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Original Research Article

FORMULATION AND EVALUATION OF FLOATING BIOADHESIVE TABLETS OF CIPROFLOXACIN HCL USING NATURAL POLYMERS

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ABSTRACT

The present study performed by Formulation and Evaluation of Floating Bioadhesive Tablets of Ciprofloxacin HCl as a model drug for prolongation of gastric residence time. Floating Bioadhesive tablets were formulated with various materials like Xanthangum and Guargum,Chitosan at varying concentrations were used for release controlling properties, sodium bicarbonate act as a effervescent agent and Lactose is used as Diluent. The tablets were prepared by direct compression technique and the prepared tablets remained buoyant for more than 12 hours in the released medium and showed good Bioadhesion Strength. The variant proportion of the polymers Xanthangum and Guargum, Chitosan showed significant difference in the release rate, buoyancy, bioadhesive strength and lag of the tablet.

Key words: Ciprofloxacin HCL, floating bioadhesive tablets, flouroquinolone antibiotic.

INTRODUCTION

Ciprofloxacin ($C_{17}H_{18}FN_3O_3$) is a synthetic chemotherapeutic antibiotic.It is a second generation fluoroquinolone antibacterial. It kills bacteria by interfering with the enzymes that cause DNA to rewind after being copied, which stops DNA and protein synthesis. Ciprofloxacin is a broad-spectrum antibiotic that is active against both Gram-positive and Gram-negative bacteria. It acts by inhibiting DNA gyrase, a type II topoisomerase, and topoisomerase IV (40), enzymes necessary to separate bacterial DNA, thereby inhibiting cell division.[4] Ciprofloxacin is mainly absorbed in proximal areas of G.I.T. . Therefore, conventional sustained release formulations liberating their drug contents along with the intestine result in an incomplete release of the drug from the drug delivery system.[4]

The purpose of this work is to develop a novel sustained release tablet with a unique combination of bioadhesion and floatation to prolong the gastric residence time of Ciprofloxacin.The use of Natural polymers were proven safe based on Biocompatability and safety.Natural gums are among the most popular hydrophilic polymers because of their Cost effectiveness and Regulatory acceptance. Moreover, these polymers are safe, non-toxic, capable of chemical modification and gel forming nature. Various approaches for preparation of gastroretentive drug delivery system include floating systems, swellable and expandable systems, high density systems, bioadhesive systems, altered shape systems, gel forming solution or suspension system and sachet systems.

Floating systems are low-density systems that have sufficient buoyancy to float over the gastric contents and remain in the stomach for a prolonged period. While the system floats over the gastric contents, the drug is released slowly at the desired rate, which results in increased gastro-retention time and reduces fluctuation in plasma drug concentration**.**

Bioadhesive delivery systems are capable to adhere to mucous membrane that prevents their passage through the pylorus; as a result, the dosage form is retained in the stomach for a longer period of time.In the present study, an effervescent floating system and a bioadhesion system will be in combination. Floating dosage forms are meant to remain floating on the gastric fluid when the stomach is full after a meal. However, as the stomach empties and the tablet reaches the pylorus, the buoyancy of the dosage form may be reduced. It may be that the dosage form will then pass through the pylorus into the small intestine.Thus, the buoyancy of an FDDS in the stomach may be limited to only 3–4 h. Furthermore, floating systems do not always release the drug at the intended site. In a bioadhesive drug delivery system, it is quite likely that the system becomes dislodged from the stomach mucosa wall when the system is full and the semi-liquid

contents are churning around due to the effect of peristalsis. A floating-bioadhesive system would overcome these drawbacks of floating and bioadhesive systems and would have a significant effect on improving the therapeutic effect of the drug involved.

MATERIALS AND METHODS

Materials

Ciprofloxacin Hcl purchased from kreative organics jeedimetla, India. Sodium bicarbonate and Lactose, Xanthan gum, Guar gum, Chitosan, Aerosil, Magnesium state were obtained from Richer pharmaceuticals Hyderabad, India. All other ingredients, reagents and solvents were of analytical grade.

Methods

Direct Compression:

Step1: Weigh appropriate quantities of all the ingredients.

Step2: Mix all the ingredients except magnesium sterate for 10-15 mins in a poly bag.

Step3: Pass the mixture through sieve ≠ 60.

Step4: Add magnesium sterate to the above mixture and pass through sieve ≠ 60 and mix for 10-15 mins.

Step5: Perform the micromeritic properties.

Step6: Compression in concave shaped circular punches 12.7mm (Cadmach 16station).

