CODEN [USA]: IAJPBB ISSN : 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES
SJIF Impact Factor: 7.187
https://doi.org/10.5281/zenodo.7533323

Available online at: http://www.iajps.com *Research Article*

FORMULATION AND EVALUATION OF TINIDAZOLE FLOATING TABLETS

H. Padmalatha
Gyana Jyothi College of Pharmacy

Abstract:
The objective of this study was to developed gastric floating drug delivery system containing Tinidazole and having a bulk density lower than that of gastric fluid and remaining buoyant on the stomach contents. In the Preformulation FTIR study was carried out for pure drug (Tinidazole), Tinidazole and excipients. It has not shown any interaction. Hence drugs were found to be compatible with excipients. The formulations were prepared by direct compression method. The angle of repose values for formulations ranges from 26.04±0.03 to 29.01±0.07. Bulk and tapped densities were used for the measurement of compressibility index. The bulk and tapped values for formulations range from 0.260±0.01 to 0.347±0.04 and 0.320±0.03 to 0.391±0.07 respectively. The carr's index and hausner's ratio values for formulations range from 13.12±0.03 to 16.52±0.01 and 1.08 ±0.05 to 1.19±0.06 respectively. Thus, all formulations exhibited good flow characteristics. From the study, concluded that F4 was the optimized formulation which has shown better buoyancy time 45sec and drug release 99.88% in 24hrs. However, further invivo studies can be carried out to support the results.

Key words: *Formulation, Optimization, Tinidazole, Floating tablets*

Corresponding author:
H. Padmalatha,
Principal,
Gyana Jyothi College of Pharmacy
Gyana Jyothi Nagar, Uppal, Hyderabad
Telangana, India.
E-mail: Padmalatha.malthar@gmail.com

QR code

Please cite this article in press ***H. Padmalatha , Formulation And Evaluation Of Tinidazole Floating Tablets.,*** *Indo Am. J. P. Sci, 2022; 09(12).*

INTRODUCTION:

Gastroretentive drug delivery systems are designed to be retained in the stomach for a prolonged time and release their active ingredients and thereby enable sustained and prolonged input of the drug to the upper part of the gastrointestinal tract.[1] A modified release drug delivery system with prolonged residence time in the stomach is of particular interest for drugs- acting locally in the stomach; having an absorption window in the stomach or in the upper part of small intestine; those unstable in the intestinal or colonic environments; or those having low solubility at high pH values.[2]

To formulate a successful gastroretentive drug delivery system, several techniques are currently used such as floating drug delivery system, low density systems, raft systems incorporating alginate gel, bioadhesive or mucoadhesive systems, high density systems, superporous hydrogel and magnetic system. Among these, the floating dosage forms have been most commonly used.[3]

Floating drug delivery systems have a bulk density less than gastric fluids and so remain buoyant in the stomach without affecting the gastric emptying rate for a prolonged period of time. While the system is floating on the gastric contents, the drug is released slowly at the desired rate from the system. After release of drug, the residual system is emptied from the stomach. This results in an increased gastric retention time and control of the fluctuation in plasma drug concentration.[4]

Tinidazole is an anti-parasitic drug used against protozoan infections. It is widely known throughout Europe and the developing world as a treatment for a variety of amoebic and parasitic infections. It was developed in 1972. A derivative of 2-methylimidazole, it is a prominent member of the nitro imidazole antibiotics. There has been considerable research over the last decade on the possibility of controlled and site-specific delivery to the GIT by controlling the gastrointestinal transit of orally administered dosage forms using gastro retentive drug delivery system (GRDDS). Such GRDDS possess the ability of retaining the dosage forms in gastrointestinal tract (GIT) particularly, in the stomach for long period the transit time in GIT i.e., from the mouth to the anus, varies from one person to another. It also depends upon the physical properties of the object ingested and the physiological conditions of the alimentary canal. Several drugs are absorbed to the most extent in the upper part of the small intestine. Many drugs show poor bioavailability (BA) in the presence of intestinal metabolic enzymes like cytochrome P450 (CYP3A), abundantly present in the intestinal epithelium. Their activity decreases longitudinally along the small intestine, with levels rising slightly from the duodenum to the jejunum and declining in the ileum and colon. Drugs having site-specific absorption are difficult to design as oral CRDDS because only the drug released in the region preceding and in close vicinity to the absorption window is available for absorption. After crossing the absorption window, the released drug goes waste with negligible or no absorption. This phenomenon considerably decreases the time available for drug absorption after its release and expose the success of the delivery system. The GRDDS can improve the controlled delivery of the drugs which exhibit an absorption window by continuously releasing the drug for a prolonged period before it reaches its absorption site, thus ensuring its optimal bioavailability. After oral administration, Tinidazole is well-absorbed and distributed. The drug is not primarily metabolized by hepatic enzymes. The terminal half-life of Tinidazole is about 12-14 hours. The objective of this study was to developed gastric floating drug delivery system containing Tinidazole and having a bulk density lower than that of gastric fluid and remaining buoyant on the stomach contents [5-13]

MATERIALS AND METHODOLOGY:

MATERIALS

Tinidazole Procured from**,** Provided by cadila pharma. Sodium bicarbonate, Magnesium sterate, Hydrochloric Acid, Methanol are Standard chemical Reagents

METHODOLOGY

Formulation of Tinidazole floating tablets:

Floating controlled release tablets were prepared by direct compression method. Tinidazole was mixed with the required quantities of polymers (xanthan gum, guar gum) sodium bicarbonate (12%), and lactose by geometric mixing. The powder blend was then lubricated with magnesium stearate (2%) and mixed for about 3 minutes. Finally, this mixture was compressed on a 16-station rotary tablet machine (Cadmach, Ahmedabad, India) using a 6 mm standard flat-face punches. Formulation composition of gastroretentive tablets of Tinidazole Quantity of Raw materials Per Tablet (In mg)

Table-1: Formulation of Tinidazole floating tablets

S.NO	INGREDIENTS	F1	F2	F3	F4	F5	F6	F7	F8	F9
1	Tinidazole	20	20	20	20	20	20	20	20	20
2	Xanthum gum	5	10	-	10	20	-	15	30	-
3	Guar gum	5	-	10	10	-	20	15	-	30
4	Sodium bicarbonate	12	12	12	12	12	12	12	12	12
5	Lactose	56	56	56	46	46	46	36	36	36
6	Magnesium sterate	2	2	2	2	2	2	2	2	2
7	Total weight	100	100	100	100	100	100	100	100	100

RESULTS AND DISCUSSION:

PREFORMULATION STUDY

Organoleptic properties:

Table-2: Observation of organoleptic properties:

TEST	SPECIFICATION	OBSERVATION
Colour	White or almost white powder	White powder
Odour	---	Odourless

Solubility analysis:

Tinidazole samples are examined and it was found to be insoluble in water and slightly soluble in methanol, soluble in dimethyl formamide. It also dissolved in dilute alkali and in dilute acids.

Melting point of drug:

The melting point of Tinidazole was determined by capillary method, melting point of Tinidazole was found to be 140°C. Melting point compared with USP standards that showed that drug is pure.

Loss on Drying: The loss drying of drug was founded as0.41 which is within the limit.

Table 3: Observations for loss on drying

Test	Loss on drying	Observation
Loss on drying	Not more than 0.5%	0.41%

Drug powder characterization:

Angle of repose:

Table 4: Angle of repose

Material	Angle of repose
Tinidazole Raw material	29.31

The results indicating that the raw material has good flow property.

Flow properties:

Table 5: Flow properties of pure drug

Material	Bulk density	Tapped density	Carr's index (%)	ıer ratio (%)
ɣedilol raw material	0.25	0.43	12	1.128

The results are clearly indicating that the Tinidazole raw material has good flow property.

Drug-polymer compatibility study:

FTIR studies:

The FTIR spectra of the pure drug, excipient and physical mixture of drug and excipients used in floating controlled tablet formulations shown were recorded in between 400-4000 wave number (cm^{-1}).

