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Formulation and Evaluation of Olsalazine Delayed Release Tablets

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ABSTRACT

Olsalazine is a medication employed in the treatment of ulcerative colitis. Olsalazine is an anti-inflammatory amino salicylate employed in the treatment of inflammatory bowel disease and ulcerative colitis. The tablets consisted of the polymers HMPC (Hydroxypropyl methyl cellulose) and EC (Ethyl cellulose). The tablets were evaluated for physical properties, density, hardness, friability, drug content, and in vitro drug release. The main goal was to enhance the formulation for 8 hours. In vitro release employing polymers. All formulations demonstrated advantageous flow characteristics in the pre-compression phase, rendering them appropriate for tablet manufacturing. The post-compression properties of all formulations were evaluated, and the outcomes were considered satisfactory. The in-vitro dissolving studies of the rapid release core formulations revealed that formulation F1, containing Crosspovidone, Microcrystalline cellulose, and 2% Magnesium stearate, is the superior formulation. The F1 rapid release core formulation was coated with 175 mg of HPMC and 175 mg of EC. Ultimately, P3F1 was modified to demonstrate a delayed release pattern in a fully customized manner, dependent on all factors.

Keywords: Olsalazine, Delayed Tablets, Polymers like HMPC and EC.

INTRODUCTION

The treatment of acute diseases or chronic illnesses has been achieved by the administration of drugs to patients for many years. These drug delivery methods include pills, injectables, suspensions, creams, ointments, liquids, and aerosols. Modern standard medical delivery methods are widely employed. Drug delivery denotes the techniques utilized to administer therapeutic agents into the human body. Another function of the delivery systems is to enable the secure administration of the medication. The drug in the formulation must demonstrate chemical, physical, and microbiological stability. Adverse effects and drug interactions should be reduced or alleviated through the application of suitable drug delivery methods. The delivery systems must improve patient adherence to medication by developing user-friendly applications. For example, patient adherence can be improved by developing an oral dosage form where only parenteral administration was previously possible. The distribution system must be reliable, and its design must be technically feasible. The pharmaceutical quality of delivery systems must be ensured, drug release from the system must be uniform, and the body's influence on drug release should be minimized. The effects of food after oral consumption. Delayed-release tablets are oral drugs designed to defer the release of the active ingredient until the tablet has passed through the stomach and reached a specific area of the gastrointestinal (GI) tract, usually the small intestine. This is often achieved through the application of enteric coatings that resist gastric acid..

METHODOLOGY

The materials used in the present investigation were either ACS / AR / LR grade or the best possible Pharma grade.

Materials Used:

Olsalazine (API) was gifted by Mylan Pharmaceuticals Pvt Ltd., Hyderabad. Micro crystalline cellulose, Cross-povidone, Magnesium stearate, Sodium starch glycolate, Cross caramelloses sodium, Talc excipients were procured from S.D. Fine Chem. Ltd, Mumbai, India

Equipment's used:

Table-1: List of Equipment's

Equipment's	**Model/Company**
Tablet compression machine	Cadmic single punch machine
Hardness tester	Monsanto hardness tester
Dissolution test apparatus	Lab India
Disintegration test apparatus	Campbell Electronics
Friability test apparatus	Riche Rich
U.V visible spectrophotometer	ShimadzuUV-1601, Japan
Fourier transformer infrared Spectrophotometer	Bruker (Tensor27)
Hot air oven	Lab India

Pre-formulation Studies:

Pre-formulation studies are performed to investigate the physical and chemical properties of a drug substance alone and when combined with other substances such as excipients. It is the first step in the rational development of dosage forms.

Preparation of Standard Calibration Curve of Olsalazine in 0.1NHCL

Preparation of Standard Solution:

A standard stock solution of Olsalazine was prepared in 0.1N hydrochloric acid. 100 mg of Olsalazine was accurately measured and transferred into a 100 mL volumetric flask, thereafter dissolved in a small volume of 0.1N HCl. The volume was modified using 0.1N HCl to attain a concentration of 1000 µg/ml (SS-I). A 10 ml aliquot of the solution was extracted and diluted to 100 ml with 0.1N HCl to get a concentration of 100 µg/ml (SS-II).

Preparation of Working Standard Solutions:

Furthermore, aliquots of 0.2ml, 0.4ml, 0.6ml, 0.8ml, and 1ml were dispensed from (SS-II) into 10ml volumetric flasks. The volume was modified using 0.1N HCl to attain final concentrations of 2, 4, 6, 8, and 10 µg/ml, respectively. Absorbance was measured for each concentration at 207 nm. The results are organized in a table and illustrated in a graph, featuring a λ Max of 207 nm and a *Beer's range* of 2-10 µg/ml.

Preparation of Standard Calibration Curve of Olsalazine in pH-6.8 Phosphate Buffer Preparation of Standard Solution:

Standard stock solution of Olsalazine was prepared in Phosphate buffer PH 6.8. 100mg of Olsalazine was accurately weighed into 100ml volumetric flask and dissolved in small quantity of buffer. The volume was made up with water to get a concentration of 1000µg/ml (SS-I). From this 10 ml solution was withdrawn and diluted to 100ml of phosphate buffer p^H 6.8 to get a concentration of 100µg/m (SS-II).