EVALUATION PARAMETERS:

The prepared floating tablets were evaluated for uniformity of weight using 20, tablets, Hardness, Friability, In vitro buoyancy, swelling behavior (water uptake studies) and In vitro dissolution studies.

Hardness:

Hardness is defined as the force required breaking a tablet in a diametric compression test. The devices operating in this manner are the Monsanto tester, the Strong- cobb tester, the Pfizer tester, the Erweka tester and the Schleuniger tester. Monsanto tester was used to measure the hardness of ten tablets. Mean and standard deviation were computed and reported. It is expressed in kg/cm^2.

Friability:

Thermionic friabilator was used to determine the friability of the tablets. It is expressed in percentage (%). Initially ten tablets were weighed and transferred into the friabilator. It was operated at 25 rpm for 4 minutes. The tablets were weighed again after 4 minutes the % friability was then calculated by using the formula.

% Friability= Initial weight - Final weight/ Initial weight×100

Weight Variation:

Randomly twenty tablets were selected and the average weight of the tablets was determined. Then the weight of individual tablets was compared to the average weight.

Drug Content Uniformity:

Ten tablets from each formulation were powdered. The powder equivalent to one tablet weight of Ciprofloxacin was weighed and dissolved in 5ml of water and 60ml of methanol in 200 ml standard flask Shake for 30min and then make up with 0.1N HCL and then centrifuge it from that take 5ml of solution in 50 ml standard flask make up with 0.1N HCL .

Then these samples were analyzed spectrophotometrically at 278 nm.

Invitro Buoyancy Studies:

The invitro buoyancy was determined by floating lag time. The time required for the tablet to rise to the surface and float was determined as floating lag time. In this the tablets were placed in 100 ml beaker containing 0.1 N HCL.

Swelling Study: Floating matrix tablet was introduced into basket type dissolution apparatus containing 900mL of 0.1N HCl (pH 1.2 at 37^0C) at 100rpm. The tablets were removed at definite time intervals and swollen weight of each tablet was determined. Swelling (%) is calculated according to the following formula

Swelling index (S.I) = {(wt-wo) /wo}×100

Where S.I. =swelling index

Wt =weight of the tablet at time t

WO Weight of tablet before immersion

Ex- vivo mucoadhesion strength:

Mucoadhesion strength of the tablet was measured on the modified physical balance. The apparatus consists of a modified double beam physical balance in which additional weight has been added to right pan, to make the right side weight equal with left side pan. A small beaker was kept in a beaker filled with 0.1 N HCl Buffer pH 1.2, which was then placed under the pan. Fresh goat intestinal mucosa was used as the membrane and 0.1 N HCl Buffer pH 1.2, was used as the moistening fluid. The goat intestinal mucosa was obtained from local slaughter house and kept in a Krebs buffer during transportation. The underlying mucus membrane was separated using surgical blade and washed thoroughly with 0.1 N HCl Buffer pH 1.2, and tied over the smaller beaker using a thread. The smaller beaker was kept in large glass beaker filled with 0.1 N HCl Buffer pH 1.2 up to the upper surface of the goat intestinal mucosa . The one side of the tablet was attached to the right arm/pan of the balance and then the beaker was raised slowly until contact between goat mucosa and mucoadhesive tablet was established. A preload of 5g was placed for 5 min (preload time) to established adhesion bonding between mucoadhesive tablet and goat intestinal mucosa. The preload and preload time were kept constant for all

formulations. After the completion of preload time, preload was removed from the glass slide and water was then added in the plastic bottle in left side arm by burette at a constant rate of 100 drops per min. The addition of water was stopped when mucoadhesive tablet was detached from the goat intestinal mucosa. The weight of water required to detach mucoadhesive tablet from intestinal mucosa was noted as mucoadhesion strength in gms. From the mucoadhesion strength the force of adhesion (N) was calculated.

Force of adhesion (N) = (Mucoadhesive strength × 9.81) ÷ 1000

In Vitro Dissolution Studies:

In-vitro drug release studies were carried out using USP XXIV dissolution apparatus type II, with 900ml of dissolution medium maintained at 37±0.5°C for 24hrs, at 75 rpm,(pH 1.2) 0.1N HCL buffer as dissolution medium. Sample was with drawn at pre -determined time intervals replacing with an equal quantity of drug free dissolution fluid. The samples withdrawn were filtered through 0.45µ membrane filter, and concentration of drug in each sample was analyzed by UV spectrophotometer at 278 nm and cumulative percent drug release was calculated. The study was performed in triplicate .

