DEVELOPMENT AND CHARACTERIZATION OF MOUTH DISSOLVING TABLETS USING NATURAL AND SYNTHETIC SUPERDISINTEGRANTS

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1. INTRODUCTION

Oral drug delivery has been known for decades as the most widely utilized route of administration among all the routes that have been explored for the systemic delivery of drugs via various pharmaceutical products of different dosage forms [1]. Oral routes of drug administration have wide acceptance up to 50-60% of total dosage forms. Solid dosage forms are popular because of ease of administration, accurate dosage, self-medication, pain avoidance and most importantly the patient compliance.

The most popular solid dosage forms are being tablets and capsules; one important drawback of these dosage forms for some patients, is the difficulty to swallow [2]. The problem can be resolved by the creation of rapidly dispersing or dissolving oral forms, which do not require water to aid swallowing. The dosages forms are placed in the mouth, allowed to disperse or dissolve in the saliva, and then are swallowed in the normal way [3].

United States Food and Drug Administration (FDA) defined orodispersible tablet as "A solid dosage form containing medicinal substances or active ingredient which disintegrates rapidly usually within a matter of seconds when placed upon the tongue". The disintegration time for orodispersible tablets generally ranges from several seconds to about a minute [4]. The tablet is the most widely used dosage form existing today because of its convenience in terms of self-administration, compactness and ease in manufacturing.

However, geriatric, pediatric and mentally ill patients experiences difficulty in swallowing conventional tablets, which leads to poor patient compliance. To overcome these problems, scientists have developed innovative drug delivery system known as mouth dissolving/disintegrating tablets (MDTs). According to European pharmacopoeia, these mouth dissolving tablets should dissolve/disintegrate in less than three minutes. The formulation is more useful for the bed-ridden and patients who have the swallowing problem [5, 6, 7].

Natural ingredients, either active or inactive , are in high demand for their drug delivery applications because of their versatile availability, low cost as compared to synthetic and semi-synthetic products, and their biocompatible and bideradable nature. Mouth dissolving tablets are commercially prepared by direct compression technology which makes use of super disintegrants and when placed on the tongue, disintegrates within seconds, allowing the drug to dissolve or disperse in saliva[8].

2. MATERIALS

Levocetirizine hydrochloride was received as gift sample from symbiosis pharmaceutical Pvt.Ltd., kala Amb(H.P). Plantago ovata seeds was purchased from local market. Microcrystalline cellulose , Sodium starch glycolate, Mannitol, Magnesium stearate (Lubricant), Saccharine sodium, Talc, Potassium dihydrogen Phosphate (Buffering agent), Disodium hydrogen phosphate were purchased from Loba Chemie Pvt. Ltd. Mumbai. The plantago ovata seeds were powdered and passed through a 60 mesh seive for research work. All other chemicals were of analytical grade and were used as such.

3. METHODS

3.1 Characterization of plantago ovata seeds

3.1.1 Isolation of mucilage [9,10]

Seeds of plantago ovata were soaked in distilled water for 48 h and then boiled for few minutes so that mucilage was completely released into water. The material collected was squeezed through muslin cloth for filtering and separating out the marc. Then, an equal volume of

acetone was added to the filtrate so as to precipitate the mucilage. The separated mucilage was dried (in oven at temperature less than 60°C), powdered, sieved (#80) and stored in a desicator until use.

3.1.2 Swelling index

The swelling index is the volume in milliliters occupied by 1 gram of a super disintegrant, including any adhering mucilage, after it has swollen in an aqueous liquid for 4 h. In a 25 mL ground-glass stoppered cylinder graduated over a height of 125±5 mm in 0.5 mL divisions, 1.0 gm of super disintegrant was placed. Unless otherwise directed, the super disintegrant was moistened with 1.0 mL of alcohol; 25 mL was added and covered the cylinder.

The cylinder was shaken vigorously every 10 min for 1 h. It was allowed to stand for 3 h at 90 min after the beginning of the test. Any large volume of liquid retained in the layer of the super disintegrant and any particle of super disintegrant floating at the surface of liquid was released by rotating the cylinder about a vertical axis. The volume occupied by the super disintegrant was measured, including any adhering mucilage. Three tests were carried out at the same time. The swelling index was calculated by the means of three tests.

3.2 Preparation of Mouth Dissolving Tablets [11,12]

3.2.1 Direct compression method

Levocetirizine HCl mouth dissolving tablets were prepared by direct compression method. The orodispersible tablets of levocetirizine HCl were prepared using super disintegrant (MCC, SSG), mannitol as a diluent, sodium saccharin as sweetening agent, talc with magnesium stearate, as a flow promoter. The drug and other ingredients were mixed together and then blended in a tumbling cylindrical blender with talc, and magnesium stearate and compressed into tablets using a 7.6-mm punch single-tablet machine.