Preparation of Working Standard Solutions:

Further, from (SS-II) aliquots of 0.2ml, 0.4ml, 0.6ml, 0.8ml, and 1ml were pipetted into 10ml volumetric flasks. The volume was made up with phosphate buffer p^H **6.8** to get the final concentrations of 2,4, 6,8 and 10µg/ml respectively. The absorbance of each concentration was measured at 276nm.The data are compiled in Table and plotted a graph with *λmax :* 276nm. & *Beer's range:* 2-10µg/ml.

Flow Properties:

Angle of repose: The flow property was determined by measuring the Angle of Repose. In order to determine the flow property, the Angle of Repose was determined. It is the maximum angle that can be obtained between the free-standing surface of a powder heap and the horizontal.

Angle of repose = $\tan^{-1}(h/r)$

Where: h = height of a pile (2cm); r = radius of pile base.

Procedure:

- 20gms of the sample was taken.
- The sample was passed through the funnel slowly to form a heap.
- The height of the powder heap formed was measured.
- The circumference formed was drawn with a pencil on the graph paper.
- The radius was measured, and the angle of repose was determined. This was repeated three times for a sample.

Bulk Density: Bulk density is a ratio of given mass of powder and its bulk volume. Bulk density was determine by measuring the volume of known mass of powder sample that has been passed through the screen into graduated cylinder or through volume measuring apparatus into cup.

Bulk density=M/V_0

Where: M = mass of the powder, V_0=bulk volume of the powder.

Limits: It has been stated that the bulk density values having less than 1.2 g/cm3 indicates good packing and values greater than 1.5 g/cm3 indicates poor packing.

Tapped Density: A known quantity of powder was transferred to a graduated cylinder and volume V0 was noted. The cylinder fixed to a density determination apparatus, tapped for 500 times then reading was observed. The density is achieved by mechanically tapped by a measuring cylinder containing the powder sample. After observing the initial volume, the cylinder is mechanically tapped and volume reading was taken until little further volume changes are observed.

Tapped density =M/ Vr

Where: M = mass of the powder, Vr = final tapping volume of the powder.

Compressibility Index and Hausner's ratio: The compressibility index and Hausner's ratio may be calculated using measured values of bulk density and tapped density as follows:

Compressibility index = 100×tapped density/ bulk density Hausner's ratio = tapped density / bulk density

Flow properties and corresponding Angle of repose, Compressibility index and Hausner's ratio:

Table-2: Acceptance Criteria of Flow Properties

S. No.	Flow properties	Angle of repose(θ)	Compressibility Index (%)	Hausner's ratio
1.	Excellent	25-30	<10	1.00-1.11
2.	Good	31-35	11-15	1.12-1.18
3.	Fair	36-40	16-20	1.19-1.25
4.	Passable	41-45	21-25	1.26-1.34
5.	Poor	46-55	26-31	1.35-1.45
6.	Very poor	56-65	32-37	1.46-1.59
7.	Very very poor	>66	>38	>1.6

Angle of repose: The angle of repose of the powder blend was determined by using funnel method. The accurately weighed powder was taken in a funnel. The height of the funnel was adjusted in such a way that the tip of the funnel just touched the apex of the heap of the powder. The diameter of the powder cone was measured, and angle of repose was calculated by using the equation.

$$\tan\theta = \frac{h}{r}$$

Where hand rare the height of pile and radius of the base of pile.

Different ranges of flow ability in terms of angle of repose are given below:

Table-3: Relationship between Angle of Repose(θ) and Flow Properties

Angle of Repose(θ)	Flow
<25	Excellent
25-30	Good
30-40	Passable
>40	Very poor

Drug–Excipient Compatibility Study: Drug is in intimate contact with one or more excipient in all the dosage forms. Later it could affect the stability of drug. Knowledge of drug excipient interaction is useful in selecting an appropriate excipient.

Procedure:

- API and excipient are taken in the ratios above mentioned and mixed together in a poly bag for 5 min.
- Each mixture is allotted sample code for identification. 4sets of samples were located where each sample mixture is divided into 1g into its corresponding glass vials (USP TYPE-1) different conditions.
- All vials are properly sealed and loaded at respective conditions.
- The samples are to be check for its description related substances and water content by KF.
- The prepared drug and excipient mixtures were evaluated at various intervals for related substances by UV as per the following conditions and time intervals. Sampling schedule for compatibility study is given in Table no.4

Formulation of Olsalazine Tablets (Colon Targeting Drug Delivery):