DRUG RELEASE KINETICS:

Zero order release rate kinetics:

To study the zero order release kinetics the release rate data are fitted to the following equation

$$F=K_0t$$

Here, F is the fraction of drug release
K_0 is the rate constant
T is the release time

First order model:

This model has also been used to describe absorption and/elimination of drug, the release of the drug which followed first order kinetic can be expressed by the equation

$$\text{Log } C=\log c_0-kt/2.303$$

Where, C_o is the initial concentration of drug
K is the first order rate constant
t = is the time

Higuchi release model:

To study the higuchi release kinetics, the release rate data was fitted to the following eqution

$$F=K_H.t^{1/2}$$

Where, F is the amount of the drug release
Kh is the release time
t is the release time

Korsmeyer and peppas model:

The release rate date were fitted to the following eqution,

$$Mt/M8=K_M.t^n$$

Where, Mt/M8 is the fraction of drug release
K_M is the release constant
t is the release time

RESULTS

Table.1.Composition of the Formulations (per each tablet in mg)

Formulation (mg/tab)	Ciprofloxacin	Lactose	Guar gum	Xanthan gum	Chitosan	Na_2co_3	Aerosil	Mg.Stearate
F1	500	92	120	--	--	64	16	8
F2	500	52	160	--	--	64	16	8
F3	500	12	200	--	--	64	16	8
F4	500	92	--	120	--	64	16	8
F5	500	52	--	160	--	64	16	8
F6	500	12	--	200	--	64	16	8
F7	500	92	--	--	200	64	16	8
F8	500	52	--	--	160	64	16	8
F9	500	12	--	--	120	64	16	8
F10	500	92	60	--	60	64	16	8
F11	500	52	80	--	80	64	16	8
F12	500	12	100	--	100	64	16	8
F13	500	92	--	60	60	64	16	8
F14	500	52	--	80	80	64	16	8
F15	500	12	--	100	100	64	16	8
F16	500	92	60	60	--	64	16	8
17	500	52	80	80	--	64	16	8
F18	500	12	100	100	--	64	16	8

*** Quantities were taken in milligrams**

Table.2.Pre Compression Parameters Indicating Flow Properties of Blend

Formulation	Bulk density	Tapped density	%Compessibility	Hausner's ratio	Angle of Repose
F1	0.372±0.045	0.455 ±0.027	18.24 ±0.320	1.22 ±0.015	27.89 ±1.35
F2	0.382±0.032	0.462±0.015	17.31±0.208	1.20±0.015	28.35±1.64
F3	0.46±0.069	0.496±0.020	17.33±0.320	1.20±0.013	27.22±1.31
F4	0.376±0.282	0.432±0.038	12.96±0.342	1.14±0.016	27.13±1.26
F5	0.412±0.012	0.478±0.069	14.22±0.401	1.16±0.019	28.98±1.57
F6	0.46±0.017	0.480±0.027	14.58±0.26	1.17±0.012	26.90±1.23
F7	0.390±0.048	0.462±0.013	15.58±0.237	1.18±0.015	29.89±1.45
F8	0.355±0.055	0.409±0.073	13.20±0.238	1.15±0.018	28.97±1.58
F9	0.361±0.033	0.432±0.038	12.96±0.342	1.14±0.016	27.13±1.26
F6	0.352±0.016	0.407±0.013	13.51±0.282	1.15±0.018	29.85±1.44
F11	0.347±0.068	0.407±0.066	14.74±0.313	1.17±0.015	27.13±1.23
F12	0.348±0.047	0.403±0.091	14.28±0.196	1.16±0.011	25.35±1.62
F13	0.370±0.023	0.450 ±0.076	17.77 ±0.254	1.21 ±0.016	27.83 ±1.37
F14	0.382±0.019	0.476 ±0.054	19.74 ±0.195	1.24 ±0.06	25.68 ±1.64
F15	0.396±0.034	0.473 ±0.013	16.27± 0.156	1.19 ±0.019	26.42 ±1.49
F16	0.405±0.051	0.470±0.032	13.82 ±0.198	1.16±0.016	28.23±1.6
F17	0.347±0.032	0.398 ±0.033	12.81 ±0.164	1.14 ±0.013	29.52 ±1.61
F18	0.343±0.065	0.399 ±0.055	14.28 ±0.188	1.16 ±0.017	25.69 ±1.76