Fig. No 1: IR spectrum of Tinidazole standard

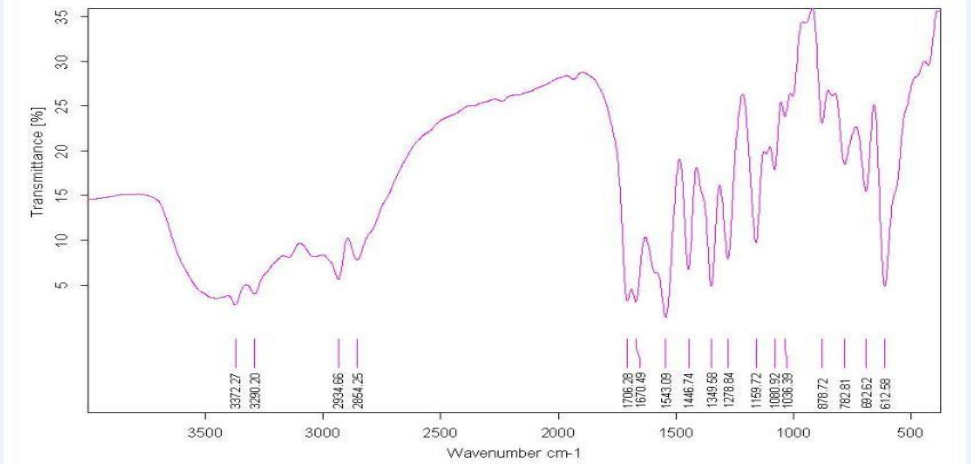


Fig. No 2: IR spectrum of guar gum

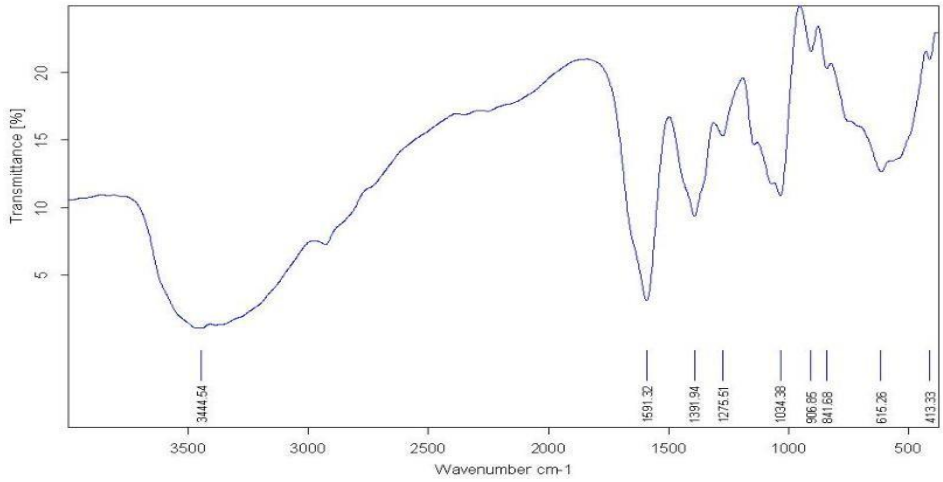


Fig. No 3: IR spectrum of Xanthan gum

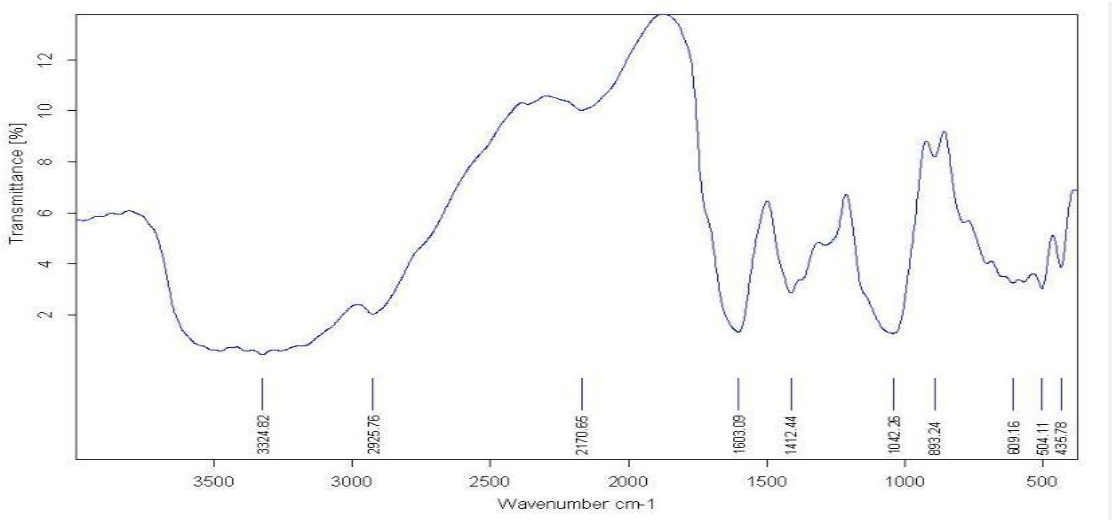


Fig. No 4: IR Spectrum of Tinidazole and polymers

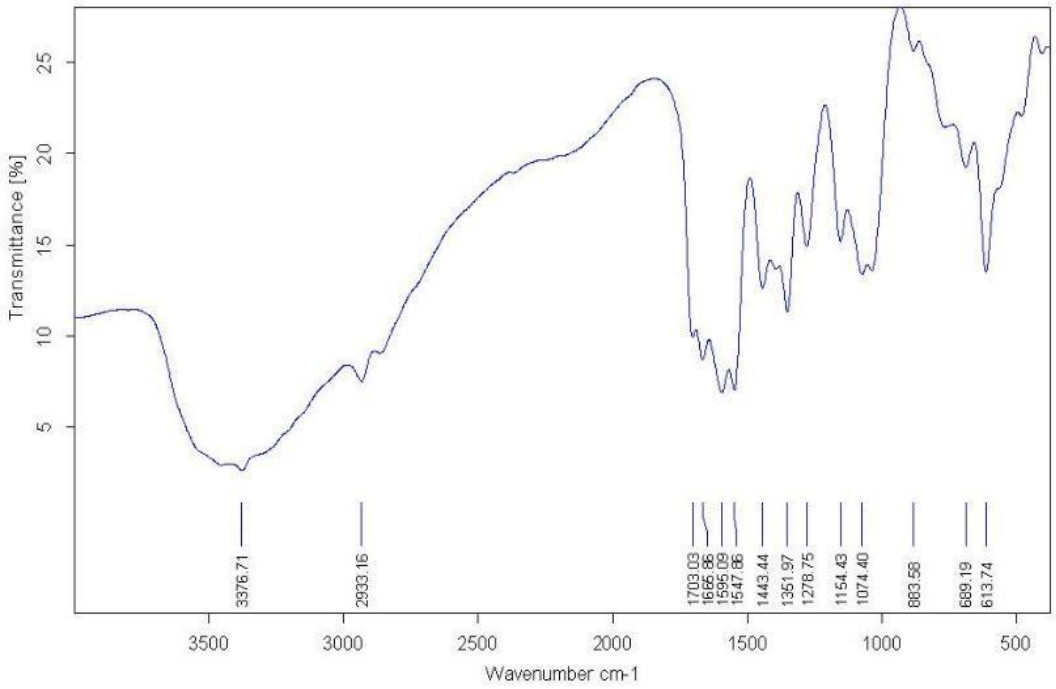


Fig. No 5: IR Spectrum of Magnesium stearate

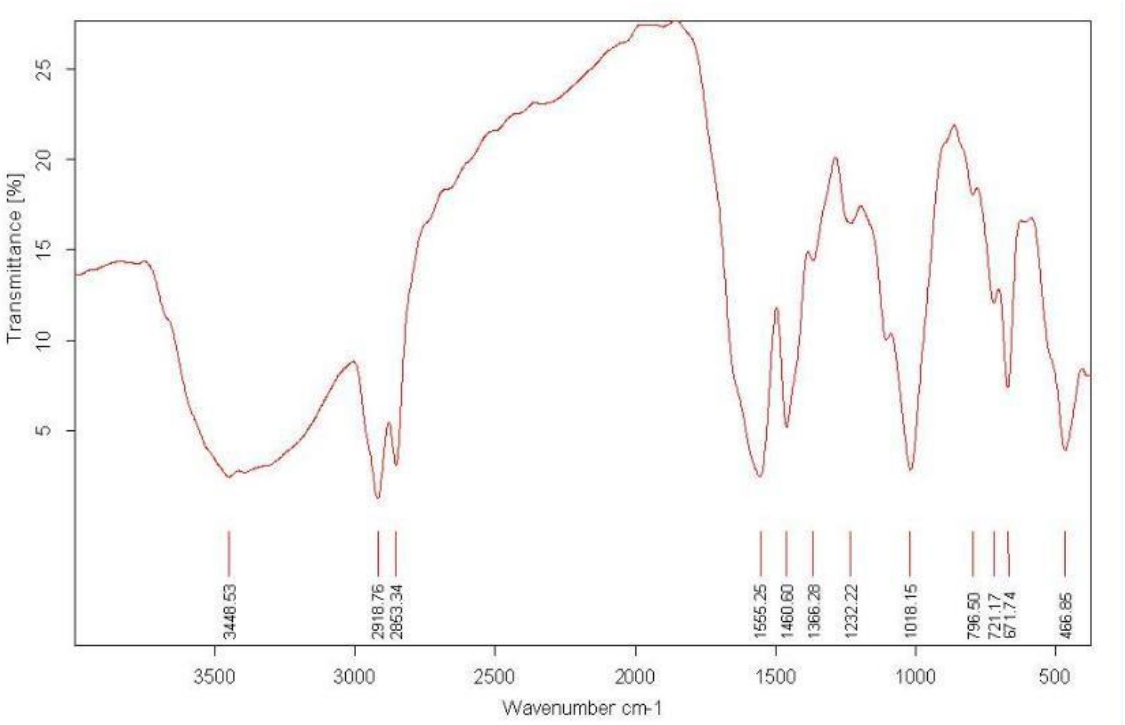


Fig. No 6: IR Spectrum of Lactose

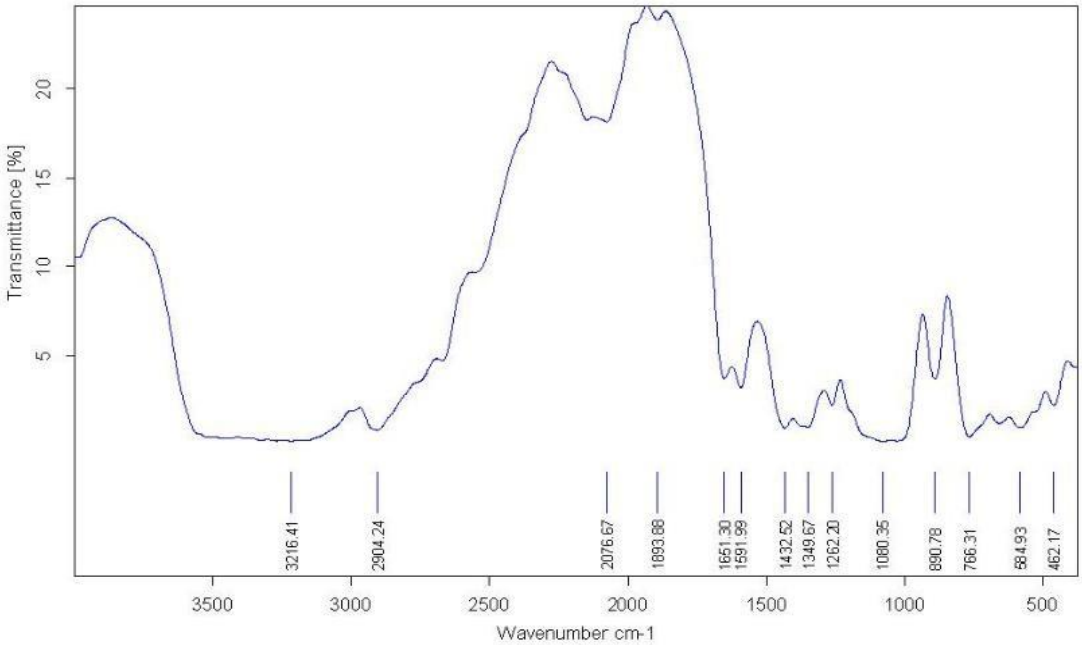


Fig. No 7: IR Spectrum of Sodium Bicarbonate

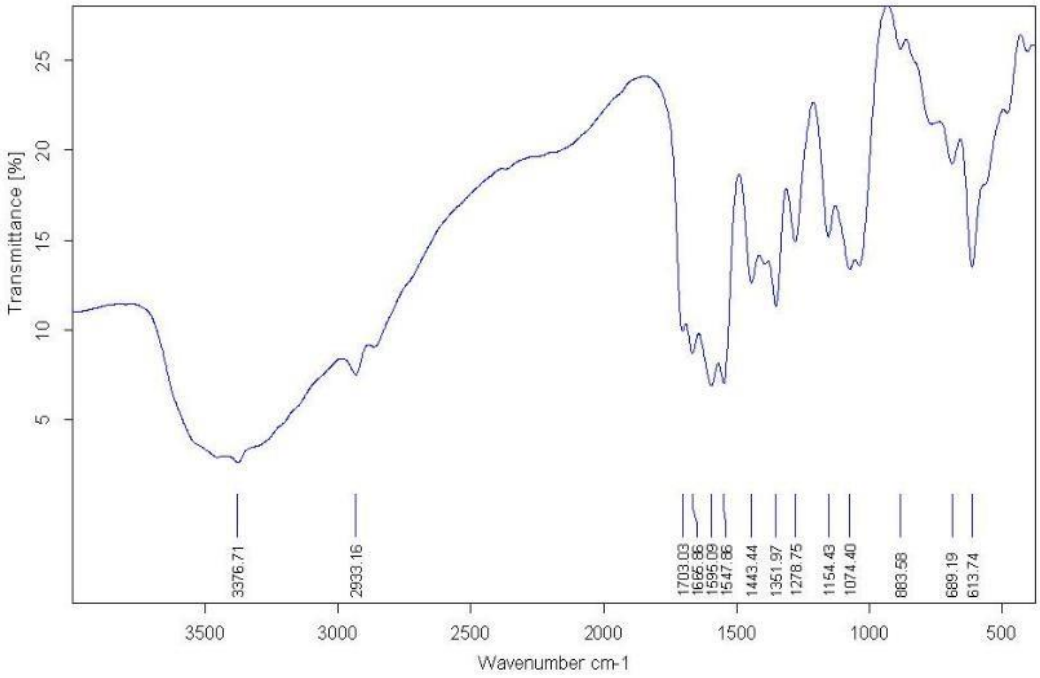


Fig. No 8: IR Spectrum of Tinidazole, polymers and excipients

