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RESEARCH ARTICLE
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FORMULATION AND EVALUATION OF MOUTH DISSOLVING TABLETS OF FLURBIPROFEN UTILIZING VARIOUS SUPERDISINTEGRANTS

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Abstract
This study aimed to develop mouth dissolving tablets of Flurbiprofen, a non-selective COX inhibitor commonly used to treat rheumatoid arthritis and osteoarthritis. The objective was to improve patient compliance by providing a convenient dosage form, particularly for pediatric and geriatric patients or those who have difficulty swallowing conventional tablets or capsules. Different formulations of oral dispersible tablets of Flurbiprofen were prepared using various superdisintegrants (sodium starch glycolate, crospovidone, croscarmellose sodium, and L-hydroxy propyl cellulose) through the direct compression method. The tablets underwent thorough evaluation for hardness, thickness, friability, weight variation, uniformity of content, wetting time, disintegration time, and dissolution behavior. In vitro dissolution studies revealed that the release rate followed the order of superdisintegrants: croscarmellose sodium > crospovidone > L-hydroxy propyl cellulose > sodium starch glycolate. Among the formulations, FF-11, containing 6% croscarmellose sodium, exhibited the highest in vitro dissolution. Based on these findings, it was concluded that croscarmellose sodium at a concentration of 6% is suitable for the preparation of immediate-release mouth dissolving tablets of Flurbiprofen.

Keywords: Mouth Dissolving Tablets, Flurbiprofen, Superdisintegrants, Immediate Release, Rheumatoid Arthritis

INTRODUCTION

In recent years, the development of novel drug delivery systems has been a focus of research and development in the pharmaceutical industry. One such approach is mouth dissolving tablets (MDTs), also known as orally disintegrating tablets (ODTs). These tablets are designed to dissolve or disintegrate quickly in the oral cavity, providing immediate drug release and improved patient compliance, particularly in populations such as pediatrics and geriatrics who may have difficulty swallowing conventional solid dosage forms (1, 2). Flurbiprofen, a nonsteroidal anti-inflammatory drug (NSAID), has gained significant attention due to its potent analgesic, antipyretic, and anti-inflammatory properties. It is commonly used in the management of rheumatoid arthritis and

osteoarthritis (3). Flurbiprofen belongs to the propionic acid derivatives class of NSAIDs and acts as a non-selective cyclooxygenase (COX) inhibitor, inhibiting both COX-1 and COX-2 enzymes (4). However, despite its therapeutic benefits, the oral administration of Flurbiprofen in conventional tablet or capsule form may pose challenges to certain patient populations. Pediatric and geriatric patients often face difficulties in swallowing solid dosage forms, leading to potential non-compliance with medication regimens. Swallowing difficulties, known as dysphagia, can result from various factors such as physical limitations, cognitive disorders, or underlying medical conditions, making it necessary to explore alternative drug delivery strategies to address these challenges (5, 6). Moreover, the rapid onset of action and ease of administration associated with mouth dissolving tablets have been shown to enhance patient convenience and improve medication adherence. The development of mouth dissolving tablets involves careful formulation design and selection of appropriate excipients that enable rapid disintegration or dissolution in the oral cavity. A critical aspect in the formulation of MDTs is the choice of superdisintegrants, which are highly effective in promoting tablet disintegration and subsequent drug release. Superdisintegrants aid in the rapid breakdown of the tablet matrix, thereby facilitating drug dissolution and immediate absorption (7). Several superdisintegrants have been extensively investigated for their potential in mouth dissolving tablet formulations, including sodium starch glycolate, crospovidone, croscarmellose sodium, and L-hydroxy propyl cellulose (8, 9). These excipients possess unique swelling, wicking, and water absorption properties that contribute to rapid disintegration and enhanced drug release. The selection of the most suitable superdisintegrant depends on factors such as drug solubility and release characteristics, tablet hardness, and mechanical properties (10). In this study, our primary objective was to develop mouth dissolving tablets of Flurbiprofen using various superdisintegrants. The secondary objective was to evaluate the physicochemical characteristics, disintegration behavior, and dissolution profile of the formulated tablets. By systematically exploring different superdisintegrants, we aimed to identify the optimal formulation that would provide rapid drug release and meet the specific requirements of Flurbiprofen. To achieve our goals, we employed the direct compression method for the preparation of MDTs. Direct compression offers advantages such as simplicity, cost-effectiveness, and preserving the drug's stability by avoiding the use of heat or moisture during manufacturing (11). The formulated tablets were subjected to comprehensive evaluation, including hardness, thickness, friability, weight variation, uniformity of content, wetting time, disintegration time, and in vitro dissolution studies. These parameters provide essential insights into the tablets' physical integrity, uniformity, and drug release characteristics. Understanding the correlation between the choice of superdisintegrant and the drug release profile is crucial for optimizing the formulation and ensuring consistent therapeutic outcomes. By systematically investigating the performance of different superdisintegrants in Flurbiprofen mouth dissolving tablets, we aimed to contribute to the development of an effective and patient-friendly dosage form. In conclusion, this research aims to address the challenges associated with the oral administration of Flurbiprofen by formulating mouth dissolving tablets. The utilization of various superdisintegrants will be systematically evaluated to identify the optimal formulation with rapid drug release characteristics. The outcomes of this study will provide valuable insights into the design and evaluation of mouth dissolving tablets, contributing to enhanced patient compliance and the effective treatment of rheumatoid arthritis and osteoarthritis.