Table.3.Post Compression Parameters of Tablets of Batches F1 – F18

Formulation	Hardness (Kg/cm^2)	Friability (%)	Thickness (mm)	Weight variation(%)	Drug Content(%)
F1	5.8 ± 0.15	0.229 ±0.03	3.86 ±0.15	803 ±1.82	99.45 ±1.74
F2	6.0 ±0.23	0.124 ±0.08	3.96 ±0.14	799 ±1.54	98.46 ±1.48
F3	5.8 ±0.17	0.170 ±0.04	3.94 ±0.12	800 ±1.35	99.56 ±1.37
F4	5.9 ±0.14	0.125 ±0.01	3.92 ±0.33	801 ±1.92	100.04 ±1.0
F5	5.7 ±0.49	0.130 ±0.03	3.89 ±0.43	795 ±1.86	99.63 ±1.45
F6	5.8 ±0.34	0.117 ±0.05	3.96 ±0.58	798 ±1.51	97.68 ±1.73
F7	5.9 ±0.25	0.26 ±0.09	3.91 ±0.32	802 ±1.80	98.89 ±1.28
F8	6.2 ±0.44	0.158 ±0.02	3.87 ±0.24	796 ±1.27	99.87 ±1.97
F9	5.7 ±0.17	0.204 ±0.06	3.89 ±0.17	800 ±1.65	100.68 ±1.7
F6	6.1 ±0.15	0.145 ±0.02	3.86 ±0.11	797 ±1.72	96.57 ±1.33
F11	5.9 ±0.23	0.186 ±0.07	3.93 ±0.62	799 ±1.88	99.79 ±1.85
F12	5.7 ±0.14	0.167 ±0.04	3.90 ±0.85	801 ±1.47	99.32 ±1.64
F13	5.5 ±0.75	0.172 ±0.06	3.83 ±0.75	795 ±1.35	98.65 ±1.36
F14	6.3 ±0.34	0.198 ±0.09	3.96 ±0.56	797 ±1.48	97.64 ±1.87
F15	5.9 ±0.51	0.202 ±0.05	3.68 ±0.30	803 ±1.25	99.25 ±1.50
F16	6.1 ±0.24	0.148 ±0.07	3.75 ±0.50	795 ±1.50	96.89 ±1.46
F17	5.8 ±0.13	0.185 ±0.03	3.91 ±0.22	796 ±1.42	99.56 ±1.85
F18	6.0 ±0.20	0.197 ±0.08	3.90 ±0.6	800 ±1.65	99.89 ±1.20

Table.4.Post Compression Parameters of Tablets of Batches F1 – F18

Formulation	Floating lag time(seconds)	Total floating time	Bio adhesive strength(mg)	Bio adhesive force(N)
F1	28±1	>12 hrs	13.5±1.87	0.13
F2	34±2	>12 hrs	16.67±1.62	0.16
F3	42±4	>12 hrs	18.74±2.17	0.18
F4	18±1	>12 hrs	21.5±1.26	0.21
F5	26±6	>12 hrs	23.42±0.98	0.22
F6	43±3	>12 hrs	25.88±0.07	0.25
F7	30±2	>12 hrs	9.6±2.0	0.6
F8	27±4	>12 hrs	11.4±0.12	0.11
F9	21±1	>12 hrs	12.63±1.31	0.12
F6	19±5	>12 hrs	14.53±1.72	0.14
F11	15±2	>12 hrs	17.78±0.48	0.17
F12	22±4	>12 hrs	19.36±0.67	0.18
F13	17±3	>12 hrs	22.68±0.09	0.22
F14	32±1	>12 hrs	24.54±1.32	0.24
F15	40±2	>12 hrs	26.87±0.89	0.26
F16	35±4	>12 hrs	28.67±1.75	0.28
F17	26±2	>12 hrs	33.00±2.00	0.32
F18	15±2	>12 hrs	36.35±1.49	0.35

Table.5.Swelling Index of Batches F1 – F18

Formulation	1hr	2hr	4hr	6hr
F1	2.80±0.09	4.27±0.17	8.45±0.14	16.88±0.18
F2	3.62±0.01	6.45±0.22	6.76±0.05	19.52±0.05
F3	4.81±0.05	7.21±0.09	12.68±0.03	23.09±0.01
F4	22.67±0.6	35.49±0.13	44.80±0.6	59.30±0.16
F5	28.54±0.29	37.08±0.08	48.95±0.05	66.70±0.07
F6	31.97±0.04	40.76±0.11	52.49±0.12	69.05±0.09
F7	1.23±0.12	2.51±0.02	4.62±0.09	8.75±0.15
F8	1.78±0.05	3.24±0.20	5.89±0.05	9.46±0.18
F9	0.92±0.08	1.38±0.19	3.95±0.15	6.83±0.12
F6	1.96±0.03	3.85±0.05	6.92±0.07	15.18±0.20
F11	2.81±0.23	5.59±0.03	9.38±0.01	17.81±0.04
F12	3.92±0.16	6.97±0.6	11.20±0.11	19.25±0.02
F13	7.68±0.09	12.68±0.03	22.38±0.16	32.79±0.6
F14	9.45±0.6	14.11±0.06	25.96±0.05	36.04±0.09
F15	11.01±0.03	17.34±0.04	27.80±0.08	39.92±0.03
F16	12.35±0.01	26.67±0.15	35.96±0.17	47.28±0.16
F17	18.23±0.05	29.05±0.16	38.64±0.05	49.89±0.07
F18	19.40±0.15	34.97±0.07	43.05±0.02	56.12±0.11