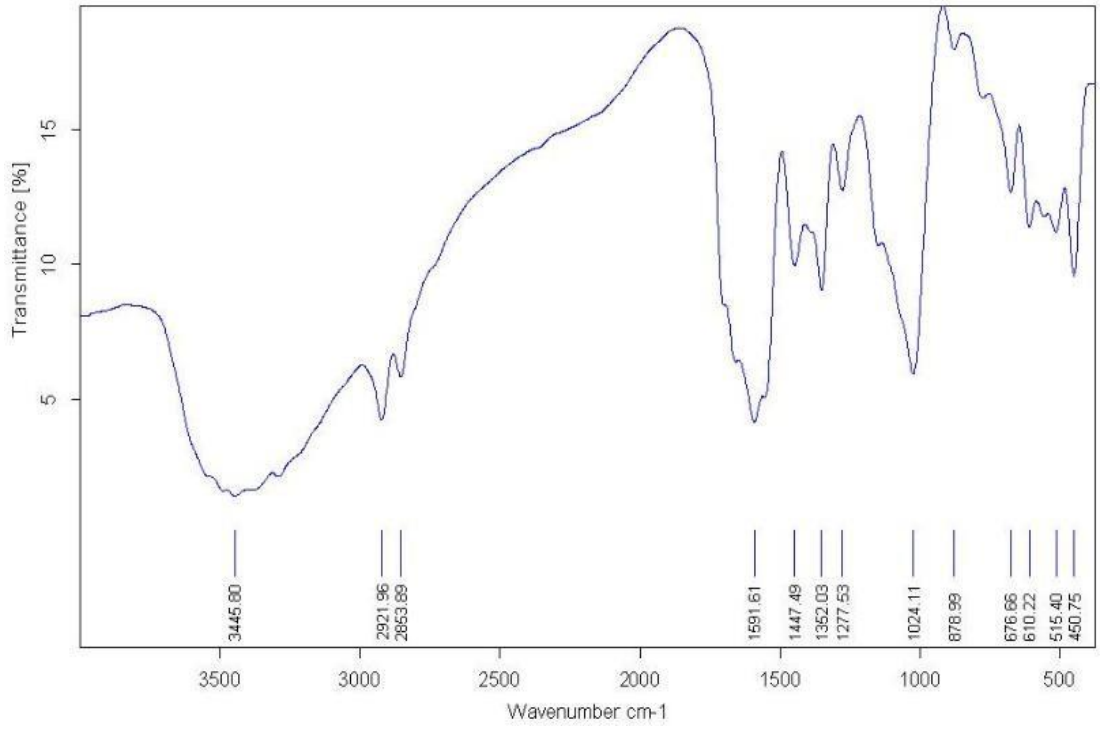


Table 6: FT-IR Peaks of various components

S.No	Peak in pure drug (cm^{-1})	Functional Group	Type of vibration	Peak in Physical mixture
1.	3372.27	Amine (-N-H)	Stretch (medium)	3376.71
2.	2934.66	Aromatic (-C-H)	Stretch (medium)	2933.16
3.	1706.28	Amide (C=0)	Stretch (Strong)	1703.03
4.	1670.49	Methylene cyclohexane	Stretch (Scissoring)	1666.86
5.	1080.92	Sulfoxides	Stretch (Strong)	1074.40
6.	1349.58	Aromatic plane bending (C-H)	Stretch (medium)	1351.97
7.	1543.09	Aromatic (C=C)	retch (Weak, multiple)	1547.86

The IR Spectrum of pure drug and physical mixture of drug and polymer were studied.