Table 1: Formula used in formulation of MDTs of levocetirizine HCL

Excipients	F1	F2	F3	F4	F5	F6	F7	F8	F9
Levocetirizine HCL	10	10	10	10	10	10	10	10	10
Plantago ovata seeds	15	15	4	0	0	0	4	15	4
SSG	4	15	4	4	15	0	0	0	15
MCC	125	125	125	125	125	125	125	125	125
Mannitol	86.5	75.5	97.5	101.5	90.5	105.5	101.5	90.5	86.5
Sod. Saccharin	3	3	3	3	3	3	3	3	3
Talc	3	3	3	3	3	3	3	3	3
Mg. stearate	3	3	3	3	3	3	3	3	3
Total weight (mg)	250	250	250	250	250	250	250	250	250

3.3 Evaluation parameters of mouth dissolving tablets [13,14,15]

Evaluation of mouth dissolving tablets means a process of systematically assessing the quality or efficacy of mouth dissolving tablets by studying various parameters in accordance with the official standards (IP, BP or USP).

3.3.1 General Appearance

The general appearance of a tablet, its visual identity and over all "elegance" is essential for consumer acceptance. It includes are tablet's size, shape, colour, presence or absence of an odour, taste, surface texture, physical flaws, consistency and legibility of any identifying marking.

3.3.2 Weight Variation

I.P. procedure for uniformity of weight was followed, 20 tablets were taken and their weight was determined individually and collectively on an electronic weighing balance. The average weight of one tablet was determined from the collective weight. Not more than two of the individual weights deviate from the average weight by more than the percentage shown in table 2.

Table 2: Permissible limits of weight variation according to Indian Pharmacopoeia

Average weight of tablets (mg)	Maximum percentage difference allowed
≤ 80	10
80-250	7.5
≥ 250	5

3.3.3 Thickness

Thickness of tablets was determined using vernier caliper. Three tablets from each batch were used, and an average value was calculated. The mean ± standard deviation values of thickness were calculated.

3.3.4 Tablet Hardness

Hardness of tablet is defined as the force applied across the diameter of the tablet in the order to break the tablet. Hardness of the tablet of the each formulation was determined using Pfizer hardness tester. Three tablets from each formulation batch were tested randomly and the average reading was noted.

3.3.5 Friability

Friability is the measurement of mechanical strength of tablets. Roche friabilator was used to determine the friability. About 10 pre-weighed tablets were placed in the plastic chamber of friabilator that revolves at 25 rpm, dropping the tablets at a distance of six inches with each revolution. The tablets were rotated in the friabilator for 4 min or for 100 revolutions. At the end of test, tablets were dusted and reweighed; the loss in weight of tablets is the measure of friability and is expressed in percentage as:

% Friability = Loss in weight / Initial weight x 100

3.4 In-vitro Disintegration Time

The test was carried out on 6 tablets using the disintegration apparatus. Phosphate buffer (pH 6.8) maintained at 37°C ± 2°C was used as a disintegration media and the time in sec taken for complete disintegration of the tablet with no palpable mass remaining in the apparatus was measured in sec. According to IP, dispersible tablets should disintegrate within 3 min. The test was carried out in triplicates.

3.4.1 Wetting Time

A piece of tissue paper (12 cmx7.5 cm) folded twice was placed in a small petridish (ID = 6.5 cm) containing 6 mL of phosphate buffer (pH 6.8). A tablet was placed on the paper and the time taken for complete wetting (time required for buffer to reach the upper surface of the tablet) was noted. Three tablets from each formulation were randomly selected and the average wetting time was noted. Less is the wetting time, indicates more porous the tablet.

3.4.2 Water Absorption Ratio

Water absorption ratio 'R' was determined using the equation

$$R = 100 (W_b - W_a) / W_a$$

Where,

- W_a = Weight of the tablet before water absorption
- W_b = Weight of the tablet after water absorption

3.4.3 Drug Content

The drug content was determined by triturating 10 tablets; the powder equivalent to 10 mg of drug was accurately weighed and dissolved in 100 mL of phosphate buffer pH 6.8. The solution was filtered, suitably diluted and assayed for drug content, using UV spectrophotometer at λ_{max} 233 nm.

3.4.4 In-vitro Drug Release Studies

The in-vitro drug release was studied using USP dissolution apparatus II (paddle type) at 50 rpm in 900 mL of phosphate buffer (pH 6.8) and at temperature range of 37 ± 0.5°C. 5 ml of aliquots of samples were withdrawn at specific time intervals i.e. 1, 2, 3, 4, 5, 6, 7 min and was filtered. An equal volume of the medium was introduced into the container after each withdrawal to maintain a constant volume. The absorbance of the samples was determined by UV spectrophotometer at

λ_{max} 233 nm. The mean values of drug released were plotted as cumulative percent drug release vs. time. The studies were carried out in triplicate.

3.4.5 Kinetic Modeling of Drug Release [16,17]

Kinetics of drug release is important because they correlate the in-vitro and in-vivo drug responses by comparing results of pharmacokinetics and dissolution patterns.

- **Zero order kinetics:** System is said to follow to zero order when the plot of Q_t/t gives a straight line with a slope of K_o and intercept of t = 0.

$$\mathbf{Q_t = Q_o + K_o t}$$

Where, Q_t is the amount of drug dissolved in time t.