MATERIAL AND METHODS

In this study, various materials and equipment were utilized. The materials included Flurbiprofen obtained from Abbot Pharma, sodium starch glycolate sourced from NOEL Pharma, L-Hydroxypropyl cellulose obtained from HETERO Drugs, Crospovidone from HETERO Drugs, Croscarmellose sodium sourced from HETERO Drugs, microcrystalline cellulose from NR CHEM. Pvt. Ltd, talc from NR CHEM. Pvt. Ltd, magnesium stearate from BUGOYNE, orange flavor from NOEL Pharma, and saccharine sodium from NOEL Pharma. The corresponding equipment used in the study consisted of a precision balance (CONTECH – CA123), hardness tester by SCHNEUNIGER, UV-Double beam spectrophotometer (LABINDIA® UV-3000), pH meter manufactured by ELICO IND PVT LTD, dissolution test apparatus (ELECTROLAB – TDT-08L),

disintegration apparatus (ELECTROLAB – ED-2L), IR Spectrometer by BRUKAR, friability apparatus (ROCHE FRIABILATOR), multiple stage rotating punching machine (REMIK), hot air oven (MICRO TEKNIK, MODEL-JEQ-3A, AMBALA), and bulk density apparatus by EDISONR. These materials and equipment were essential for the successful execution of the research study.

METHODOLOGY

Pre-formulation studies

Preformulation studies were conducted to gather basic knowledge about the drug substance and its compatibility with excipients. The following preformulation studies were carried out (12):

Organoleptic properties Appearance

A small amount of the sample (2g) was spread on a white paper and visually examined.

Drug compatibility study Infrared (FTIR) studies

Infrared spectroscopy (IR) was used to analyze the purity of the drug and its physical mixtures with excipients. IR spectra were recorded using a BRUKAR IR spectrophotometer, and the scanning range was 4500-450cm^-1.

Preparation of Calibration Curve

A buffer solution of pH 6.8 was prepared, and a calibration curve was plotted for Flurbiprofen using different concentrations of the drug in the buffer solution. The absorbance of the solutions was measured at 245nm.

Pre-compression parameters of mouth dissolving tablets

Several pre-compression parameters were evaluated to assess the quality of the powder blend used for tablet formulation. These parameters included:

Angle of repose: The angle of repose was calculated to determine the flow characteristics of the powder.

Bulk density and tapped density: The bulk density and tapped density of the powder were measured to assess its compressibility (13).

Powder compressibility: The compressibility index of the powder was calculated to evaluate its flow characteristics (13).

Hausner's ratio: Hausner's ratio was measured to determine the flow properties of the powder.

Formulation of mouth dissolving tablets of Flurbiprofen by using direct compression method

Different formulations of mouth dissolving tablets containing Flurbiprofen and various excipients were prepared using the direct compression method. The drug and excipients were passed through a sieve and then mixed in a blender to obtain a uniform powder blend.

S. No	Ingredients(mg)	FF1	FF2	FF3	FF4	FF5	FF6	FF7	FF8	FF9	FF10	FF11	FF12
1	Flurbiprofen	50	50	50	50	50	50	50	50	50	50	50	50
2	Sodium starchglycolate	8	12	16	-	-	-	-	-	-	-	-	-
3	L-hydroxy propyl cellulose	-	-	-	8	12	16	-	-	-	-	-	-
4	Cross povidone	-	-	-	-	-	-	8	12	16	-	-	-
5	Crosscarmellosesodium	-	-	-	-	-	-	-	-	-	8	12	16
6	Saccharinesodium	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
7	Orange flavour	1	1	1	1	1	1	1	1	1	1	1	1
8	Talc	2	2	2	2	2	2	2	2	2	2	2	2
9	Magnesiumstearate	2	2	2	2	2	2	2	2	2	2	2	2
10	Micro crystallinecellulose	136.5	132.5	128.5	136.5	132.5	128.5	136.5	132.5	128.5	136.5	132.5	128.5
11	Total weight(mg)	200	200	200	200	200	200	200	200	200	200	200	200

Evaluation of Flurbiprofen Mouth Dissolving Tablets

The formulated mouth dissolving tablets were evaluated for the following parameters (13):

1. Physical appearance: The tablets were visually examined for smoothness, absence of cracks, chips, and other undesirable characteristics.