Formulation	8hr	10hr	12hr
F1	28.60±0.09	27.54±0.07	20.12±0.6
F2	31.07±0.12	30.90±0.17	23.80±0.03
F3	34.29±0.01	32.46±0.03	29.53±0.01
F4	71.58±0.04	64.47±0.11	52.87±0.15
F5	82.63±0.18	79.25±0.04	60.60±0.11
F6	87.42±0.02	85.14±0.01	79.59±0.06
F7	12.32±0.19	11.79±0.17	09.06±0.12
F8	15.88±0.07	14.29±0.08	12.31±0.20
F9	6.06±0.01	6.53±0.06	6.44±0.02
F6	26.30±0.17	24.93±0.14	21.08±0.17
F11	30.11±0.11	28.07±0.07	22.16±0.11
F12	33.36±0.08	30.72±0.09	25.29±0.08
F13	42.19±0.16	43.52±0.19	38.39±0.11
F14	45.83±0.05	44.39±0.03	39.20±0.03
F15	49.05±0.09	45.68±0.02	42.98±0.09
F16	52.51±0.13	50.07±0.05	46.14±0.07
F17	56.90±0.01	56.49±0.12	50.03±0.17
F18	64.24±0.19	62.88±0.09	58.37±0.05

Table.6.*In Vitro* Dissolution Data For Batches F1 – F6

S.No	Time	F1	F2	F3	F4	F5	F6
1	1	20.12±1.23	18.34±1.73	13.52±1.54	15.4±i.05	6.3±0.97	8.1±0.65
2	3	36.35±0.65	32.61±1.08	25.38±1.21	28.7±0.93	21.06±1.24	19.83±1.20
3	6	54.83±0.89	49.20±0.34	41.97±1.01	45.5±0.25	38.35±0.84	32.55±0.45
4	9	75.21±1.05	70.56±1.65	64.22±0.55	66.6±1.11	56.91±1.56	49.37±1.09
5	12	99.32±0.76	92.86±0.41	80.88±0.76	81.12±0.74	74.25±1.02	60.62±0.73
6	15	--	--	97.12±0.97	99.21±0.31	86.60±0.53	75.90±0.21
7	18	--	--	--	--	98.34±0.22	90.86±0.54
8	21	--	--	--	--	--	--
9	24	--	--	--	--	--	--

Table.7.*In Vitro* Dissolution Data For Batches F7 – F12

S.No	Time (hrs)	F7	F8	F9	F10	F11	F12
1	1	24.98±0.96	19.93±0.55	12.57±1.22	26.18±0.77	23.20±1.06	17.77±0.33
2	3	40.75±0.75	36.42±0.85	24.67±0.63	34.32±1.07	39.59±0.68	21.73±1.09
3	6	63.21±1.87	51.78±0.53	42.86±0.11	47.02±0.51	52.98±0.34	39.09±0.42
4	9	79.56±0.33	69.36±0.71	65.28±0.84	66.69±0.63	63.40±1.27	52.63±0.17
5	12	96.40±1.63	89.97±1.02	76.39±0.51	81.32±1.34	74.03±0.98	64.72±0.93
6	15	--	--	84.69±0.43	92.93±0.80	83.67±0.52	78.90±1.35
7	18	--	--	95.52±1.03	--	96.37±0.99	91.64±0.58
8	21	--	--	--	--	--	--
9	24	--	--	--	--	--	--

Table.8.*In Vitro* Dissolution Data For Batches F13 – F18

S.No	Time	F13	F14	F15	F16	F17	F18
1	1	20.12±1.09	16.16±0.93	12.92±0.38	19.84±0.92	17.16±0.90	12.51±1.95
2	3	31.36±0.52	25.60±0.57	24.82±1.31	36.64±0.42	28.03±1.72	21.14±1.05
3	6	47.95±0.22	39.68±0.14	33.81±0.99	49.50±0.41	37.68±0.52	32.76±0.50
4	9	66.38±0.77	59.82±0.12	52.07±0.50	64.22±1.28	48.82±0.27	44.74±0.09
5	12	75.85±0.91	71.96±1.20	69.33±0.28	73.88±1.51	61.96±0.61	56.6±1.41
6	15	87.82±1.52	82.88±1.04	80.30±1.64	86.18±0.73	73.88±1.49	65.96±0.47
7	18	97.28±1.92	95.95±0.53	90.93±1.12	98.72±0.17	86.44±0.79	77.93±0.52
8	21	--		--	--	97.32±0.63	87.62±0.69
9	24	--		--	--	--	99.87±0.12