- Q_o is the initial amount of drug in solution, which is zero.
- K_o is the zero order rate constant has units of moles L^{-1} sec^{-1}.
- **First order kinetics:** System is said to follow to first order when the plot of $Log(C_0–C_t)/t$ gives a straight line with a slope of k/ 2.303 and an intercept of Log C_0 at t = o.

$$\mathbf{In\ [C_S/\ (C_S - C_t\ )\ ] = kt}$$
$$\mathbf{Log\ C_t = Log\ C_0 - kt\ /\ 2.303}$$

Where,

- C_t is the amount of drug dissolved in time t.
- C_0 is the initial concentration of drug, which is zero.

K is first order rate constant has units of sec^{-1}.

- **Higuchi kinetics:** This model is applicable when the release rate is dependent upon the diffusion of drug from the insoluble matrix. The plot of $Q/\sqrt{t}$ gives a straight line with a slope of K.

$$\mathbf{Q = K\sqrt{t}}$$

Where, Q is the amount of drug released in time t.

K is the Higuchi release rate constant reflecting the design variables of the system.

- **Hixson-Crowell cube root law:** It describes the release from systems where there is a change in surface area and diameter of particles or tablets. The plot of $(Q_o^{1/3} – Q_t^{1/3})/t$ give a straight line with a slope of K_{HC}.

$$\mathbf{Q_o^{1/3} – Q_t^{1/3} = K_{HC}\ t}$$

Where,

- Q_t is the amount of drug released in time t.
- Q_0 is the initial amount of the drug in tablet.
- K_{HC} is the rate constant for Hixson-Crowell rate equation.
- **Korsmeyer peppas model (Power law):** It described drug release from a polymeric system.

$\mathbf{M_t/M_\infty = Kt^n}$ where, M_t / M_∞ is fraction of drug released at time t. k is the rate constant and n is the release exponent.

After fitting release data to all the mentioned models, values of regression coefficients from all the models were obtained and value which was closer to one was selected as the best fit model for the drug release.

4. RESULTS

4.1 Flow properties of powder

In the preformulation study levocetirizine hydrochloride was characterized for bulk, tapped density and angle of repose. Result of the compressibility index, Hausner's ratio and angle of repose show that all materials have sufficient compressibility and flow properties.

Table 3: Flow properties of powder from batch F1 to F9

Batch code	Bulk density	Tapped Density(g/ml)	Compressibility Index (%)	Hausner's Ratio	Angle of Repose(θ)
F1	0.44	0.56	22.08	1.28	32.52
F2	0.44	0.58	23.96	1.31	30.05
F3	0.45	0.59	22.37	1.28	36.86
F4	0.44	0.56	22.22	1.28	31.28
F5	0.44	0.58	23.96	1.31	35.05
F6	0.45	0.59	21.03	1.26	35.95
F7	0.45	0.56	24.36	1.32	36.86

F8	0.45	0.56	20.63	1.26	32.36
F9	0.45	0.56	20.63	1.26	36.52

Micrometrics properties of all mixed blend were evaluated in which all show good properties. All the values of micrometrics properties have been shown in table 3. The bulk density was found in the range 0.44-0.45 g/mL. The tapped density was found in the range 0.56-0.59 g/mL. The Angle of repose of various powder mixed blends was found in the range 30.05-36.86 i.e. good powder flow. All formulation shows the good flow ability.

The Compressibility index of various powder mixed blends, prepared with different super disintegrants, using bulk density and tapped density data, compressibility index was calculated. It was found in the range 20-25 % i.e. passable powder flow. The Hausner ratio of various powder mixed blends, prepared with different super disintegrants, was calculated by using bulk density and tapped density data and found in the range of 1.26-1.32.

4.2 Evaluation of tablets

All the batches of mouth dissolving tablets were formulated under similar conditions to avoid processing variables

Table 4: Formula used in formulation of MDTs of levocetirizine HCL

Excipients	F1	F2	F3	F4	F5	F6	F7	F8	F9
Levocetirizine HCL	10	10	10	10	10	10	10	10	10
Plantago ovata seeds	15	15	4	0	0	0	4	15	4
SSG	4	15	4	4	15	0	0	0	15
MCC	125	125	125	125	125	125	125	125	125
Mannitol	86.5	75.5	97.5	101.5	90.5	105.5	101.5	90.5	86.5
Sod. Saccharin	3	3	3	3	3	3	3	3	3
Talc	3	3	3	3	3	3	3	3	3
Mg. stearate	3	3	3	3	3	3	3	3	3
Total weight (mg)	250	250	250	250	250	250	250	250	250

The tablets prepared by direct compression method were found to be free from capping, chipping and sticking. The prepared tablets were evaluated for various physical parametric tests. All batches were found to be varying in thickness from 3.19-3.72 mm and diameter from 9.42-9.68 mm. Hardness of tablets of all batches varied from 2.7-3.2 Kg/cm^3. The average weight of mouth dissolving tablets of all the batches was found to be varying from 3.3 to 4.8 %.

Friability of all formulations was within acceptable limits. Friability of all the batches was found to be varying from 0.42-0.96 %. All the batches were found to be varying from 13-26 sec. All the batches were found to be varying from 31.17-60.2 %. The maximum % drug content for the all formulation was found to be 98.66% and minimum % drug content from the all formulation was found to be 89.66%. Formulation F8 and F1 show 98.66 % and 95.33% drug content respectively.