2. Weight variation: Twenty tablets were individually and collectively weighed. The average weight was calculated from the collective weight, and each tablet's weight was compared to the average weight to ensure it fell within the permissible limits.

3. Friability: The tablets' friability was determined using a Roche friabilator. Ten tablets were rotated at 25 rpm for 4 minutes (100 revolutions), after which they were dedusted, weighed, and the percentage friability was calculated.
4. Thickness: The tablet thickness was measured using Vernier calipers. Three tablets from each batch were measured to calculate the average and standard deviation.
5. Hardness: The hardness of the tablets was determined using a Monsanto hardness tester. The lower plunger of the tester was brought into contact with the tablet, and the force required to fracture the tablet was measured in kg/cm².
6. Drug content: Twenty tablets from each formulation were weighed and powdered. An equivalent amount of powder (10 mg of Flurbiprofen) was transferred into a 100 ml standard flask and made up to volume with 0.5% Sodium lauryl sulphate solution. The absorbance of the resulting solution was measured at 245 nm to determine the drug content.
7. Disintegration time: The disintegration time of the tablets was determined using a simplified method. A 6 ml solution of 0.5% Sodium lauryl sulphate was placed in a 25 ml measuring cylinder, temperature-controlled at 37±2°C. A tablet was added, and the time taken for complete disintegration was recorded.
8. Wetting time: The wetting time, which relates to the disintegration properties of the tablet, was measured by placing a tablet on five circular paper pieces in a petri dish. The time taken for the upper surface of the paper to get wet was recorded as the wetting time.
9. Water absorption ratio: The water absorption ratio of the tablets was determined by weighing a tablet and then placing it in a petri dish (Wb). After wetting, the tablet was reweighed (Wa). The water absorption ratio (R) was calculated using the equation provided.
10. In-vitro dissolution studies: The dissolution of Flurbiprofen from the mouth dissolving tablets was studied using the USP dissolution test apparatus with a paddle method at 50 rpm in 900 ml of pH 6.8 phosphate buffer maintained at 37±0.5°C. Samples of dissolution media were withdrawn at specific time intervals and analyzed spectrophotometrically at 245 nm. The cumulative drug release values were calculated from the dissolution data.
Dissolution studies of the formulated tablets were carried out using a paddle method in 900 ml of pH 6.8 phosphate buffer at 37.5±0.5°C. Aliquots of 5 ml were withdrawn at specific time intervals, filtered using Whatman filter paper, and analyzed spectrophotometrically at 245 nm. Equal volumes of fresh dissolution medium were replenished after each sample.
11. Accelerated stability studies: Formulations were subjected to stability studies as per ICH guidelines. Samples were kept at 40±2°C/75±2% RH and analyzed for weight variation, hardness, friability, drug content, and in-vitro dissolution study every month for three months.
These evaluations were conducted to assess the physical characteristics, performance, drug content, disintegration time, dissolution rate, and stability of the mouth dissolving tablets.

RESULTS

PREFORMULATION STUDY

Organoleptic properties

These tests were performed as per procedure.

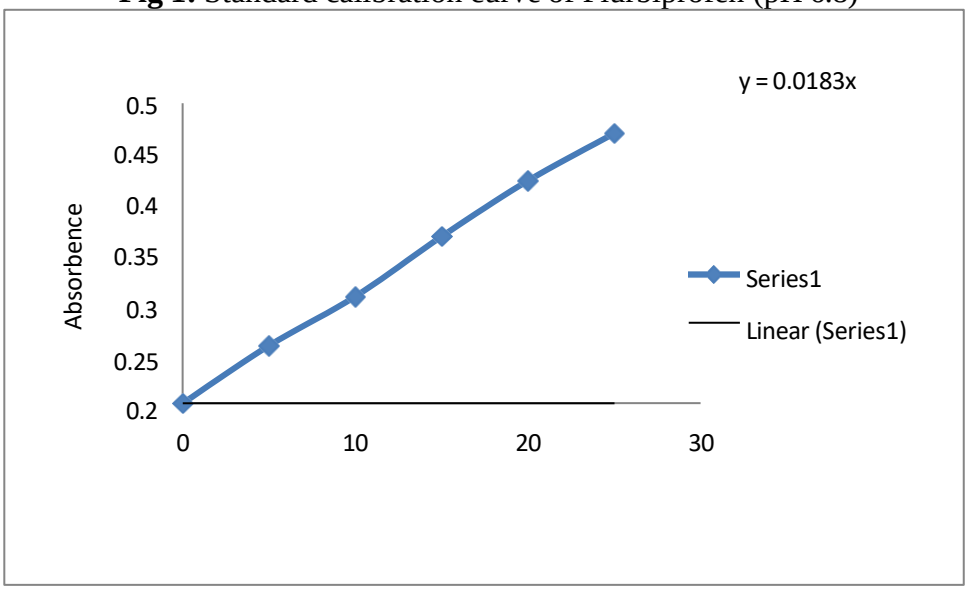
Table 2: Organoleptic properties of Flurbiprofen

Test	**Specification/limits**
Colour	White, (or) Slightly yellow crystalline powder
Odour	Odour less

Table 3: Standard curve of Flurbiprofen with (pH 6.8)

Concentration (µg/ml)	Absorbance at 245 nm.
0	0
5	0.096
10	0.178
15	0.278
20	0.371
25	0.450

Fig 1: Standard calibration curve of Flurbiprofen (pH 6.8)



The method obeyed Beer's law in the range 0-10µg/ml for Flurbiprofen in water containing 0.5% SLS. To find out the degree of linear relationship correlation coefficient was calculated. It was found to be 0.999. Hence it was interest to establish the mathematicalform of linear relationship between two variables (concentration and absorbance).