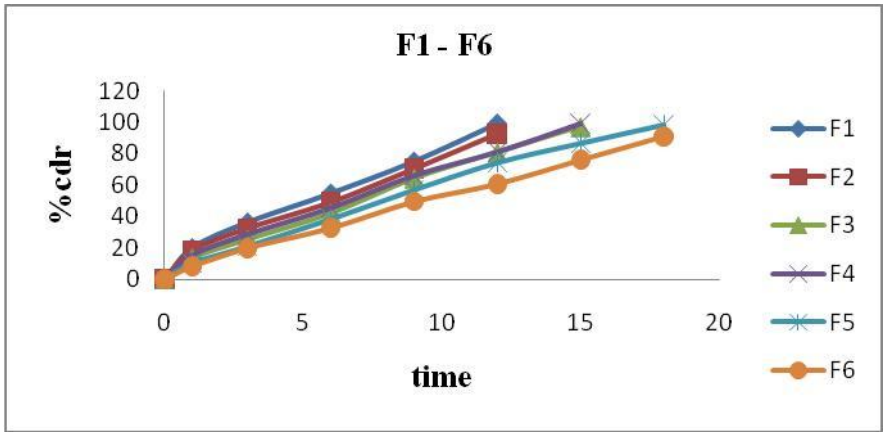

Fig.1.*In Vitro* Dissolution Profile For Batches F1 – F6

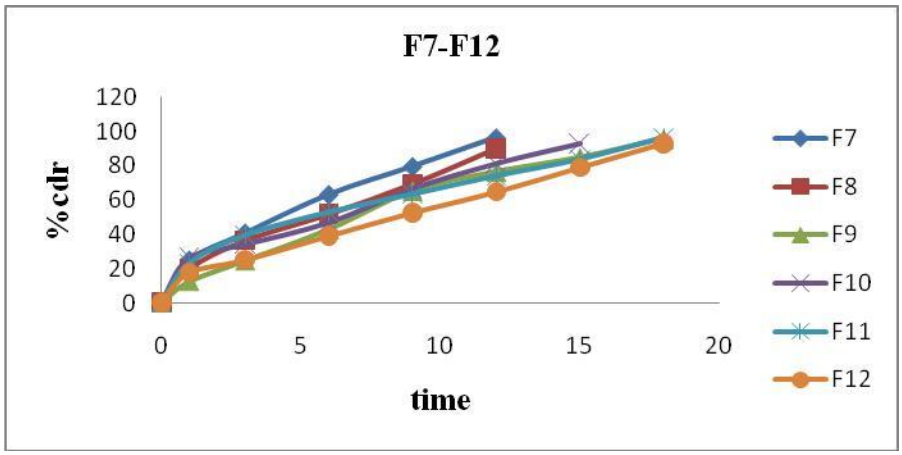

Fig.2.*In Vitro* Dissolution Profile For Batches F7 – F12

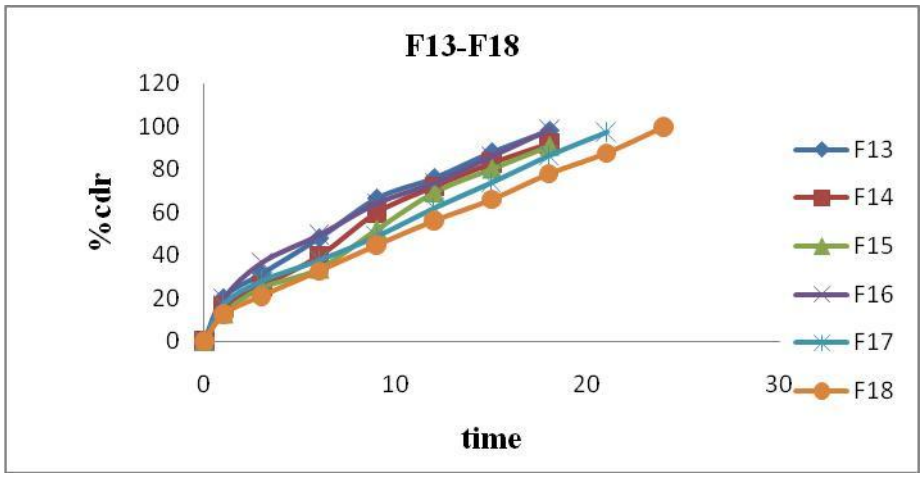

Fig.3.*In Vitro* Dissolution Profile For Batches F13 – F18

Kinetic studies for F18 formulation:

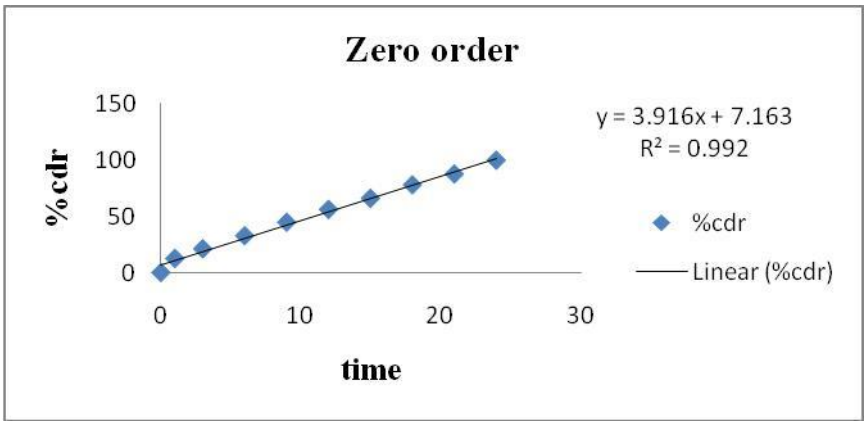

Fig.4.Graphical representation of Zero order kinetic studies

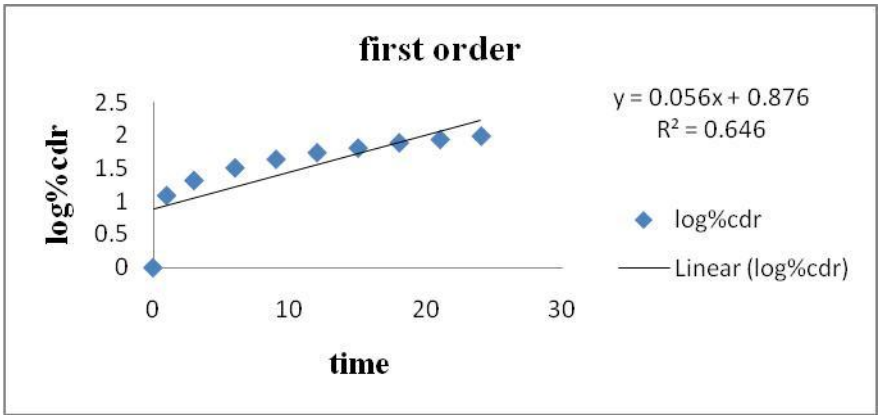

Fig.5.Graphical representation of First order kinetic studies

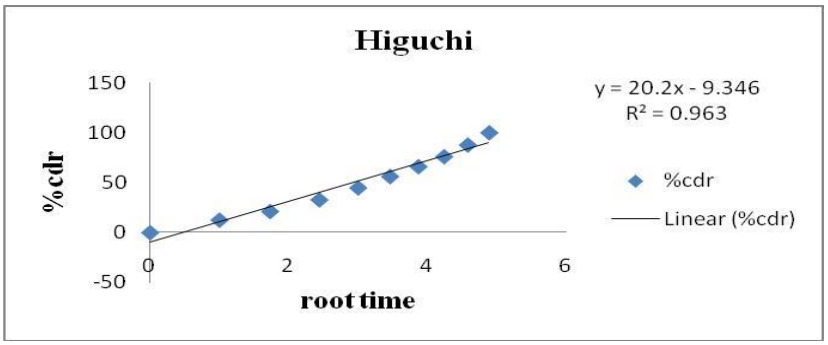

Fig.6. Graphical representation of Higuchi mechanism of release

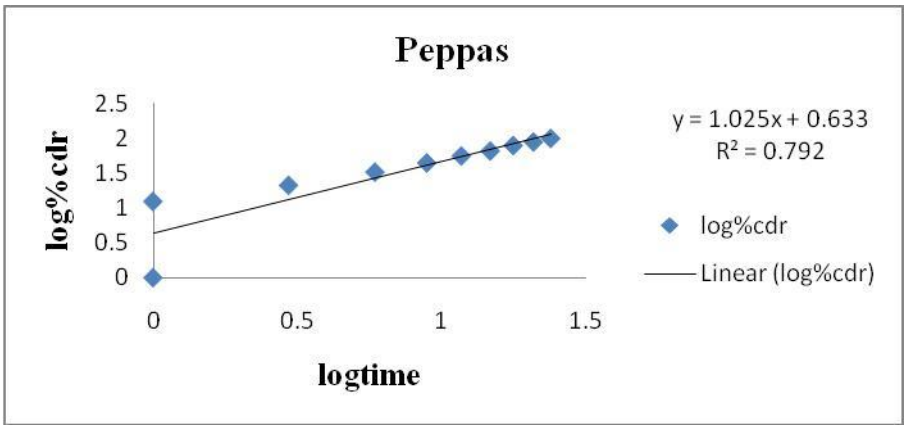

Fig.7.Graphical representation of Peppas mechanism of release

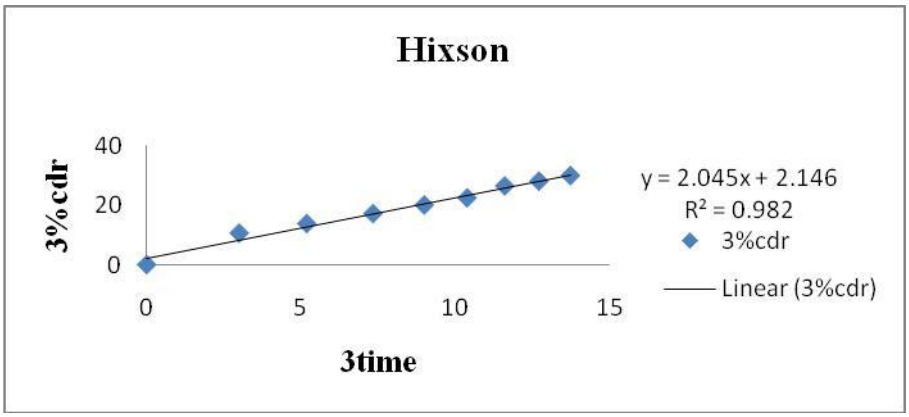

Fig.8. Graphical representation of Hixson&Crowell mechanism of release

DISCUSSION

Pre-compression parameters:

Ciprofloxacin HCL along with other excipients were evaluated for bulk density, tap density, angle of repose, compressibility and Hausner ratio, before proceeding to direct compression.The physical parameters are recorded in Table 2.

Angle of repose: 25.69° to 29.85° indicating good.
Compressibility index: 12.81 to 19.74 indicating good
Hausner ratio: 1.14 to 1.24 indicating good.

Post compression parameters:

The important parameters in the production of tablets were evaluated and reported in Table 3, 4 and Table 5. The thickness varied from 3.68 mm to 3.96 mm. The hardness varied from 5.5 kg\cm^2 to 6.3 kg\cm^2 found satisfactory. The friability test was passed. The buoyancy lag time was found to be 15 sec to 43sec (table 1.3). The total lag float time were found to be more than 12hrs. The drug content uniformity

was 96.57 % to 100.68 % and therefore was satisfactory.

Dissolution Studies

Based on the objectives of the present investigation, the tablets were evaluated for release of Ciprofloxacin. Dissolution studies were attempted. Since the delivery system was floating, bioadhesive stimulated gastric acid fluid pH 1.2 solutions was used as dissolution