Table 5: Different physical parameter tests for all batches

Batch code	Thickness (mm)	Diameter (mm)	Hardness (kg/cm^3)	Weight variation (%)	Friability (%)	Wetting Time (sec)	Disintegrating Time (sec)	Water Absorption Ratio (%)	Drug Content
F1	3.40±0.07	9.68±0.02	3.2±0.26	3.3	0.96	14.66±0.57	55.66±2.08	68.33±0.57	95.33±0.57
F2	3.49±0.14	9.64±0.08	2.9±0.20	3.3	0.80	24.66±0.57	63.33±1.15	35.33±1.15	91.66±0.57
F3	3.41±0.04	9.60±0.01	3.1±0.25	3.9	0.90	25.66±0.57	78.33±0.57	31.00±0.00	89.66±0.57
F4	3.29±0.17	9.56±0.11	2.9±0.20	4.8	0.76	19.33±0.57	61.66±0.57	40.66±0.57	92.66±0.57
F5	3.25±0.02	9.65±0.005	3.2±0.20	4.3	0.89	18.66±0.57	57.00±1.73	53.66±0.57	93.66±0.57
F6	3.72±0.65	9.61±0.11	3.0±0.15	3.3	0.42	20.33±0.57	80.66±0.57	32.66±0.57	90.66±0.57
F7	3.30±0.02	9.54±0.09	3.1±0.26	3.9	0.79	20.00±1.00	58.33±0.57	42.33±0.57	92.66±0.57
F8	3.36±0.02	9.42±0.20	3.1±0.25	3.5	0.69	13.33±0.57	53.00±1.00	70.33±0.57	98.66±0.57
F9	3.19±0.03	9.61±0.04	2.7±0.25	3.9	0.64	18.33±0.57	53.33±1.15	62.00±1.00	95.33±0.57