Drug- Excipient Compatability Studies (FTIR-Study):

This test was performed using infra-red spectrophotometer.

Fig 2: FTIR spectra of Flurbiprofen

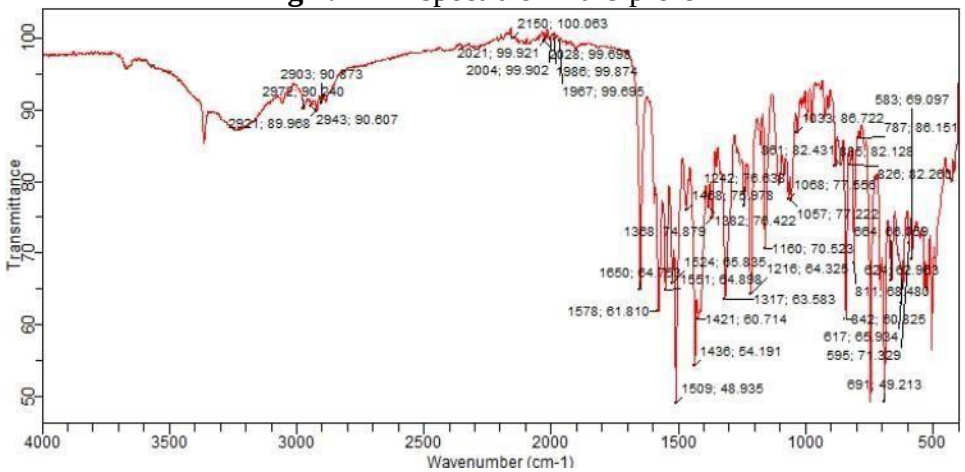


Table 4: FTIR interpretation of flurbiprofen

BOND	ACTUAL FREQUENCYRANGE (cm^{-1})	OBSERVED FREQUENCY (cm^{-1})	CONFIRMATION
C-F Stretch	1400-1000	1160.70	HALIDE
Aromatic C=C Stretch	1600-1475	1509.48	AROMATIC
C-O Stretch	1320-1210	1317.63	KETONE
O-H Stretch	3400-2400	3363.42	HYDROXYL

Fig 3: FTIR spectra of Flurbiprofen optimized formula final blend.

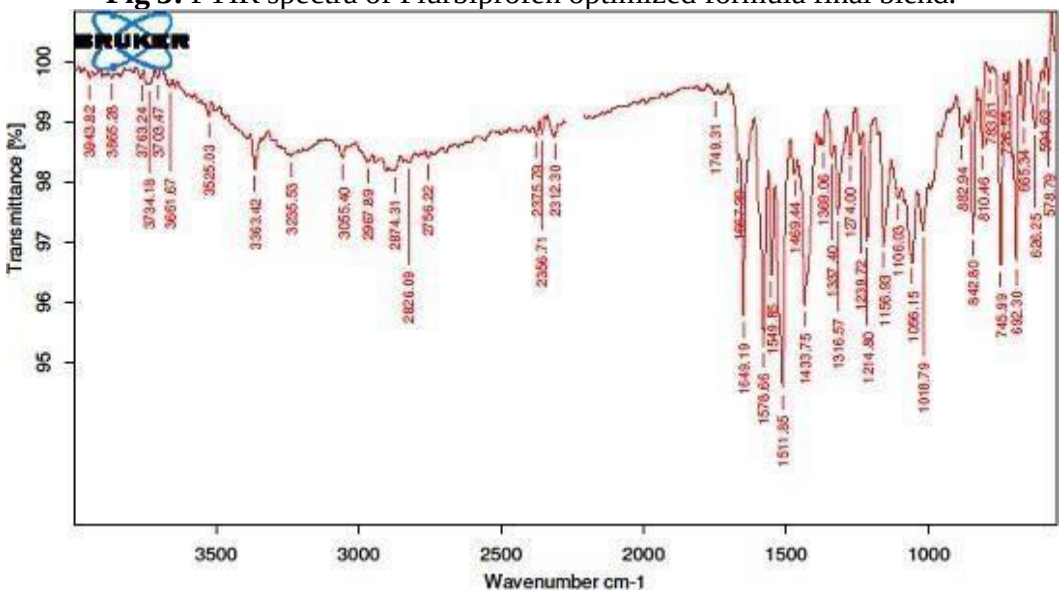


Table 5: FTIR studies of Flurbiprofen optimized formula final blend interpretations.