Table-4: Formulation for Core Table

S. No.	**Ingredients**	**F1**	**F2**	**F3**	**F4**	**F5**	**F6**	**F7**	**F8**	**F9**
1.	Olsalazine	50 mg	50 mg	50 mg	50 mg	50 mg	50mg	50 mg	50 mg	50 mg
2.	Microcrystalline cellulose	q. s	q. s	q. s	q. s	q. s	q. s	q. s	q. s	q. s
3.	Cross povidone	5mg	7.5mg	10mg	-	-	-	-	-	-
4.	Cross caramel Lose sodium	-	-	-	5mg	7.5mg	10mg	-	-	-
5.	Sodium starch glycolate	-	-	-	-	-	-	5mg	7.5mg	10mg
6.	Magnesium stearate	2mg	2 mg	2 mg	2 mg	2 mg	2 mg	2 mg	2 mg	2 mg
7	Talc	2mg	2%	2mg	2mg	2mg	2mg	2mg	2mg	2mg
	Total Wt	150mg	150mg	150mg	150mg	150mg	150mg	150mg	150mg	150mg

Table-5: Formulation for Press Coat

Press Coat	**P1F1**	**P2F1**	**P3F1**	**P4F1**	**P5F1**
HPMC	150	200	175	100	250
E.C	200	150	175	250	100
Total Wt	350mg	350mg	350mg	350mg	350mg

Table-6: Enteric Coated Formula

HPMC Phthalate 55	17.17mg
Myvacet	1.72mg
Ferric oxide(red)	2.58mg
Ethanol	q. s

Formulation of Core Tablets by Direct Compression: The inner core tablets were prepared by using direct compression method. As shown in Table 1 powder mixtures of Olsalazine, microcrystalline cellulose (MCC, AvicelPH-102), cross-Carmellose sodium (Ac-Di-Sol) SSG, cross povidone, ingredients were dry blended for20min. Followed by addition of Magnesium Stearate. The mixtures were then further blended for 10 min., 150mg of resultant powder blend was manually compressed using KBr hydraulic press at a pressure of 1ton, with a 8mm round punch and die to obtain the core tablet.

Formulation of Mixed Blend for Barrier Layer: The various formulations containing Ethyl cellulose and Guar gum in different compositions were weighed dry blended at about 10min and used as press-coating material to prepare press-coated tablets respectively by direct compression method.

Preparation of Press-Coated Tablets: The core tablets were press-coated with 400mg of mixed blend/granules as given in Table 3. 200mg of barrier layer material was weighed and transferred into a 12mm die then the core tablet was placed manually at the center. The remaining 200mg of the barrier layer materiel was added into the die and compressed at a pressure of 5 tons for 3min using KBr hydraulic press.

Preparation of Enteric Coating Solution: Polymer solution was prepared with HPMC phthalate, misact and color in ethanol as solvent.

Evaluation of Rapid Release Core (RRCT) and Press-Coated Tablets of Olsalazine

Evaluation of Tablets:

The quantitative evaluation and assessment of a tablet's chemical, physical and bioavailability properties are important in the design of tablets and to monitor product quality. There are various standards that have been set in the various pharmacopoeias regarding the quality of pharmaceutical tablets. These include the diameter, size, shape, thickness, weight, hardness, disintegration, and dissolution characters.

1. **Physical Appearance:** The general appearance of a tablet, its identity and general elegance is essential for consumer acceptance, for control of low-to-lot uniformity and tablet-to-tablet uniformity. The control of general appearance involves the measurement of size, shape, color, presence or absence of odor, taste etc

2. **Size &Shape:** It can bed imensionally described & controlled. The thickness of a tablet is only variables. Tablet thickness can be measured by micro-meter or by another device. Tablet thickness should be controlled within a ± 5% variation of standard value.

3. **Weight Variation Test:** This is an in-process quality control test to ensure that the manufacturers control the variation in the weight of the compressed tablets, different pharmacopoeia specify these weight variation tests. These tests are primarily based on the comparison of the weight of the individual tablets of a sample of tablets with an upper and lower percentage limit of the observed sample average. The USP has provided limits for the average weight of uncoated compressed tablets. These are applicable when the tablet contains 50mg or more of the drug substance or when the latter comprises 50% or more, by weight of the dosage form.

Method: Twenty tablets were weighed individually, and the average weight was calculated. The individual tablet weights are then compared to the average weight. Not more than two tablets should differ in their average weight by more than percentages stated in USP. No tablet must differ by more than double the relevant percentage.

Table-7: Limits for Tablet Weight Variation Test

Average Weight of Tablet(mg)	**%Difference Allowed**
130or less	10%
From130to324	7.5%
>324	5%

4. **Content Uniformity:** The content uniformity test is used to ensure that every tablet contains the amount of drug substance intended with little variation among tablets within a batch. Due to increased awareness of physiological availability, the content uniformity test has been included in the monographs of all coated and uncoated tablets and all capsules intended for oral administration where the range of size of the dosage form available include 50mg or smaller sizes.

Method: Randomly select 30tablets. 10 of these assayed individually. The tablet pass the test if 9 of the 10 tablets must contain not less than 85% and not more than 115% of the labelled drug content and the 10th tablet may not contain less than 75% and more than 125% of the labelled content. If these conditions are not met, remaining 20 tablets assayed individually and none may fall outside of the 85 to 115% range.