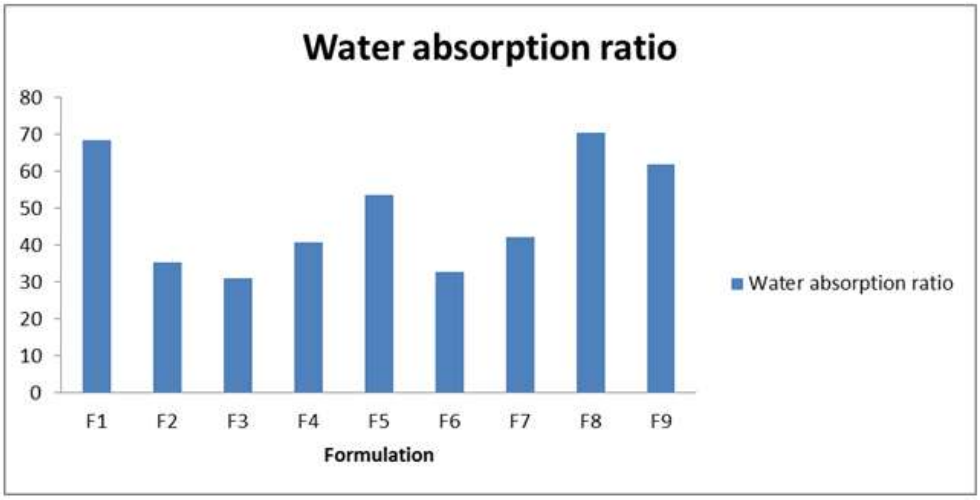

Fig. 1: Water absorption ratio of different formulation batches

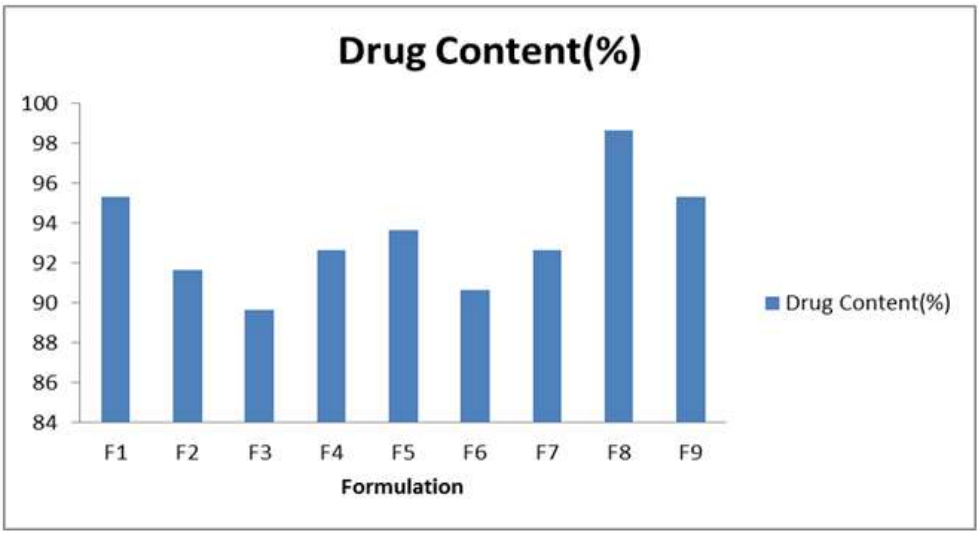

Fig. 2: Drug content of different formulation batches

4.3 In vitro drug release study

Table 6: In vitro dissolution data of batches F1 to F9

Time (min.)	Cumulative % Drug Release ± SD								
	F1	F2	F3	F4	F5	F6	F7	F8	F9
0	0	0	0	0	0	0	0	0	0
5	39.10±0.36	36.03±0.99	36.28±0.63	39.31±0.06	41.63±0.50	41.25±1.03	41.68±0.43	43.94±0.93	36.15±0.8
10	44.30±0.74	47.20±0.33	43.64±1.65	43.60±1.73	47.72±0.37	47.19±0.38	46.87±0.84	47.38±0.13	42.32±0.2
15	52.23±1.04	52.15±1.12	50.83±0.75	54.92±0.90	58.03±0.27	55.48±0.16	58.79±0.81	70.81±0.77	50.82±0.76
20	67.06±1.04	58.18±0.42	61.01±0.09	64.06±0.46	64.34±0.78	68.98±0.05	70.97±0.98	86..88±0.86	69.09±0.23
25	84.93±0.21	76.17±0.71	71.68±0.31	82.42±0.06	85.05±0.11	76.76±0.72	87.03±1.07	97.94±0.74	85.64±0.84
30	102.68±1.75	92.88±0.58	91.02±0.5	92.90±0.71	99.30±0.83	88.23±0.06	95.72±0.61	106.07±1.14	101.76±0.71
45	82.80±0.66	82.87±0.33	86.15±0.33	81.04±0.35	81.35±0.67	81.04±0.34	88.31±0.70	83.61±0.32	82.91±0.71
60	70.80±0.63	70.72±0.78	78.80±0.71	71.01±0.39	65.17±0.58	67.74±0.52	79.03±0.30	66.20±0.39	71.03±0.35

F3 shows 91.02%, F2 92.88%, and F1 102.68% in-vitro drug release in 30 min. F6 shows 88.23%, F4 92.90%,and F5 99.30% in-vitro drug release in 30 min. ,F7 shows 95.72%, F9 101.76%,and F8 106.07% in-vitro drug release in 30 min. Batch F8 , F1 and F9 show best drug release 106.07%, 102.68% and101.76% in 30 min respectively.

4.4 Drug Release Kinetics

There are number of kinetic models, which describe the overall release of drug from the dosage forms the qualitative and

quantitative changes in a formulation may alter drug release profile and in vivo performance. Correlation coefficient (R^2) was determined for kinetic models (Zero order, First order, Higuchi, Hixson Crowell and Peppas model) and compared with each other, the model showing the greatest correlation coefficient (≈1) was taken as best fit model. Kinetic model study, was found that best batch F9 show that Koresmeyer-peppas kinetics model.

Table 7: Drug Release Kinetics models (in phosphate buffer, pH 6.8)

Batch	Correlation Coefficient (R^2)					
	Zero order	**First order**	**Higuchi**	**Hixson**	**Koresmeyer-peppas**	**Best Fit Model**
F1	0.6641	0.3295	0.739	0.2659	0.755	Korsmeyer-peppas
F8	0.5163	0.2872	0.6411	0.2485	0.724	Korsmeyer-peppas
F9	**0.6725**	**0.338**	**0.7546**	**0.2904**	**0.778**	**Korsmeyer-peppas**

Table 8: In vitro release data of formulation F1, F8 and F9: Zero Order Kinetics Model

Time	% Cumulative Drug Released		
	F1	**F8**	**F9**
0	0	0	0
5	39.10	43.94	39.10
10	44.30	47.38	44.30
15	82.23	70.81	82.23
20	67.06	86.88	67.06
25	84.93	97.94	84.93
30	102.68	106.07	102.68
45	82.80	83.61	82.80
60	70.80	66.20	70.80