BOND	ACTUAL FREQUENCYRANGE (cm^{-1})	OBSERVED FREQUENCY (cm^{-1})	CONFIRMATION
C-F Stretch	1400-1000	1158.93	HALIDE
Aromatic C=C Stretch	1600-1475	1578.66	AROMATIC
C-O Stretch	1320-1210	1214.80	KETONE
O-H Stretch	3400-2400	3362.42	HYDROXYL

Evaluation of Flurbiprofen mouth dissolving tablets

Table 6: Evaluation of pre-compression parameters

S: No	Formulations	Bulk density	Tapped density	Carr"s index	Hausneers ratio
1	FF-1	0.634±0.05	0.74±0.1	14.3±.829	1.18±.008
2	FF-2	0.675±0.05	0.8±.01	15.6±.792	1.19±.007
3	FF-3	0.651±0.05	0.777±0.05	16.2±.979	1.19±.009
4	FF-4	0.63±0.1	0.75±0.1	16.0±0.71	1.18±.017
5	FF-5	0.73±0.1	0.863±0.05	15.4±.85	1.20±.018
6	FF-6	0.627±0.05	0.74±0.1	15.2±0.83	1.21±.008
7	FF-7	0.674±0.05	0.82±0	17.8±0.92	1.2=1±.010
8	FF-8	0.725±0.05	0.86±0.1	16.4±0.67	1.18±.016
9	FF-9	0.674±0.05	0.804±0.05	16.1±.164	1.19±.006
10	FF-10	0.63±0.1	0.745±0.05	15.4±.78	1.21±.027
11	FF-11	0.583±0.05	0.708±0.05	17.6±.12	1.20±.021
12	FF-12	0.62±0.1	0.76±0.1	18.4±.17	1.20±.031

Values are expressed as Mean ±SD, *n = 3, MF formulations of Flurbiprofen mouth dissolving1 tablets.

Table 7: Post-compressional parameters of Flurbiprofen MDT's

S: No	Formulations	Weight variation(mg)	Thickness in (mm)	Hardness (kg/cm^2)	Friability % w/w	Drug Content (%)	Wetting time(sec)	Water absorption ratio	Disintegration Time(sec)
1	FF-1	198±2.0	3.7±0.1	4.8±0.2 12	0.36±.005	89.15±.14	40±5.50	53.88±1.28	40±5.4
2	FF-2	197±2.5	3.5±0.1	4.8±0.1 5	0.93±.004	96.03±0.12	38±3.02	173±1.50	23±2.2
3	FF-3	198±2.12	3.6±0	4.7±0.15	0.64±.005	95.16±0.06	32±2.55	142.5±2.02	26±2.5
4	FF-4	201±1.52			0.61±.005	97.34±.096			28.23±1.5

			3.9±0.1	4.4±0.3			33±2.01	202±1.54	
5	FF-5	199±2.2	3.8±0.1	4.8±0.152	0.34±.002	96.16±0.17	32±2.56	165.3±1.02	23.72±2.01
6	FF-6	201±1.0	3.9±0	4.9±0.25	0.97±.006	92.38±.0.27	29±1.82	197±1.11	17.66±1.8
7	FF-7	197±2.5	3.7±0.1	4.7±0.15	0.65±.004	92.3±.180	36±1.254	157.7±0.94	27.14±2.52
8	FF-8	200±3.2	3.8±0.1	4.6±0.212	0.32±.005	93.38±.120	19±2.02	165.6±1.36	19.19±1.89
9	FF-9	201±2.02	3.9±0.1	4.8±0.17	0.64±.004	84.63±.212	16.5±1.24	186.8±0.85	12.83±1.50
10	FF-10	199±1.5	3.8±0	4.8±0.15	0.33±.003	86.36±.167	38±3.02	149±1.78	10.75±1.82
11	FF-11	200±1.0	3.9.±0.1	4.8±0.34	0.62±.003	99.21±0.11	15±2.15	203±1.64	10.14±2.2
12	FF-12	197±2.5	3.7±0.1	4.8±0.10	0.62±.004	93.17±.095	26.5±2.16	199.2±1.02	15.52±3.05

Values are expressed as Mean ±SD, *n = 3, FF formulations of Flurbiprofen mouth dissolving tablets.