5. **Thickness and diameter**: The thickness and diameter of 10 tablets were recorded during the process of compression using Vernier Callipers.

6. **Hardness:** Hardness, which is now more appropriately called crushing strength determinations are made during tablet production and are used to determine the need for pressure adjustment on tablet machine. If the tablet is too hard, it may not disintegrate in the required period to meet the dissolution specifications; if it is too soft, it may not be able to withstand the handling during subsequent processing such as coating or packaging and shipping operations. The force required to break the tablet is measured in kilograms. The small and portable hardness tester measures the force required to break the tablet when the force generated by a coil spring is applied diametrically to the tablet.

7. **Friability:** Friction and shock are the forces that most often cause tablets to chip, cap or break. The friability test is closely related to tablet hardness and designed to evaluate the ability of the tablet to withstand abrasion in packaging, handling and shipping. It is usually measured by the use of the Roche fabricator.

Method: A number of tablets are weighed and placed in the apparatus where they are exposed to rolling and repeated shocks as they fall 6 inches in each turn within the apparatus. After four minutes of this treatment or 100 revolutions, the tablets are weighed and the weight compared with the initial weight. The loss due to abrasion is a measure of the tablet friability. The value is expressed as percentage. A maximum weight loss of not more than1% of the weight of the weight of the tablets being tested during the friability test is considered generally acceptable and any broken or smashed tablets are not picked. The percentage friability was determined by the formula: **%Friability = $(W_1-W_2)/W_1X100$**

W_1 = Weight of tablets before test W_2 = Weight of tablets after test

8. **Disintegration test (RRCT):** For a drug to be absorbed from a solid dosage form after oral administration, it must first be in solution, and the first important step toward this condition is usually the break-up of the tablet; a process known as disintegration. The

disintegration test is a measure of the time required under a given set of conditions for a group of tablets to disintegrate into particles which will pass through a 10mesh screen. Generally, the test is useful as a quality assurance tool for conventional dosage forms.

Method: The U.S.P. device to test disintegration uses 6 glass tubes that are open at the top and 10 mesh screen at the end bottom. To test for disintegration time, one tablet is placed in each tube and the basket rack positioned in a 1-L beaker of water, simulated gastric fluid or simulated intestinal fluid at 37 ± 2^0C such that the tablet remains 2.5cm below the surface of liquid on their upward movement not closer than 2.5cm from the bottom of the beaker in their downward movement. Move the basket containing the tablets up and down through a distance of 2 to 6cm at a frequency of 28 to 32 cycles per minute. Floating of the tablet can be prevented by placing perforated plastic disc on each tablet. According to the test the tablet must disintegrate and all particulars must pass through the 10 mesh screen in the time specified. If any residue remains, it must have a soft mass. If one or two tablets fail to disintegrate, the test is repeated 12 tablets. Disintegration time: uncoated tablet: 5 to 30 minutes. Coated tablet: 1 to 2 hours.

9. ***In-vitro* release studies for RRCT's:** Tablet was introduced into the basket of the LABINDIA TS 8000 USP dissolution test apparatus and the apparatus were set in motion at 50 rpm for time period of 1hr, 5 ml of sample was withdrawn for every 5min intervals and replaced by 0.1N HCL solutions. Samples withdrawn were analyzed by UV spectrophotometer for presence of drug using 0.1 N HCL solutions as blank.

Dissolution Parameters for RRCTs:

Apparatus: USP-II, Paddle Method, Dissolution Medium 0.1 NHCL, RPM 50, Sampling intervals (min) 5, 10, 15, 20, 30, 45, 60 min. Temperature: 37 ±0.5°C

***In-vitro* Dissolution Methods for Enteric Press-Coated Tablets**

In –vitro dissolution studies of colon targeted drug delivery systems were done with the conventional paddle method of press coated tablets were performed at 37±0.5° Causing 0.1NHCL in USPII paddle method at 50rpm for first two hours and replaced with pH **6.8** phosphate buffer. 5ml of filtered a liquid was manually withdrawn at pre- determined time intervals and replaced with 5ml of fresh buffer solution maintained at the same temperature. The samples were analyzed at 207nm using a UV spectrophotometer. The lag time and percentage release were determined of each formulation.

Dissolution Parameters for Enteric Press Coated Tablets:

Apparatus USP-II, Paddle Method, Dissolution first2hours 0.1N HCl, Medium: (pH 6.8) Phosphate buffer, RPM: 50, Sampling intervals (hr): 1,2,3,4,5,6,7, and 8, temperature: 37 ±0.5°C.