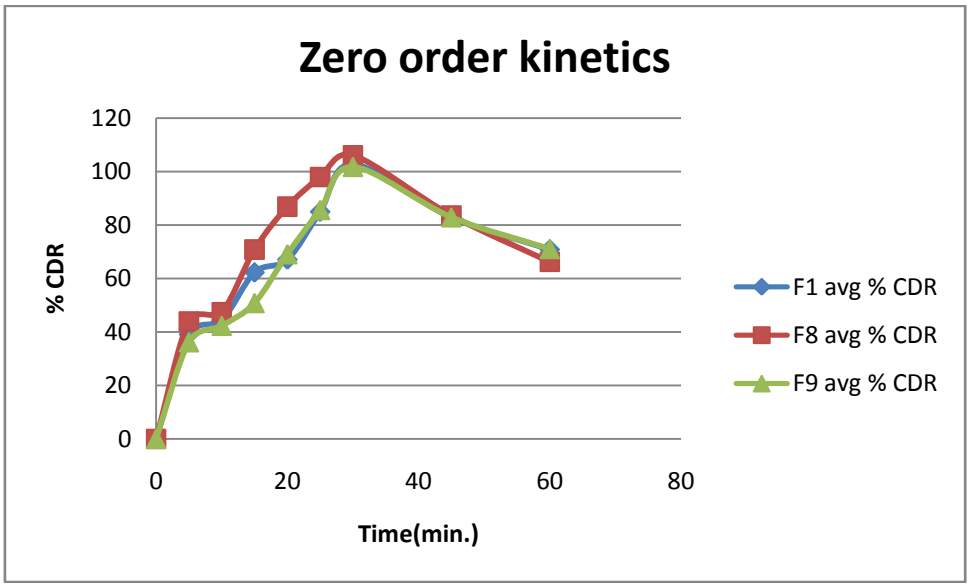

Fig. 3: Zero order kinetics model of batches F1, F8 and F9

F1 shows correlation coefficient (R^2) value 0.6641, F8 0.5163 and F9 0.6725 for zero order kinetics model.

Table 9: In vitro release data of formulations F1, F8 and F9: First Order Kinetics model

Time (min)	% Cumulative Drug Retained			Log % Cumulative Drug Retained		
	F1	F8	F9	F1	F8	F9
0	100	100	100	2.00	2.00	2.00
5	60.00	54.83	63.77	1.77	1.73	1.80
10	54.82	51.94	57.22	1.73	1.71	1.75
15	46.72	29.31	50.29	1.66	1.4	1.70
20	33.28	11.94	30.96	1.51	1.06	1.49
25	15.14	2.18	15.16	1.18	0.3	1.18
30	-3.95	-7.07	-2.07	0	0	0
45	16.84	16.69	16.93	1.22	1.22	1.23
60	29.81	34.65	30.09	1.47	1.54	1.48

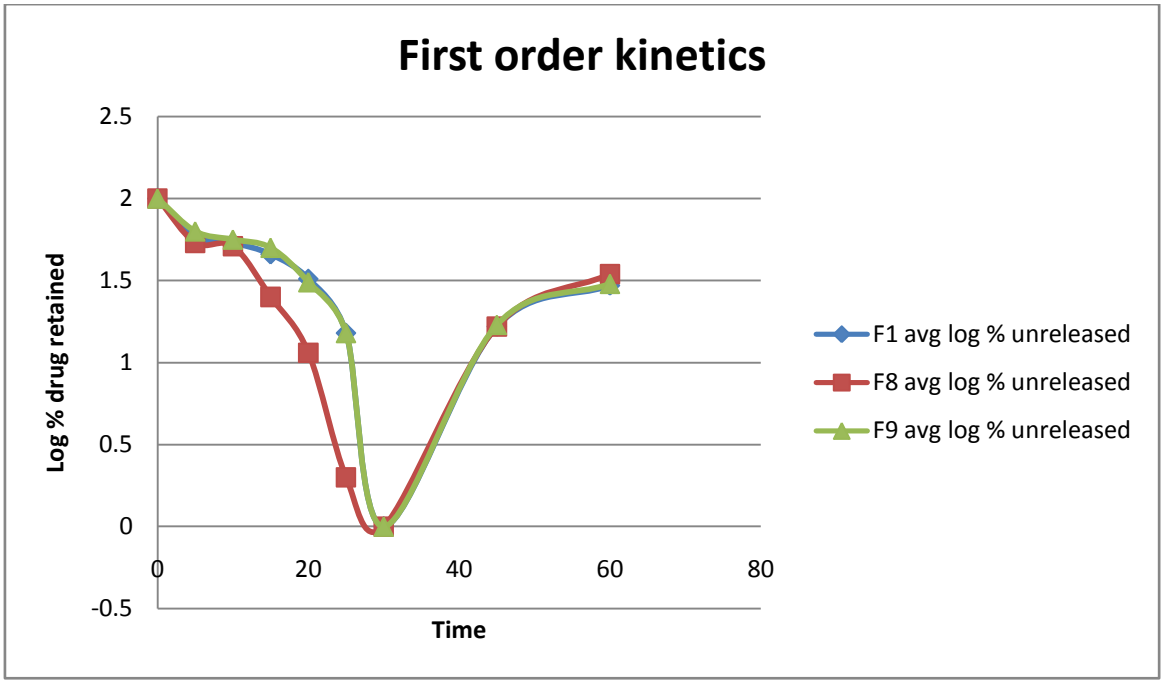

Fig. 4: First order kinetics model of batches F1, F8 and F9

F1 shows correlation coefficient (R^2) value 0.3295, F8 0.2872 and F9 0.338 for first order kinetics model.