Table 8: *In-vitro* Dissolution profile Flurbiprofen mouth dissolving tablets

Time(min)	FF-1	FF-2	FF-3	FF-4	FF-5	FF-6	FF-7	FF-8	FF-9	FF-10	FF-11	FF-12
0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
2	11.59±.69	23.62±2.31	61.32±1.88	14.6±2.31	43.14±1.98	63±5.39	18.3±.903	23.8±2.09	78.3±9.38	28.9±1.46	45.12±2.63	79.2±4.49
5	43.63±2.10	66.6±6.01	87.0±5.07	58±1.33	72.7±1.17	89.2±3.34	46.5±2.24	53.8±2.43	85.2±2.68	75.9±2.83	76.83±2.22	86.8±2.87
10	66.38±1.07	93.22±2.08	93.42±1.8 7	78.5±.87	88.17±1.66	93.6±2.31	73.8±2.56	79.7±2.76	90.7±.90	87.8±1.48	97.62±.958	95.4±1.44
20	75.47±4.61	95.97±.74	96.93±.82	89.8±1.37	93.9±1.01	95.5±.61	87.8±2.46	85.3±.386	96±.459	93.8±1.29	99.23±.305	97.43±1.28
30	83.06±4.48	97.02±1.22	97.96±.36	94.8±1.16	97±1.14	97.8±1.26	91.53±.305	95.23±.542	97.6±.395	94.013±1.54	99.4±.234	97.7±.529
40	94.32±1.66	97.74±.64	97.96±.36	95.8±1.16	97±1.14	98.3±.671	94.4±.972	96.42±.253	97.6±.395	95.032±1.54	99.4±.234	97.7±.529

Values are expressed as Mean ±SD, *n = 3, FF formulations of Flurbiprofen mouth dissolving tablets

Fig 4: *In-vitro* Dissolution profile of Flurbiprofen with sodium starch glycolate

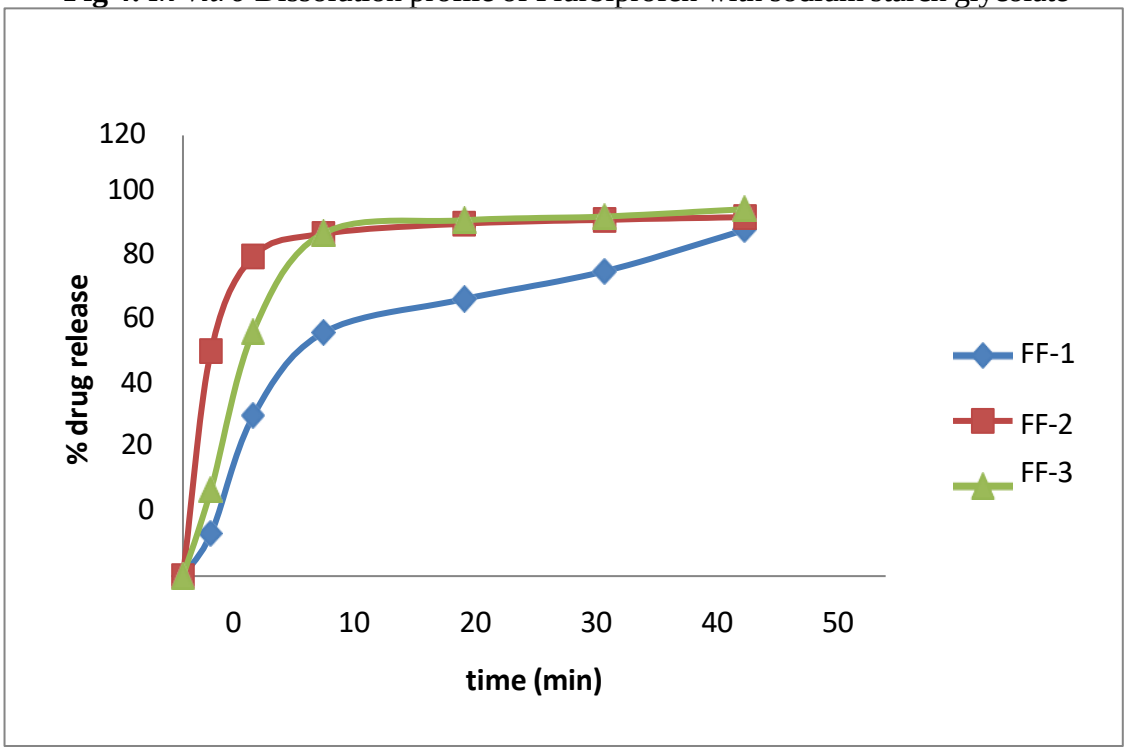


Fig 5: *In-vitro*Dissolution profile of Flurbiprofen with L-Hydroxy propyl cellulose