Results & discussion:

Preparation of Standard Calibration Curve of Olsalazine:

Table-8: Concentration and absorbances of Olsalazinein 0.1NHCL

S.No.	Concentration	Absorbance
1	0	0
2	2	0.17
3	4	0.358
4	6	0.53
5	8	0.70
6	10	0.865

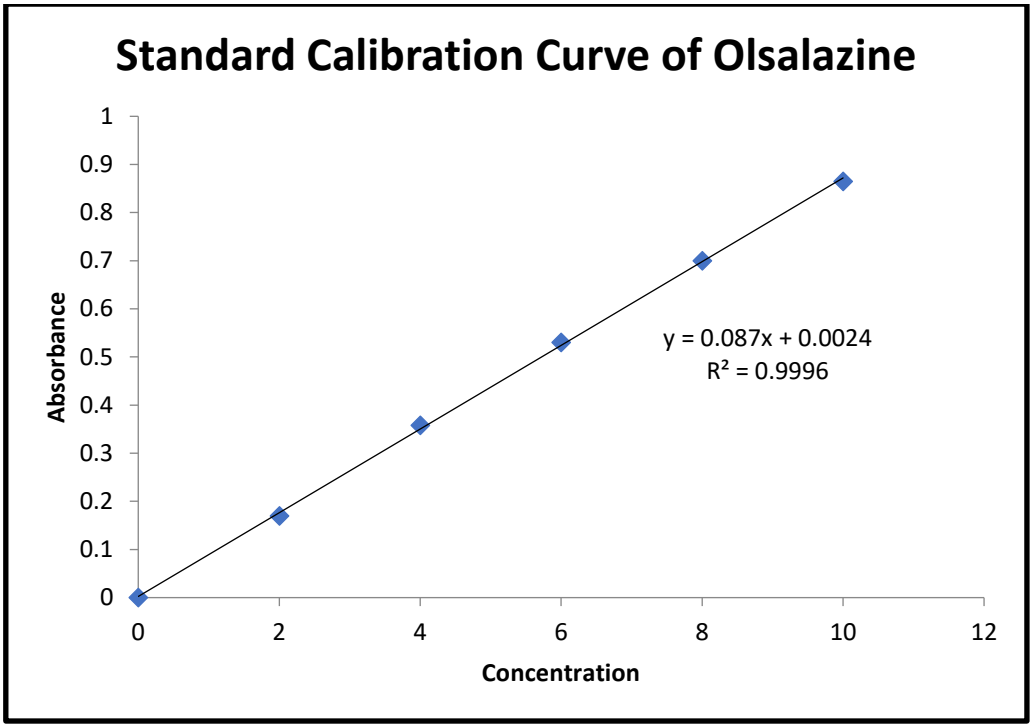


Fig-1: Calibration Curve of Olsalazine in0.1NHCL

TableNo-9: Concentration and Absorbances of Olsalazine in 6.8 pH Phosphate buffer

S.No.	Concentration	Absorbance
1	0	0
2	2	0.193
3	4	0.382
4	6	0.574
5	8	0.742
6	10	0.894