From the above results functional groups and type of vibrations are noted. In case of FTIR study no peaks are observed which interfere with the main drug peaks. So,there was no disappearance or appearance of already existing peaks. Hence drugs were found to be comptabile with excipients.

STANDARD CURVE OF TINIDAZOLE PURE DRUG:

Calibration curve of Tinidazole was determined by plotting absorbance (nm) versus concentration (µg/ml) at 240 nm. The results were obtained as follows.

Table 7: Standard curve of Tinidazole

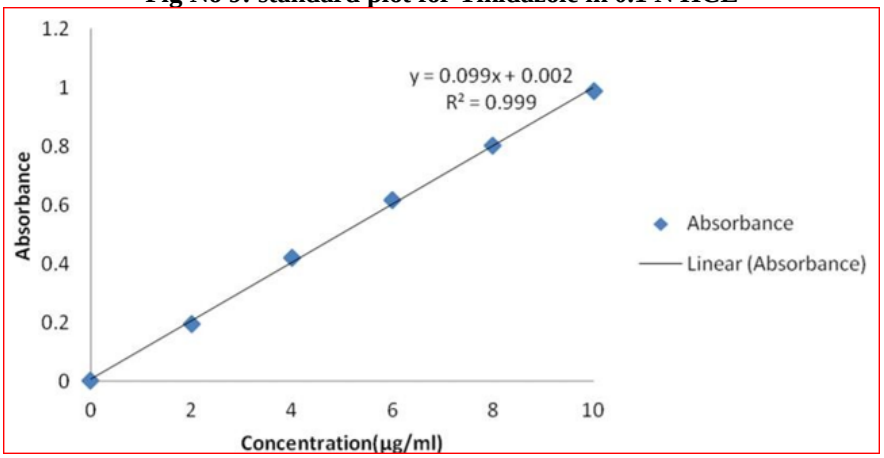
Concentration(µg/ml)	Absorbance(nm)
0	0
2	0.195
4	0.420
6	0.615
8	0.801
10	0.986

The linear regression analysis was done on absorbance data points. A straight line generated to facilitate the calculation of amount of drug, the equation is as follows:

Y = mx + c

Where Y=absorbance, m=slope, x=concentration

Fig No 9: standard plot for Tinidazole in 0.1 N HCL



EVALUATION OF PRECOMPRESSION PARAMETERS

Table 8: Evaluation of powder characteristics:

ɔrmulation code	Angle of repose (± SD)	BD (gm/ml) ± SD	TD (gm/ml) ± SD	Carr's index(%) (± SD)	Hausner's ratio (± SD)
F1	26.12±0.04	0.317±0.01	0.367±0.02	14.65±0.06	1.08±0.05
F2	27.07±0.01	0.327±0.03	0.389±0.04	15.21±0.07	1.09±0.04
F3	26.04±0.03	0.337±0.06	0.381±0.01	13.63±0.04	1.11±0.02
F4	29.0i±0.07	0.347±0.04	0.391±0.07	16.52±0.01	1.19±0.06
F5	26.97±0.09	0.296±0.03	0.320±0.03	13.12±0.03	1.16±0.03
F6	25.71±0.06	0.260±0.01	0.336±0.01	15.27±0.01	1.15±0.01
F7	26.16±0.03	0.266±0.04	0.372±0.02	14.56±0.04	1.16±0.03
F8	27.11±0.09	0.307±0.05	0.332±0.03	13.41±0.07	1.17±0.05
F9	26.16±0.04	0.312±0.02	0.356±0.01	16.31±0.05	1.18±0.04

Angle of repose for all formulations were examined. The values were found to be within the range from 26.04±0.03 to 29.01±0.07. This indicated that powder blend having good flow property.

The bulk density and tapped density values were found to be within the range from 0.260±0.01 to 0.347±0.04 and 0.320±0.03 to 0.391±0.07 respectively.

The Hauser's ratio values were found to be within the range from 1.08±0.05 to 1.19±0.06. This indicated that powder blend having good flow property.

EVALUATION OF FORMULATED TABLETS

Table 9: Evaluation of formulated tablets

Formulation code	Weight variation in mg (± SD)	Hardness in kg/cm^2 (± SD)	Friability (%)	Drug content (± SD)	ıickness in mm (± SD)
F1	101±2.99	4.5±0.34	0.47	98.76±0.19	1.3±0.12
F2	100±1.98	4.2±0.73	0.68	99.16±0.27	1.2±0.21
F3	99±3.7	4.4±1.92	0.47	100.87±0.41	1.3±0.53
F4	100±6.5	4.3±0.34	0.46	100.92±0.21	1.3±0.16
F5	100±1.3	4.6±0.28	0.72	98.48±0.26	1.3±0.42
F6	99±6.59	4.3±0.37	0.74	99.67±0.17	1.2±0.53
F7	101±1.6	4.4±0.89	0.63	99.87±0.32	1.3±0.24
F8	99±3.06	4.3±0.42	0.45	99.28±0.33	1.2±0.16
F9	100±3.9	4.4±0.56	0.83	98.87±0.16	1.2±0.29

The formulated floating tablets were then evaluated for various physical characteristics like thickness, weight variation, hardness, friability, drug content. The weight variation of tablets was uniform in all formulations and ranged from 99±0.02 to 101±0.06.The % deviation was coming within 8% to 10 % range. for 100 mg tablet the accepted %

deviation should be 10 %. F1-F9 batches came within limit and passed the test. The hardness of the prepared tablets was ranged from 4.2±0.73 to 4.5±0.2, friability values were ranged from 0.45 to 0.83 which fallen within the limit of standard (0.1 to 0.9%). Drug content of tablets was ranged from 98.76±0.19 to 100.92±0.21, F4 showed maximum drug content. Thickness of tablets was uniform and values are ranged from 1.2±0.000 to 1.3±0.011.

Buoyancy / Floating Test:

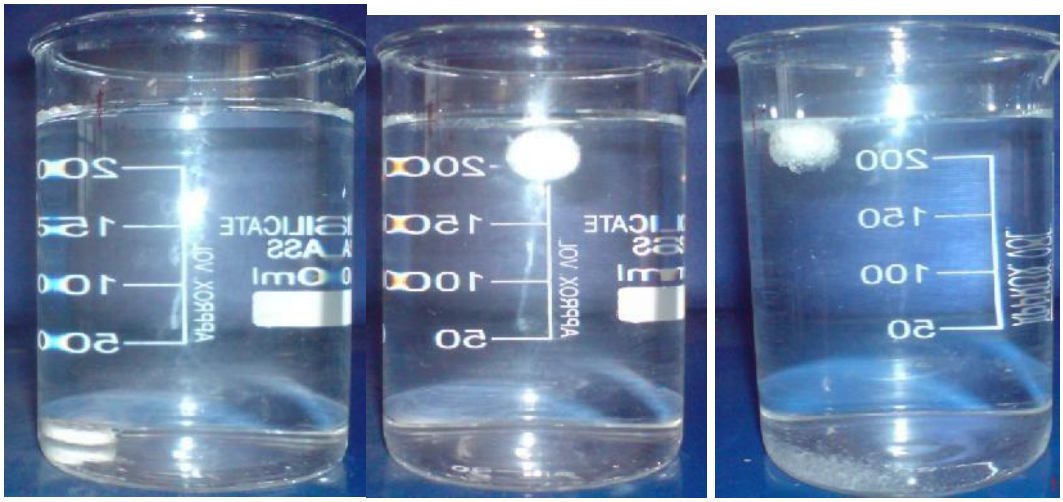
The tablets floated, while immersing in 0.1 N HCL solution PH(1.2) at 37^0C, and remained buoyant without disintegration.