Table 10: In vitro release data of formulations F1, F8 and F9: Hixson Crowell Model

Time	Cube root of % Cumulative Drug unreleased		
	F1	F8	F9
5	3.91	3.79	3.99
10	3.29	3.73	3.85
15	3.60	3.08	3.69
20	3.21	2.28	3.14
25	2.41	1.29	2.47
30	-1.58	1.91	-1.29
45	2.52	2.55	2.50
60	3.10	3.26	3.17

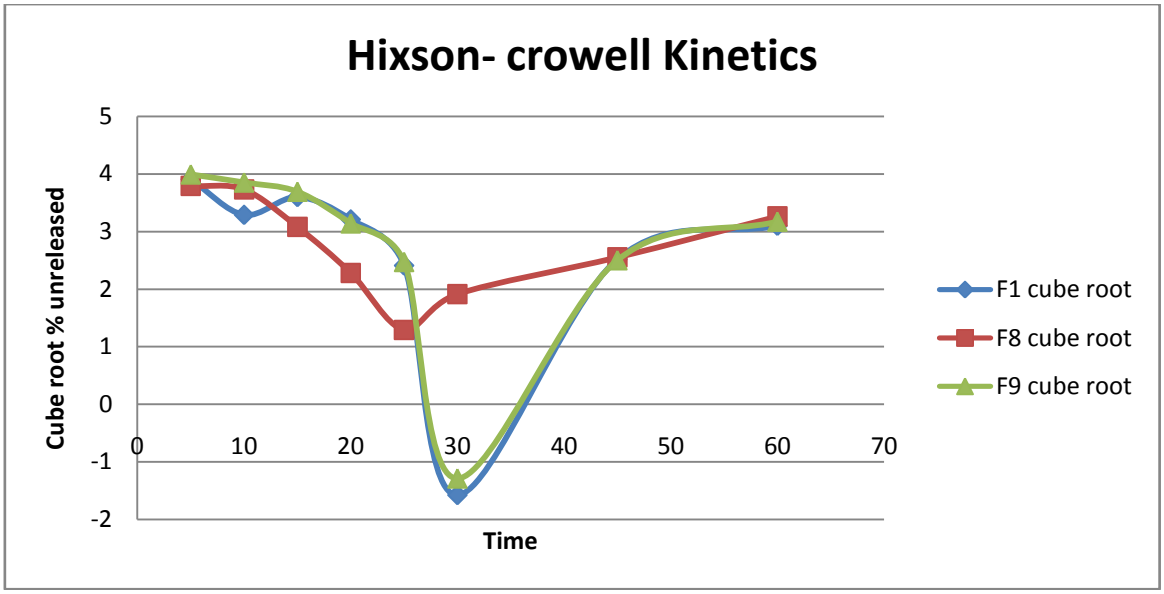

Fig. 5: Hixson-Crowell kinetics model of batches F1, F8 and F9

F1 shows correlation coefficient (R^2) value 0.2659, F8 0.2485 and F9 0.2904 for Hixson-Crowell kinetics model.

Table 11: In vitro release data of formulations F1, F8 and F9: Higuchi Model

Time (min)	Square root of time(min.)	% Cumulative Drug Released		
		F1	F8	F9
0	0	0	0	0
5	2.23	39.10	43.94	36.15
10	3.16	44.30	47.38	42.32
15	3.87	52.23	70.81	50.82
20	4.47	67.06	86.88	69.09
25	5	84.13	97.94	85.64
30	5.47	102.68	106.07	101.76
45	6.70	82.80	83.61	82.91
60	7.74	70.80	66.20	71.07

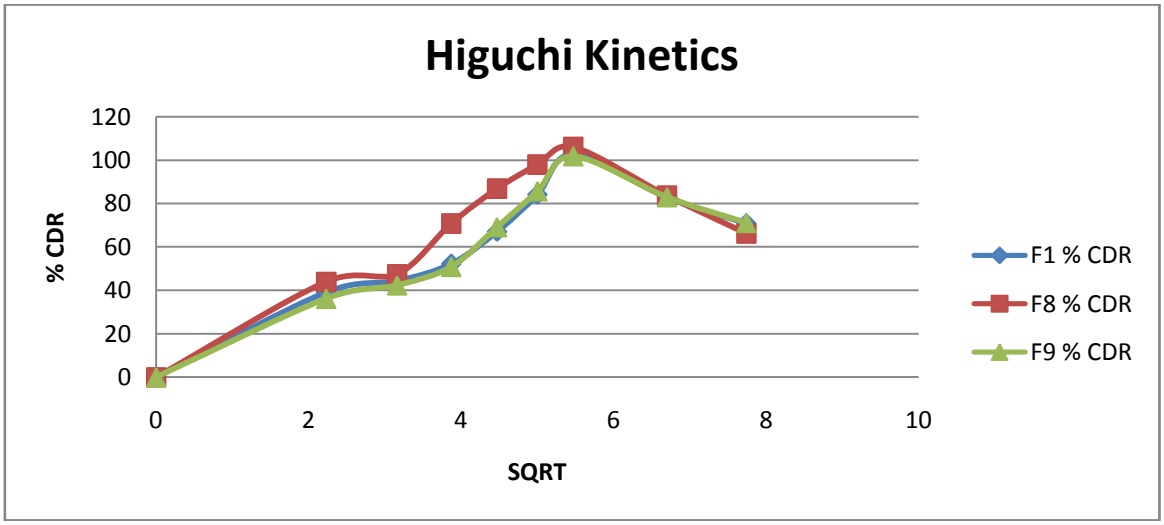

Fig. 6: Higuchi kinetics model of batches F1, F8 and F9

F1 shows correlation coefficient (R^2) value 0.739, F8 0.6411 and F9 0.7546 for Higuchi kinetics model.