medium. The results are shown in Table 6 to 8 and Figures 2 to 7. The dissolution data reveals that the rate of dissolution was decreasing linearly with increasing concentration of polymer. By using the polymers like Xanthan gum and Guar gum in those combination satisfactory results were found. In kinetic data formulation F18 (99.837%) were follows Zero order means describes the systems where the drug release rate is independent of its concentration of the dissolved substance and Hixson & crowell mechanism of drug release

CONCLUSION

The present investigation carried out to develop a Gastro retentive drug delivery dosage form for Ciprofloxacin HCL. Several approaches are currently utilized in the prolongation of the Gastric residence time, including floating drug delivery systems (FDDS), also known as hydrodynamically balanced systems (HBS), swelling and expanding systems, polymeric bioadhesive systems, high density systems, modified shape systems, and other delayed gastric emptying devices. In this present work attempt to prepare Floating Bioadhesive drug delivery with prolong gastric residence time. Various Gastric retention systems are useful for drugs that have local effect in the stomach. The release of Ciprofloxacin from the formulations is proportional to the concentration of polymers. As the concentration of polymers increases, the drug release rate decreases. Result of the study based on in vitro performance clearly suggests that sustain release floating tablet can be prepared by incorporating sodium bicarbonate as a gas generating agent in different polymer with grade. On increasing the hardness of tablets resulted in significant increased in floating lag time.

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