Table 10: Buoyancy and floating time

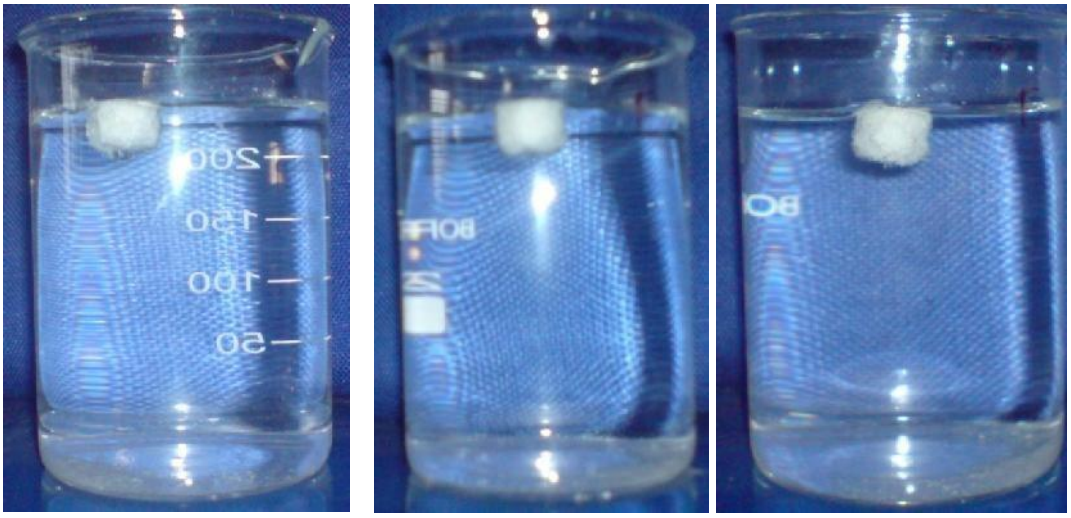
S.No	Batch No	Buoyancy lag time (sec)	Floating duration (hrs)
1	F_1	45	>12 hrs
2	F_2	60	>12 hrs
3	F_3	50	>12 hrs
4	F_4	45	>12 hrs
5	F_5	70	>12 hrs
6	F_6	90	>12 hrs
7	F_7	45	>12 hrs
8	F_8	50	>12 hrs
9	F_9	55	>12 hrs

Formulation F4 containing xanthan and guar gum showed good BLT of 45 sec,while the formulation containing xanthan gum alone and guar gum alone showed highest BLT and TFT of greater than 12 hrs. This may due to the amount of polymer and gas generating agent, which were kept constant in the present study . The gas generated cannot be entrapped inside the gelatinious layer, and it escaped leading to variation in BLT and TFT.

From the results it can be concluded that the batch containing both xanthan gum and guar gum showed good buoyancy lag time (BLT) and total floating time(TFT).



0 min 2 min 4 hr



8 hr **12 hr** **24 hr Fig**

No.18: *In vitro* buoyancy study of Tinidazole floating

Swelling Index:

The percentage swelling obtained from the water uptake studies of the formulations was shown in Figure. The formulations with Xanthan and guar gum showed the swelling and tablet integrity. The change in sodium bicarbonate concentration did not show any effect on swelling of the tablet. Complete swelling was achieved at the end of 6 hr, then diffusion and erosion takes place. The formulation containing xanthan gum shows the higher swelling compared to that of the formulations containing both xanthan and guar gum and guar gum alone. The swelling index of the tablets increased with an increased in the polymer viscosity grades.

Table 11: % swelling index of formulated floating tablets

TIME	F1	F2	F3	F4	F5	F6	F7	F8	F9
1hr	20.27	26.43	19.21	18.48	20.11	18.06	10.24	17.64	9.25
2hr	36.09	44.60	34.12	30.12	33.16	29.18	19.19	28.72	16.37
3hr	51.02	60.57	49.56	47.23	48.32	42.70	28.12	46.16	24.43
4hr	62.47	72.22	60.89	54.42	60.06	53.04	39.21	52.09	36.45
6hr	72.09	85.11	70.06	63.15	71.51	59.56	45.79	60.99	41.28