Table 12: In vitro release data of formulations F1, F8 and F9: Korsmeyer peppas Model

Time (min)	Log of time (min.)	Log % Cumulative Drug Released		
		F1	F8	F9
0	0	0	0	0
5	1.55	1.59	1.64	0.69
10	1.62	1.64	1.67	1
15	1.70	1.71	1.85	1.17
20	1.83	1.82	1.93	1.30
25	1.93	1.92	1.99	1.39
30	2.00	2.01	2.02	1.47
45	1.91	1.91	1.92	1.65
60	1.85	1.85	1.82	1.77

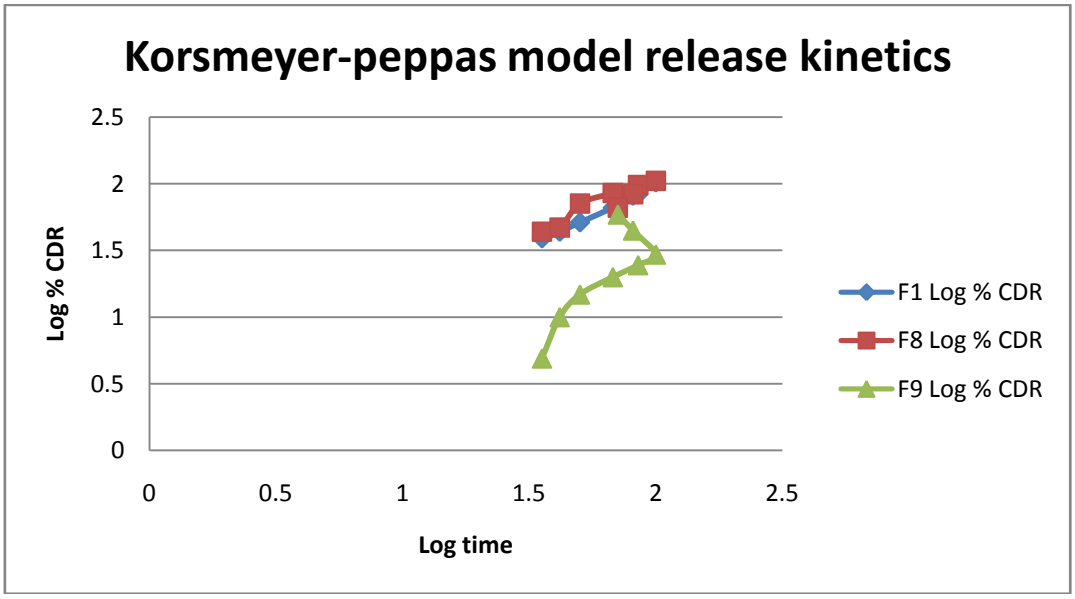

Fig. 7: Koresmeyer-peppas model release kinetics of batches F1, F8 and F9

F1 shows correlation coefficient (R^2) value 0.8324, F8 0.7712 and F9 0.8501 for Korsmeyer-peppas model release kinetics. F1 shows correlation coefficient (R^2) value 0.8324, F8 0.7712 and F9 0.8501 for Korsmeyer-peppas model release kinetics. Kinetic model study was found that batch F1, F8 and F9 are the better batches show that Korsmeyer-peppas model. But on the basis of wetting time, disintegrating time, water absorption ratio, dissolution time and drug content, was found that F8 was the best batch from all formulations. Batch F1, F8 and F9 were found the better batches.

But F8 was the best one on the basis of result. F9<F1<F8 On the basis of results was found that batch F1 is better than F9 which that means isabgol seeds (IS) shows good result as compared to SSG (IS>SSG) because F1 shows wetting time 14 sec, disintegration time 5 5 sec, water absorption ratio 68.33%, drug content 98.33%, in-vitro drug release 102.68% and F9 shows 18 sec, 53 sec, 62.00%, 95.33% 101.76% respectively.

On Comparing the combination of both the polymers, we found that batch F8 was the best batch because F8 shows wetting time 13 sec, disintegration time 53 sec, water absorption ratio 70.33%, drug content 98.66%, in-vitro

drug release 106.07% as compared to F1 which shows 14 sec, 55 sec, 68.33%, 98.33%, 102.68% respectively. Finally, we found that the formulation containing isabgol shows better results as compared to SSG (IS>SSG).

Unlike SSG, which depends predominantly on swelling for disintegration, plantago ovata use a combination of swelling and wicking, due to its high crosslink density, isabgol swells rapidly in water without gelling. Plantago ovata particles are found to be granular and highly porous which facilitates wicking of liquid into the tablet and particles to generate rapid disintegration.

5. CONCLUSION

In present study, the super disinterant property of plantago ovata seeds have been explored. The tablets disintegrated much faster and consistently when plantago ovata seeds were used as a super disintegrant compared with SSG. It can be concluded that plantago ovata seeds could be used as a natural super disintegrant in the formulation of mouth dissolving tablets

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