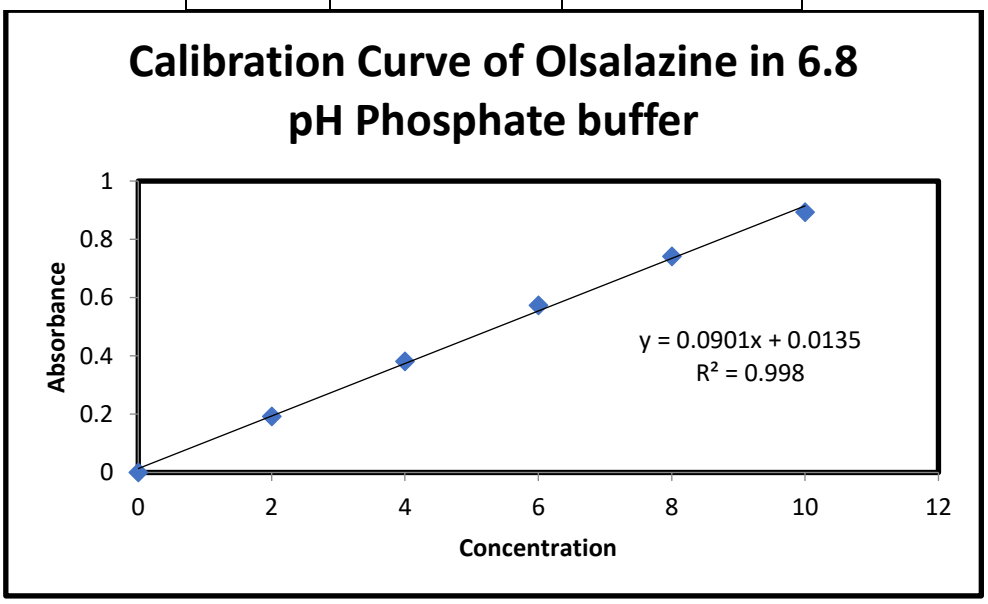
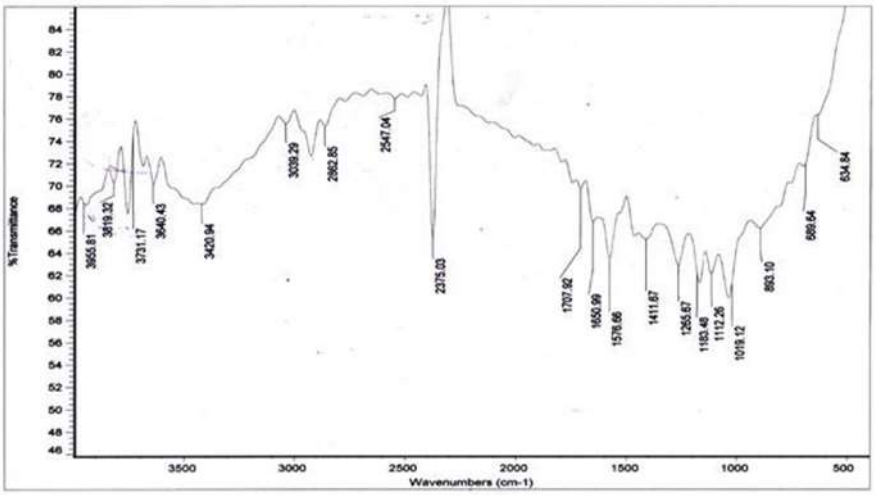
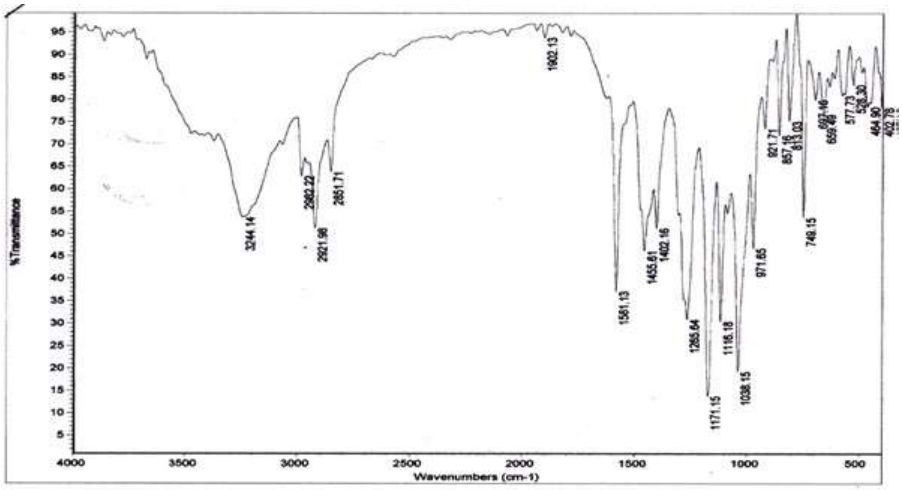


Fig-2: Calibration curve of Olsalazine in pH 6.8 phosphate buffer

Drug Excipient Compatibility Studies:



FigNo-3: FTIR Spectra of Olsalazine



FigNo-4: FTIR Spectra of Olsalazine Optimized Formulation

Pre Compression Parameters:

TableNo-10: Pre-Compression parameters

Formulations	**Angle of Repose(θ)**	**Loose Bulk Density g/ml)**	**Tapped Bulk Density (g/ml)**	**%Compressibility**	**Hausner's ratio**
A1	$21^0$55'	0.509	0.582	12.54	1.14
A2	$22^0$43'	0.415	0.481	13.72	1.15
A3	$25^0$02'	0.422	0.494	14.57	1.17
A4	$24^0$18'	0.308	0.352	12.50	1.14
A5	$26^0$89'	0.305	0.354	13.84	1.16
A6	$22^0$57'	0.321	0.375	14.4	1.16
A7	$25^0$98'	0.403	0.471	14.43	1.16
A8	$26^0$42'	0.510	0.575	11.30	1.12
A9	$24^0$62'	0.505	0.576	12.32	1.14

From the above pre-compression parameters it was clear evidence that drug and excipients has good flow properties and suitable for direct compression.

Post-Compression Parameters:

Tooling: 8mm round shape for core tablet

12mm round shape tooling for press coat.

Evaluation of Rapid Release Core (RRCT) and Press-Coated Tablets of Olsalazine Tablet Compression Parameters:

Weight of the tablet 150 mg (core tablet)

500mg (press coated tablet)

Hardness range 5.3Kg/cm^2 (core tablet)

7.0Kg/cm^2(press coat tablet)

Thickness range 3.5±0.3 mm (core tablet)

3.5±0.3mm (press coat tablet)

Table-11: Evaluation for Rapid Release Core

S. No	**Physical parameter**	**F1**	**F2**	**F3**	**F4**	**F5**	**F6**	**F7**	**F8**	**F9**
1	**Avg. Weight (mg)**	151	150	148	149	152	150	150	149	148
2	**Hardness (Kg/cm2)**	5.1	5.3	5.6	5.1	5.2	5.3	5.4	5.6	5.7
3	**Thickness (mm)**	3.50	3.47	3.51	3.5	3.5	3.46	3.48	3.51	3.6
4	**Friability%**	0.32	0.45	0.41	0.50	0.53	0.44	0.35	0.38	0.36
5	**Disintegration time**	3min 40sec	3min 52sec	3min 4sec	3min 21sec	2min 16sec	2min 08sec	4min 34sec	3min 48sec	3min 26sec