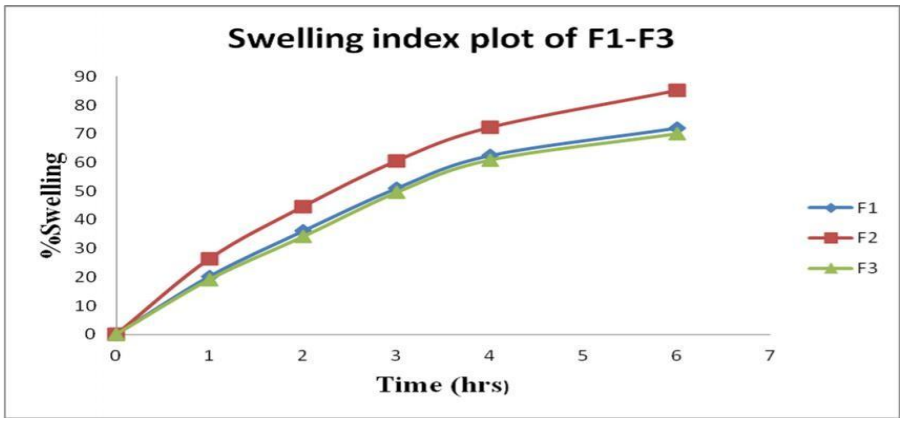


Fig No.10: Swelling index plot of F1-F3

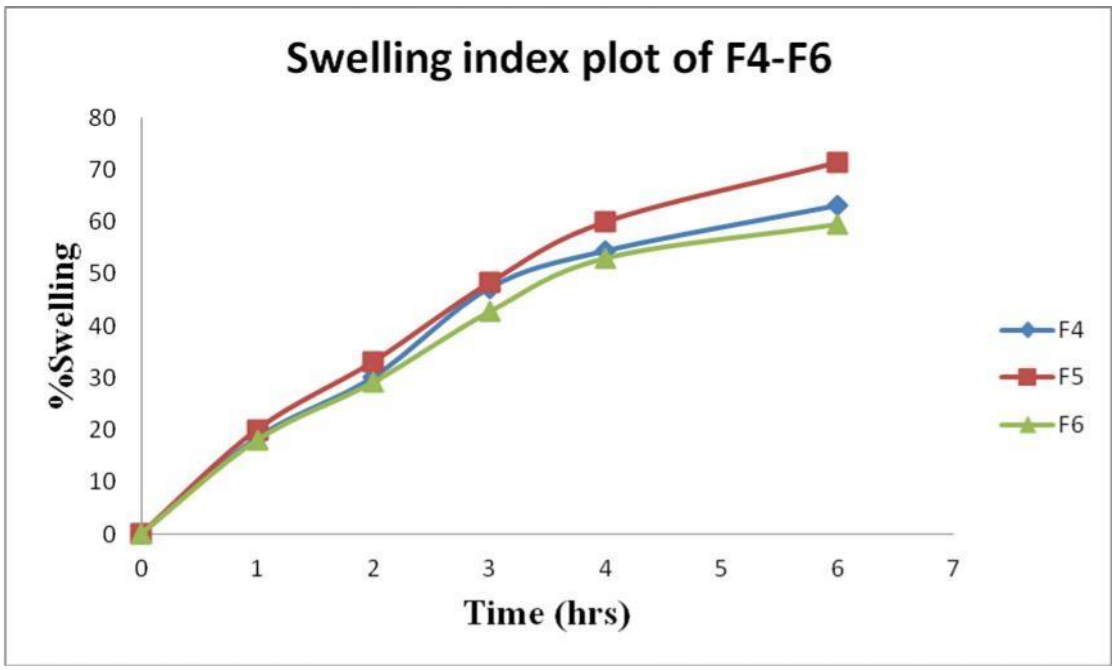


Fig No.11: Swelling index plot of F4-F6

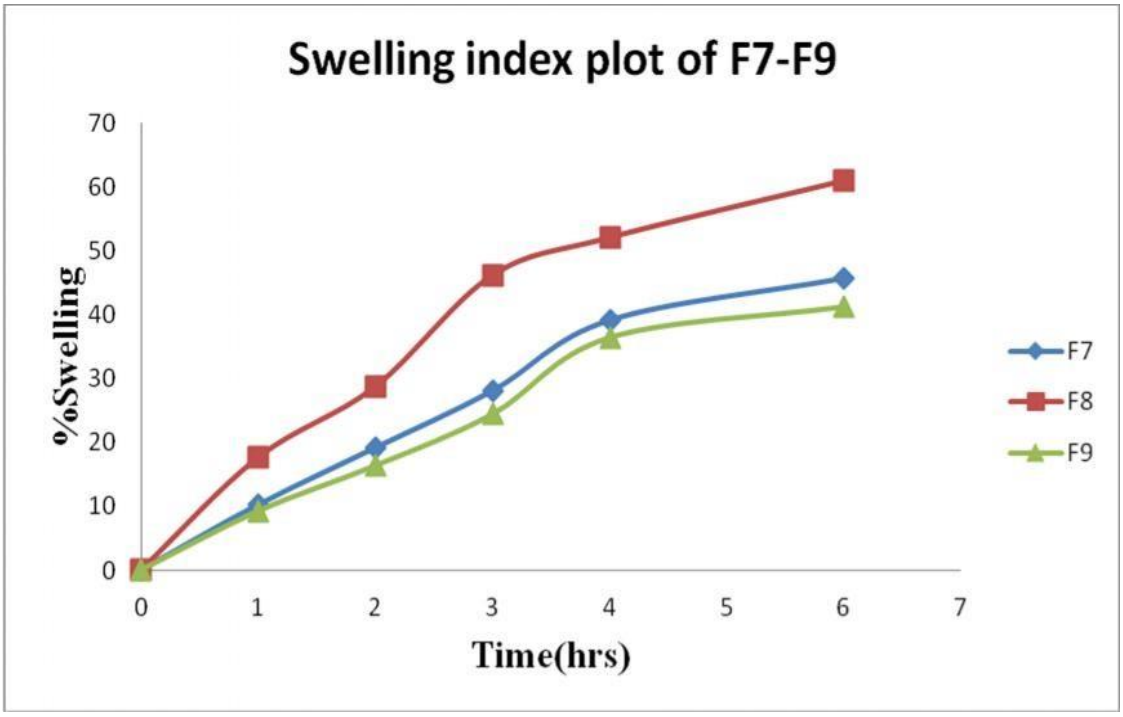


Fig No. 12: Swelling index plot of F7-F9

Invitro drug release study of formulated floating controlled release formulations

Table 12: Invitro drug release study

TIME	CUMULATIVE PERCENTAGE DRUG RELEASE (%)								
	F1	F2	F3	F4	F5	F6	F7	F8	F9
0	0	0	0	0	0	0	0	0	0
1	15.68	21.98	20.18	10.23	20.16	9.31	8.14	15.27	8.00
2	26.22	44.03	31.77	14.76	31.52	13.16	11.56	25.32	10.02
3	37.04	60.07	41.91	17.86	39.23	16.56	15.12	36.59	14.56
4	48.09	72.17	52.76	21.97	50.36	20.96	17.56	45.62	16.23
5	55.71	79.46	58.82	26.53	56.51	25.43	22.16	50.06	20.58
6	62.05	85.18	63.11	31.65	61.68	30.62	26.28	54.42	24.12
7	69.16	92.71	67.99	38.15	66.79	36.25	34.47	58.69	30.16
8	76.96	99.51	72.34	44.87	71.24	40.17	37.52	63.16	34.19
10	88.34	-	81.19	56.01	80.11	50.21	44.75	70.28	39.78
12	99.11	-	90.76	70.03	89.16	58.75	49.89	78.44	43.65
14	-	-	94.42	77.36	92.14	63.23	52.13	83.59	47.57
16	-	-	99.85	84.06	99.58	70.11	56.14	90.16	52.18
20	-	-	-	97.02	-	76.51	62.78	99.31	56.24
24	-	-	-	99.64	-	82.09	66.25	-	60.12

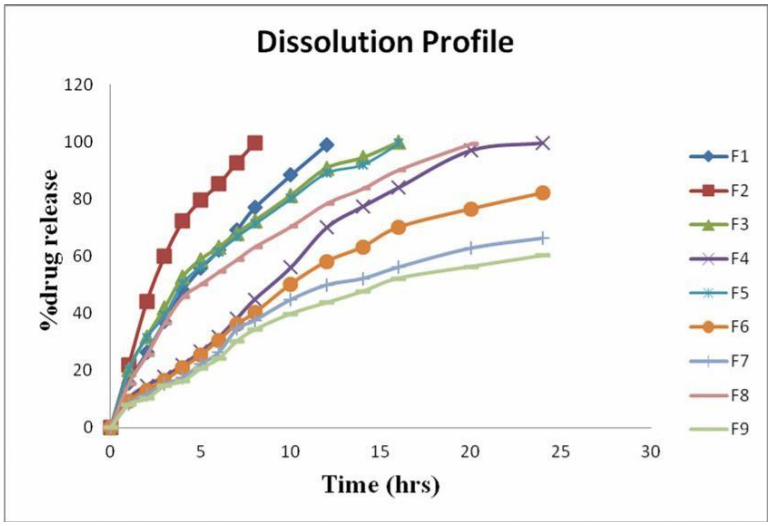


Fig No.13: Invitro drug release study

The formulated controlled release floating tablets were then subjected to *Invitro* dissolution test for evaluating drug release from the formulation. The Invitro dissolution test was carried out in 900 ml of 0.1 N HCL in USP-II paddle type apparatus at 50 rpm and 37±0.5ºC. The results of dissolution study was depends on polymer concentration. Formulation containing xanthan gum alone (F2,F5,F8) released fastly compared to that of guar gum alone (F3,F6,F9) due to the less binding nature and controlled release property. Formulation F4 containing Xanthan gum (10 mg) and guar gum (10 mg) had given drug release 99.76% in 24 hrs. Then the formulations containing Xanthan gum and guar gum were given better release profiles when compared with formulations containing xanthan gum alone (F2,F5,F8) and guar gum alone (F3,F6,F9).

KINETIC STUDIES OF FLOATING TABLETS OF TINIDAZOLE:

Table-13: kinetic study of optimized formulation F4

Time (hrs)	Log Time	√Time	cumulative % Drug release	Log cumulative % Drug release	cumulative % Drug remained	Log cumulative % Drug remained
0	0	0	0	0	100	2.000
1	0	1.000	10.23	1.009	89.76	1.953
2	0.301	1.414	14.76	1.169	85.24	1.93
3	0.477	1.732	17.86	1.251	82.23	1.915
4	0.602	2.000	21.97	1.341	79.03	1.897
5	0.698	2.236	26.53	1.423	73.47	1.866
6	0.778	2.449	31.65	1.5	68.35	1.834
7	0.845	2.645	38.15	1.581	61.88	1.786
8	0.903	2.828	44.87	1.651	55.13	1.741
10	1.000	3.162	56.01	1.748	43.99	1.643
12	1.079	3.464	70.03	1.845	29.97	1.476
14	1.146	3.741	77.36	1.888	22.64	1.354
16	1.204	4.000	84.06	1.924	15.94	1.202
20	1.301	4.472	97.02	1.986	2.98	0.474
24	1.380	4.898	99.64	1.998	0.36	-0.443

