 ±0.01	78.09 ±0.05	64.09 ±0.03	-	-	-	-	-	81.17 ±0.11	80.35 ±0.17	69.23 ±0.01	79.09 ±0.02
12	-	-	96.36 ±0.06	86.52 ±0.01	-	-	-	-	-	91.30 ±0.02	95.34 ±0.08	89.23 ±0.01	92.67 ±0.12

Note: All values were expressed as mean ± SD, n=3, SD=standard deviation

Fig:5 *In-vitro* drug release profiles of Effervescent Tablets Formulations and Reference

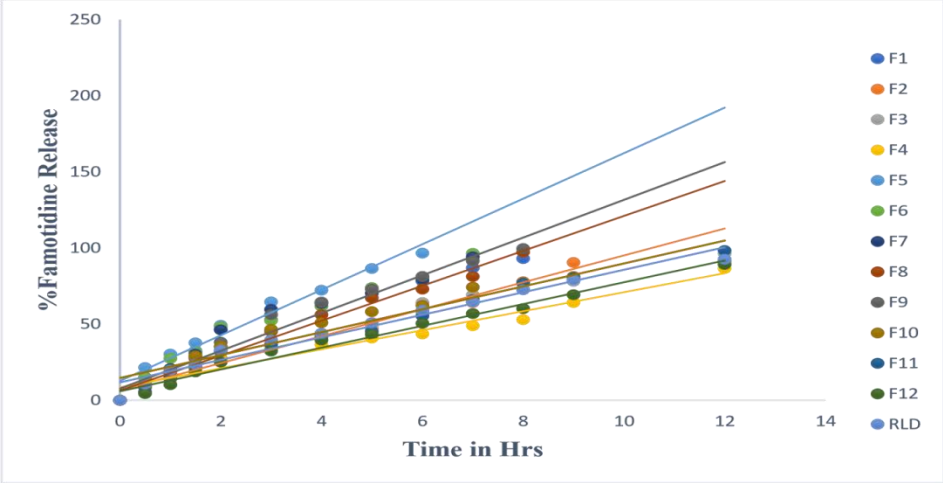

Table No 12: Pearson Correlation coefficient(r) values and *In vitro* drug release kinetics of Effervescent Tablets and Reference

Formulation	Zero order		First order		Higuchi		Peppas		T50
	R2	K0	R2	K1	R2	KH	R2	N	
F1	0.94	11.20	0.97	0.13	0.98	35.68	0.96	0.76	5.33
F2	0.98	8.84	0.86	0.08	0.93	28.66	0.96	0.64	8.66

F3	0.96	7.66	0.80	0.11	0.97	28.46	0.97	0.69	6.3
F4	0.96	6.24	0.87	0.05	0.94	22.81	0.98	0.63	13.86
F5	0.96	14.95	0.91	0.21	0.98	40.36	0.99	0.62	3.3
F6	0.96	12.38	0.84	0.16	0.97	36.26	0.98	0.66	4.33
F7	0.94	12.57	0.89	0.14	0.96	36.90	0.96	0.81	4.95
F8	0.97	11.46	0.81	0.14	0.96	35.47	0.98	0.85	4.95
F9	0.96	12.39	0.90	0.17	0.96	38.67	0.98	0.87	4.07
F10	0.92	7.52	0.98	0.08	0.98	28.67	0.97	0.68	8.66
F11	0.97	8.06	0.81	0.11	0.94	26.34	0.96	0.83	6.3
F12	0.98	7.16	0.92	0.06	0.96	26.20	0.96	0.83	11.5
Reference	0.96	7.40	0.94	0.08	0.98	27.57	0.99	0.66	8.6

Stability Studies

Table No 13: Stability testing at 40^0c/75%RH(1month)

Stability period	Optimized Formulation(F3)			
	Hardness	% Drug content	Floating time	%Drug Release
Initial (0^{th} day)	4.4±0.07	98.78±0.12	>12hrs	96.36±0.12
15	4.4±0.07	98.75±0.10	>12hrs	95.25±0.12
30	4.4±0.06	97.76±0.09	>12hrs	95.23±0.10

Stability studies were conducted to optimized final formulation F3 at 40˚C ± 2˚C/75% RH±5% for one month and %drug release from the formulation was satisfactory and any noticeable changes were not observed.

Similarity and Dissimilarity Factors

Table No14: Similarity and Dissimilarity Tests for Reference and Optimized formulation (f3), (f3 and f11)

Fit Factors	Standard values	Calculated values		Inference
		Reference&F3	F3& F11	
Difference factor(f1)	0-15	4.6	6.18	Dissolution profiles are similar
Similarity factor(f2)	50-100	98	99	Similarity or equivalence of profiles.

Statistical Methods

Table No.15: ANOVA for Dissolution Efficiency(6hrs)

Source	DF	Sum of Square	Mean Square	F Statistic	P-Value
Groups (between groups)	2	1.786	0.89	2.184	0.193
Error (within groups)	6	2.454	0.40	-	-
Total	8	4.240	0.53	-	-

Table No.16: ANOVA for Dissolution Efficiency(12hrs)

Source	DF	Sum of Square	Mean Square	F Statistic	P-Value
Groups (between groups)	2	0.86	0.43	1.803	0.243
Error (within groups)	6	1.43	0.23	-	-
Total	8	2.29	0.28	-	-

CONCLUSION

➢ Famotidine is a histamine H_2-receptor antagonist indicated for the treatment of gastric ulcers, duodenal ulcers, Zollinger-Ellison syndrome and gastroesophageal reflux disease in adults and children. The controlled release of Famotidine gastro retentive effervescent tablets were prepared by simple and cost effective technique for the treatment of Gastric ulcers and increases patient compliance by reducing dosing frequency. The

preformulation parameters of drug and excipients showed good flow properties. FTIR and DSC studies showed that there was no significant change in the chemical integrity of the drug. The quality control parameters like hardness, friability, weight variation were within the acceptable limits as per I.P standards. The F3 and F11 formulation showed drug release 96.36 and 95.23 respectively and remain buoyant for 12hrs due to its rate retarding property. The mechanism of drug was released by non-fickian diffusion. Stability studies also indicated the stable nature of the formulation and any noticeable changes were not observed. Fit factor analysis was applied to the optimized formulations (F3 and F11) and reference indicates that there is similarity between both the profiles. Statistical methods like ANOVA was applied to the optimized formulations (F3 and F11) and reference indicates that there was no significant difference between the means of any pair. Hence this study concludes that viscosity and swelling index are the major factors affecting Famotidine drug release and F3 containing *Abelmoschus esculentus* act as a release rate retardant polymers in floating drug delivery system. The natural polymer *Abelmoscesculentus* is a safe, Cost-effective, Biodegradablepolymers.

Acknowledgements: We thank our Management and our faculty for supporting to carry the study.

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