In-vitro Dissolution Studies for Core and Press Coated Tablets:-

DISSOLUTIONSTUDY:

Acidic Stage:

Medium : 0.1N HCL

Type of apparatus : USP-II(paddle type)

RPM : 50

Volume : 900ml

Temperature : 37ºC±0.5

Time : 2hrs

Buffer Stage:

Medium : 6.8 pH phosphate buffer

Type of apparatus : USP-II (paddle type)

RPM 50

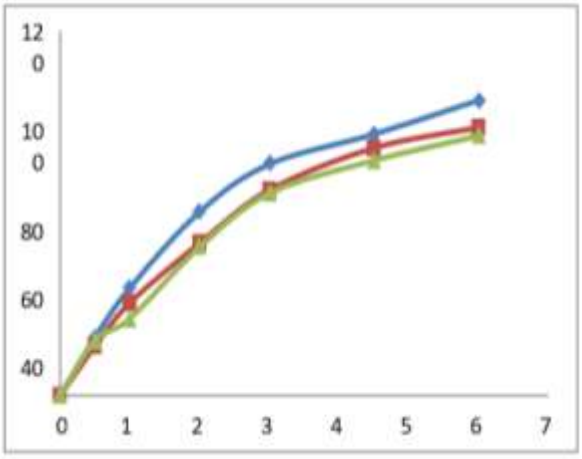
Volume : 900 ml

In vitro dissolution for core tablets was done in 0.1N HCL and enteric press coated tablets were initially placed in acidic stage and next was changed with phosphate buffer.

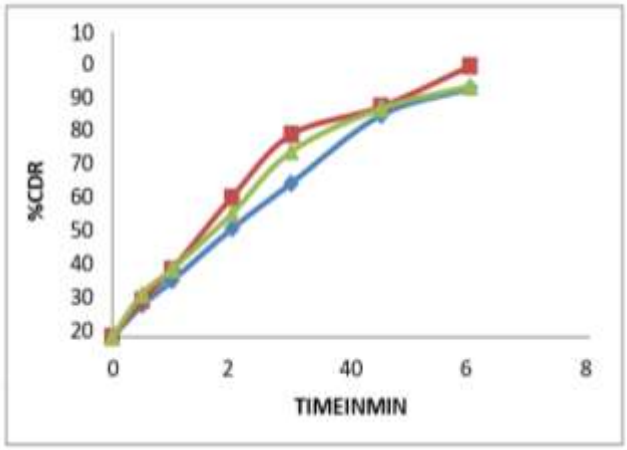
Core Tablets:-

TableNo-12: Dissolution for Core Tablet

Dissolution time(Min)	**F1**	**F2**	**F3**	**F4**	**F5**	**F6**	**F7**	**F8**	**F9**
0	0	0	0	0	0	0	0	0	0
5	19.1	16.2	18.12	10.4	12.1	14.2	15.0	16.4	20.4
10	35.4	30.5	25.31	18.4	22.1	22.23	24.1	28.9	27.8
20	60.4	50.1	48.8	35.4	45.7	40.34	45.6	48.6	33.5
30	76.1	67.6	66.5	50.4	66.3	60.76	66.6	61.4	41.6
45	86.0	81.4	77.3	72.6	75.4	74.8	75.47	72.4	60.4
60	97.1	88.2	85.4	81.5	88.7	82.13	80.4	79.6	77.6