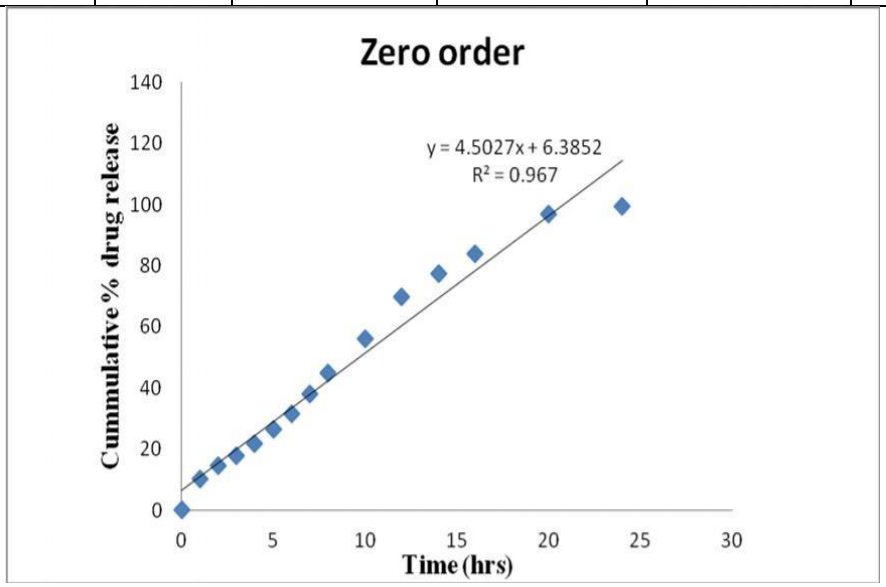


Fig No 14: zero order plot

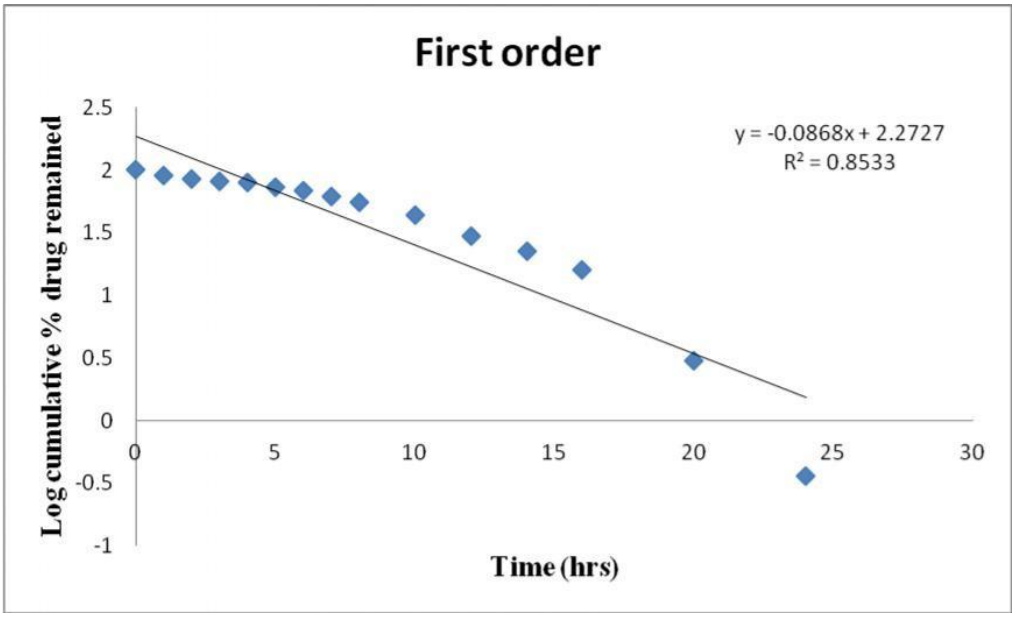


Fig No 15: First order plot

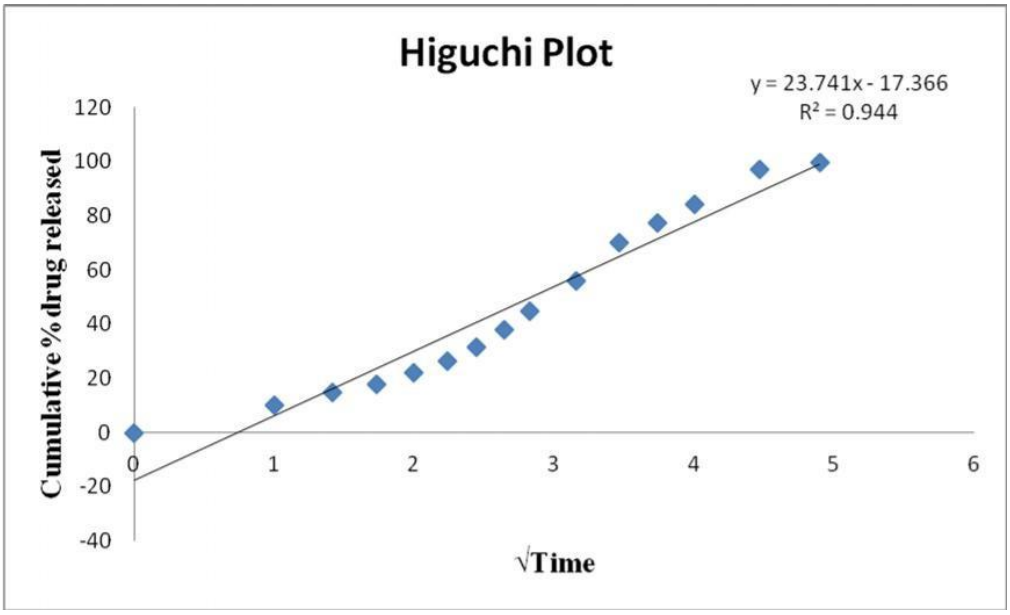


Fig No 16: Higuchi plot

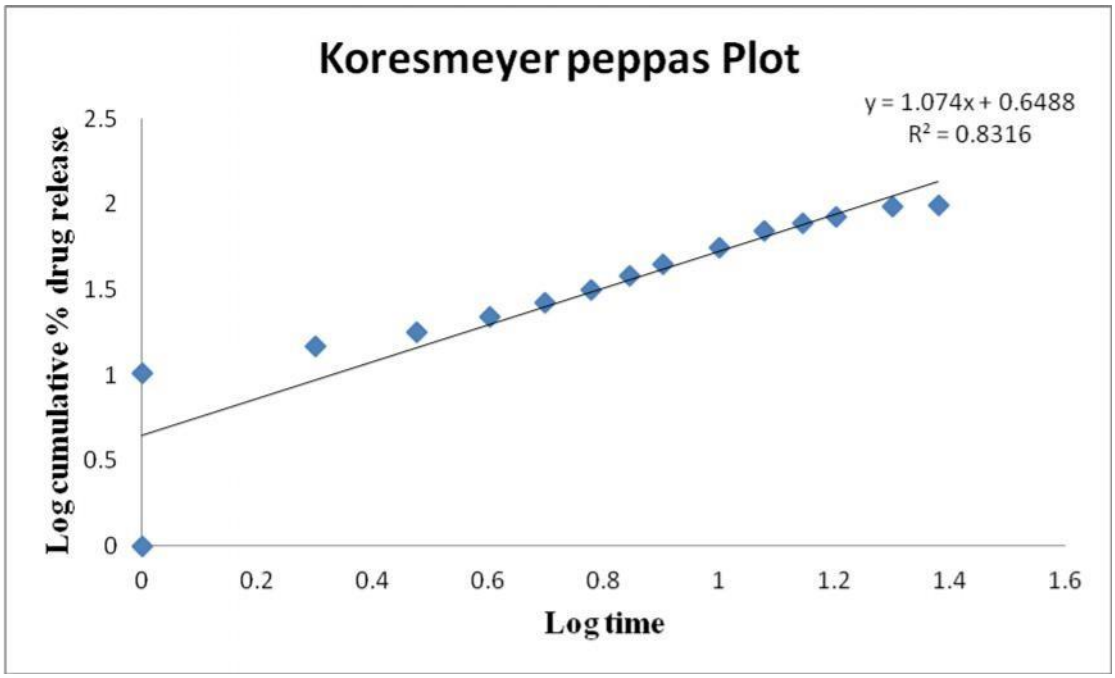


Fig No 17: koresmeyer peppas plot

KINETICS OF DRUG RELEASE

Table-14:

Formulation	Regression coefficient of Zero order	Regression coefficient of First order	Order of release
F4	0.967	0.853	Zero order release

Table-15:

Formulation	Higuchi Model		Korsemeyer Peppas Model	
	SLOPE	R^2	SLOPE	R^2
F4	23.74	0.944	1.074	0.831

In order to determine the mechanism of drug release form the formulations, the *Invitro* dissolution data was fitted to Zero order, First order, Higuchi plot and Korsemeyer-peppa's plot was drawn and interpretation of release exponent value (n) was calculated and results are shown in tables. The results of R^2 for zero and first order were obtained as 0.967, 0.853. Based on that we confirmed that the optimized formulation followed zero order release.

The drug release was diffusion controlled as the plot of optimized formulation F4 was found 0.944 as regression coefficient in higuchi plot. From korsemeyer peppa's plot the release exponent value n was found as 0.813 and it was confirmed as the release of drug from the formulation was founded as anomalous non-fickian transport of diffusion.

STABILITY STUDIES:

The optimized formulation was subjected to stability studies at 40ºC ± 2ºC / 75% RH ± 5% for 3 month and analyzed weight variation, hardness, friability, drug content.