FigureNo-5: Dissolution Graph for Formulation's F1-F3



FigureNo-6:Dissolution Graph for Formulations F4-F6

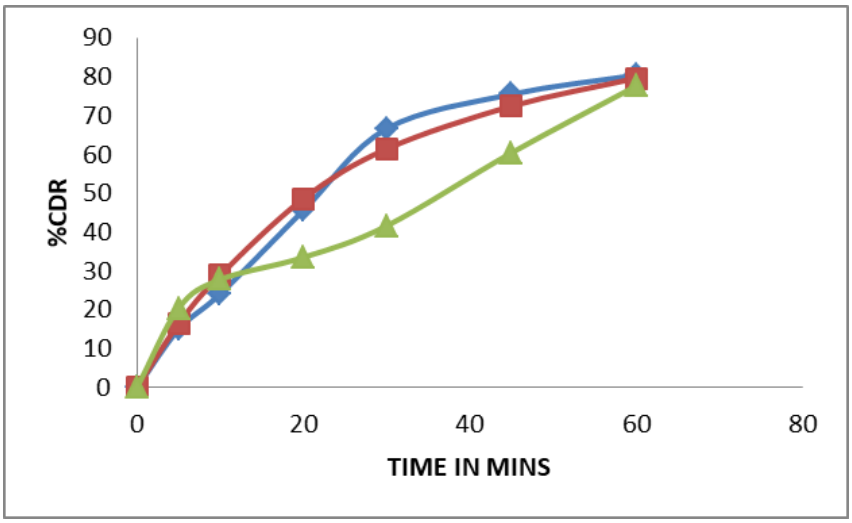


Fig. No-7: Dissolution Graph for Formulations F7-F9

Table No-13: Evaluation for Press Coated Tablets

S. No.	Physical Parameter	P1A1	P2A1	P3A1	P4A1	P5A1
1	**Avg Weight (mg)**	551	550	549	549	550
2	**Hardness (Kg/cm2)**	7.3	7.0	7.6	7.3	7.4
3	**Thickness (mm)**	2.45	2.47	2.5	2.51	2.5
4	**Friability%**	0.5	0.44	0.45	0.36	0.23

TableNo-14: Dissolution for Enteric Press Coat

Time in hrs	P1F1	P2F1	P3F1	P4F1	P5F1
0.1NHCL					
1	0	0	0	0	0
2	0	0	0	0	0
6.8 pH Phosphate Buffer					
3	5.92	0.297	2.97	4.11	7.38
4	95.43	86.70	60.58	64.55	73.10
5	98.01	94.60	79.73	77.42	85.54
6	98.01	99.10	91.31	86.56	92.84
7	98.01	99.10	99.2	87.55	93.52
8	99.40	99.10	99.87	86.85	92.34

Graph For Enteric Press Coat Formulation:

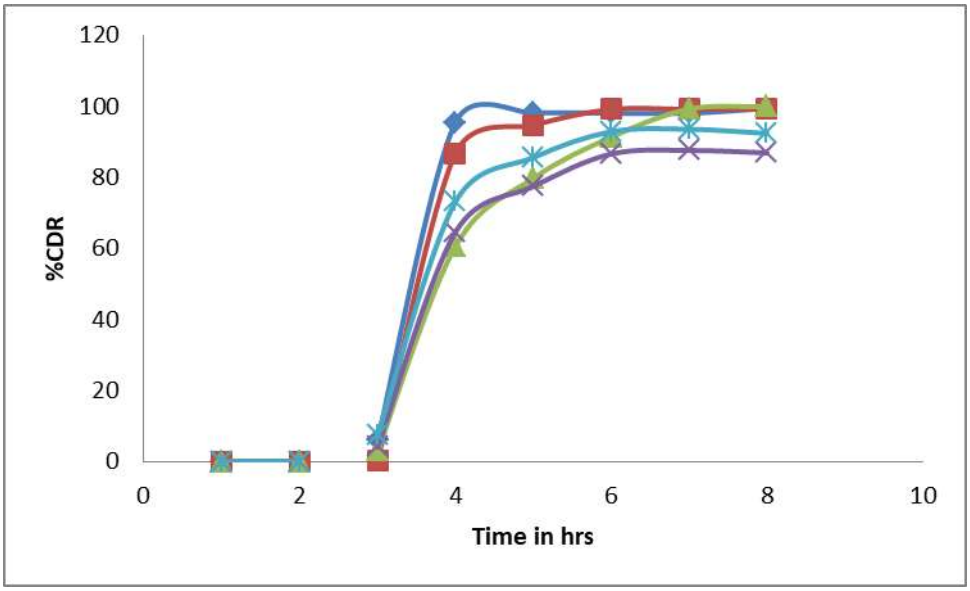


Fig-12: Graph Showing %CDR Verses Time in hrs for Formulations P1F1 to P5F1

SUMMARY AND CONCLUSION

Development of Delayed release tablets is one of the alternative routes of administration to prolonged Delayed release of drug. Delayed release tablets of Olsalazine were prepared by direct compression method using various natural and synthetic polymers like Cross povidone, microcrystalline cellulose and 2% of Magnesium stearate, % Talc is the best formulation.

The formulatedDelayedreleasetabletswereevaluatedfordifferentparameterssuchasdrugexcipient compatibility studies, weight variation, thickness, hardness, content uniformity and *In vitro* drug release. *In vitro* drug release studies performed in 0.1N HCL and phosphate buffer pH 6.8 for 60min in standard dissolution apparatus. The following conclusions could be drawn from the results of various experiments FTIR studies concluded that there was no interaction between drug and excipients. The physico- chemical properties of all the formulations prepared with different polymers like Crosspovidone, Micro-crystalline-cellulose and 2% of Magnesium stearate, %Talc were shown to be within limits. Properties and from the results, it was concluded that the *in vitro* drug release of the optimized formulations is suitable for Delayed drug delivery system. The present study concludes that Delayed drug delivery of Olsalazine tablets can be a good way to prolong duration of action of drug by reducing the frequency of dosing of Olsalazine. Present study concludes that Delayed drug delivery system should be a suitable method for Olsalazine administration. The Optimized formulation was found to be F1 formulation.

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