Table-16: Stability studies

TEST	0 days	30 days	60 days	90 days
Weight variation	99±0.87	99±0.55	98±0.84	99±0.76
Hardness	4.5	4.4	4.4	4.3
Friability	0.68	0.69	0.69	0.70
Drug content	99.83±0.04	99.59±0.07	99.39±0.07	99.28±0.06

The results indicated that there was no change in weight variation, hardness, friability and drug content.

Dissolution data of stability for optimized formulation F4

Table 27: Dissolution data of stability for formulation F4

Time (hrs)	0 days	30 days	60 days	90 days
0	0	0	0	0
1	13.47	13.23	12.98	12.78
2	20.76	20.42	19.71	19.63
3	26.59	26.37	26.12	25.93
4	34.83	34.49	34.32	34.12
5	39.15	39.02	38.86	38.65
6	43.21	42.98	42.76	42.12
7	47.46	47.23	46.99	46.83
8	51.01	50.94	50.78	50.67
10	59.82	59.63	59.41	59.19
12	70.76	70.34	70.28	69.87
14	76.04	75.83	75.57	75.28
16	82.15	81.97	81.45	81.11
20	92.99	92.98	92.87	92.74
24	99.89	99.74	99.56	99.23

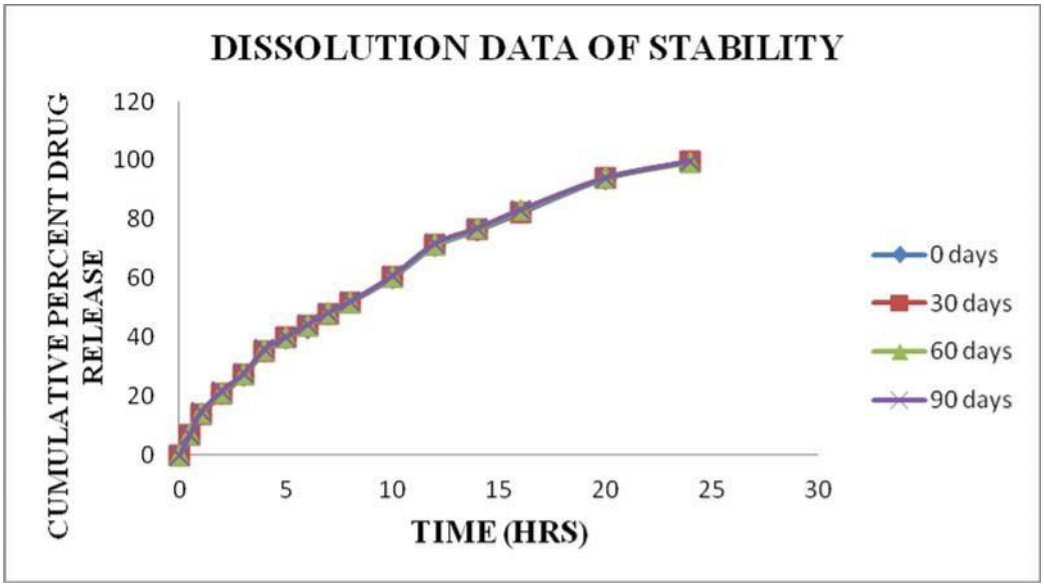


Fig. No 18: Dissolution data of stability for formulation F4

The stability studies for optimized formulation F4 was carried out based accelerated stability conditions & study of various parameters carried out at 0, 30, 60, 90 days of intervals and the results found satisfactorily and that revealed that the optimized formulation was stable under accelerated condition.

SUMMARY AND CONCLUSION:

The main objective of the present study was to develop floating controlled release formulation containing 20mg of Tinidazole for once daily therapy by using natural polymers like xanthan and guargum. GRDDS improved the bioavailability and therapeutic efficiency of drug.

In the preformulation FTIR study was carried out for pure drug (Tinidazole), Tinidazole and excipients. It has not shown any interaction.Hence drugs were found to be compatible with excipients.

The formulations were prepared by direct compression method. The angle of repose values for formulations ranges from 26.04±0.03 to 29.01±0.07. Bulk and tapped densities were used for the measurement of compressibility index. The bulk and tapped values for formulations range from 0.260±0.01 to 0.347±0.04 and 0.320±0.03 to 0.391±0.07 respectively.The carr's index and hausner's ratio values for formulations range from 13.12±0.03 to 16.52±0.01 and 1.08 ±0.05 to 1.19±0.06 respectively. Thus, all formulations exhibited good flow characteristics.

The prepared floating controlled release tablets were evaluated for various parameters like thickness, weight variation, hardness, friability and drug content uniformity. The thicknesses of tablets in all formulations were ranged from 1.2±0.16 to 1.3±0.53. The weight variations of tablets in all formulations were ranged from 99±0.02 to 101±0.06. The hardness and friability of all the formulations F1-F9 was found to be 4.2±0.73 to 4.5±0.28 and 0.45 to 0.83 respectively. Drug content of all the formulations were ranging from 98.76±0.19 to 100.92±0.21. The buoyancy lag time of all the formulations were ranging from 45sec to 90sec.

Compared to all formulations F4 showed the best buoyancy lag time, the buoyancy lag time for F4 was found to be 45sec.Total floating time of all formulations was found to be >12 hrs. The formulation containing xanthan gum shows the higher swelling compared to that of the formulations containing both xanthan and guar gum and guar gum alone.

The prepared tablets were then subjected to dissolution test for evaluating the *invitro* drug release. The dissolution studies were carried out in 0.1N Hcl in USP II appatarus at 37±0.5°C. The results of the dissolution studies indicated that the polymer concentration was having a substantial effect on the drug release from the tablets. Formulation F4 gave better controlled drug release and floating properties in comparison to the other formulations. This

formulation took 45sec to become buoyant.

The kinetic study was carried out for F4 formulation which showed that the drug release followed zero order kinetics followed by non-fickian diffusion.

The stability studies were carried out for F4 formulation at 45ºC /75% RH for 3months. Data revealed that there was no considerable difference.

From the above study, concluded that F4 was the optimized formulation which has shown better buoyancy time 45sec and drug release 99.88% in 24hrs. However, further invivo studies can be carried out to support the results.

REFERENCES:

1. Dehghan MH, Khan FN. Gastroretentive drug delivery systems: A patent perspective. Int J Health Res. 2009;2:23–44. [Google Scholar]
2. Rocca JG, Omidian H, Shah K. Progress in gastroretentive drug delivery systems. Business briefing. Pharma Tech. 2003;5:152–6. [Google Scholar]
3. Mathur P, Saroha K, Syan N, Verma S, Kumar V. Floating drug delivery systems: An innovative acceptable approach in gastroretentive drug delivery. Arch Apll Sci Res. 2010;2:257–70. [Google Scholar]
4. Shah SH, Patel JK, Patel NV. Stomach specific floating drug delivery system: A review. Int J Pharm Tech Res. 2009;1:623–33. [Google Scholar]
5. . Streubel A, Siepmann J and Bodmeier R. Gastroretentive drug delivery systems. Expert Opin Drug Deliv. 2006;3(2):217-233.
6. Nayak AK, Maji R and Das B. Gastroretentive drug delivery systems: a review. Asian J Pharm Clin Res. 2010;3(1):2-10.
7. Gopalakrishnan S and Chenthilnathan A. Floating drug delivery systems: a review. J Pharm Sci Technol. 2011;3(2):548-554.
8. Iannucelli V, Coppi G, Bernabei MT and Camerorni R. Air compartment multiple-unit system for prolonged gastric residence. Part-I, Formulation study. Int J Pharm. 1998;174:47-54.
9. Garg R and Gupta GD. Progress in controlled gastroretentive delivery systems. Trop J Pharm Res. 2008;7(3):1055-1066.
10. Anupama S, Ratnaparkhi MP and Shilpa C. Floating drug delivery system: an overview. Int J Res Dev Pharm L Sci. 2014;3(5):1106-1115.
11. Neha N. An updated review on: floating drug de livery system. Int J App Pharm. 2011; 3(1): 1-7.
12. Badoni A, Ojha A, Gnanarajan G and Kothiyal P. Review on gastro retentive drug delivery system. Pharm Innov. 2012;1(8):32-42.
13. Deshpande AA, Shah NH, Rhodes CT and Malick W. Development of a novel controlled-release system for gastric retention. Pharm Res. 1997;14(6):815- 819.