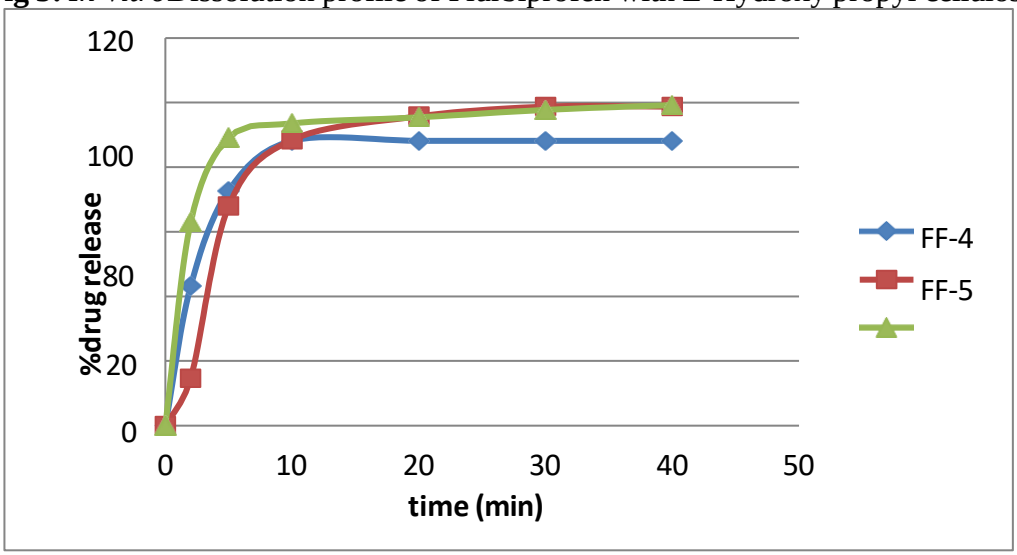


Fig 6: *In-vitro* Dissolution profile of Flurbiprofen with crospovidone

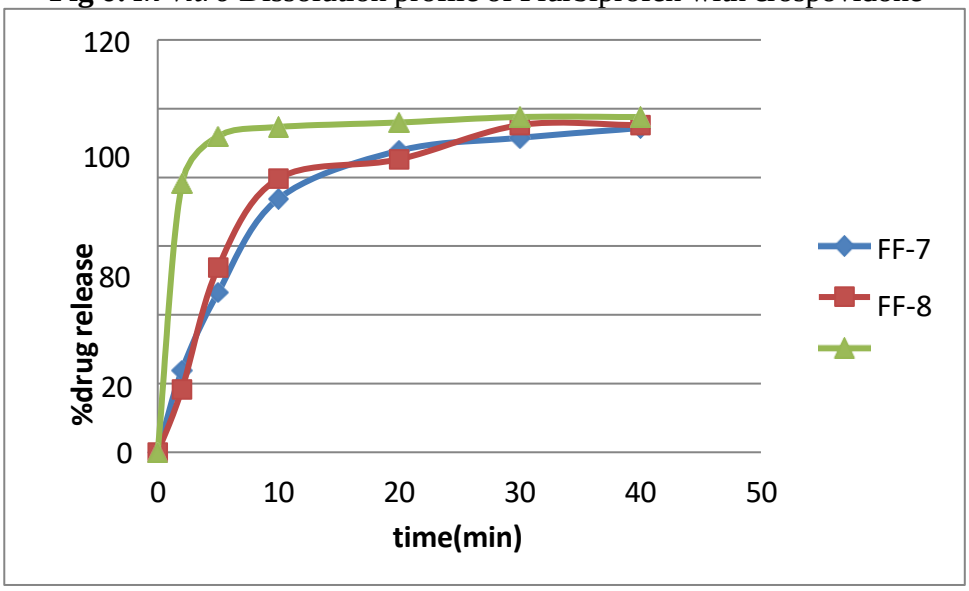


Fig 8: *In-vitro*Dissolution profile of Flurbiprofen with croscarmellose sodium

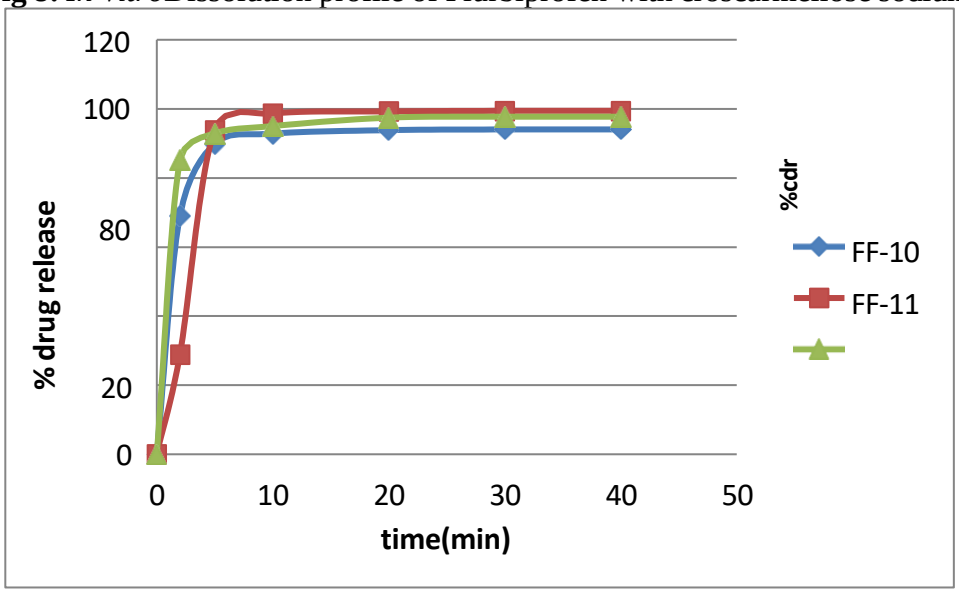


Fig 7: *In-vitro* Dissolution profile of all formulations of Flurbiprofen MDT's

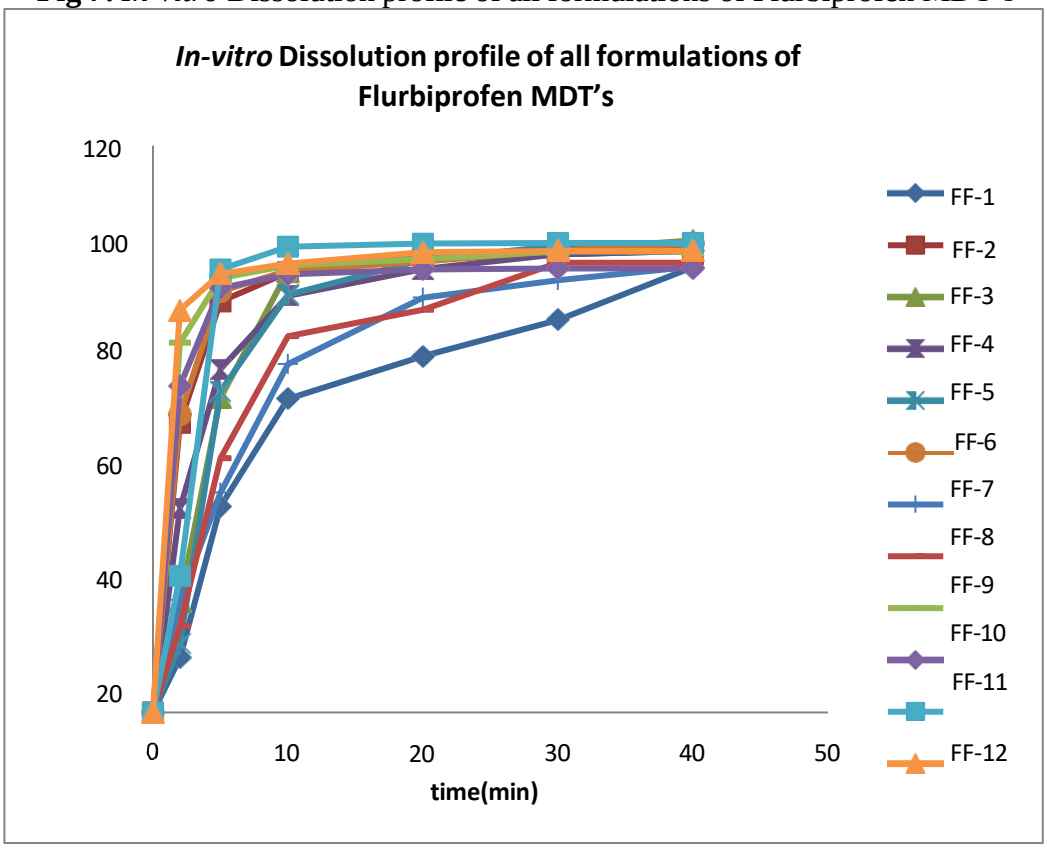


Table 9: *In-vitro* Dissolution parameters of different formulations of MDT's

Formulation number	k^{-1}	t 1/2	r	DR 10
FF-1	0.09214	7.5226	0.929518	86.0±5.07
FF-2	0.05986	11.5737	0.977754	42.63±2.10
FF-3	0.12204	5.67756	0.959685	65.4±6.01
FF-4	0.09671	7.16458	0.974168	71.7±1.17
FF-5	0.11978	5.78676	0.962287	67±1.33
FF-6	0.0785	8.85037	0.852645	88.3±3.34
FF-7	0.07137	9.70681	0.967986	47.3±2.24
FF-8	0.13816	5.0153	0.925205	52.7±2.43
FF-9	0.06907	10.0305	0.77845	93±2.68
FF-10	0.04834	14.3292	0.724568	88.8±2.83
FF-11	0.11747	5.90025	0.822194	92.9±2.87
FF-12	0.07139	9.70685	0.793724	92.85±2.22

First order rate constant was minimum for FF-10 (0.048) and maximum for FF-8 (0.138). Half-life was minimum for FF-8 (5.01) and maximum for FF-10 (14.32). Regression value wasminimum for FF-9 (0.778) and maximum for FF- 2 (0.977). dissolution rate at 10 min was minimum for FF-2 (42.62) and maximum for FF- 9 (93).

Table 10: Dissolution parameters of optimized formulation FF-11

Time (min)	% CDR	t/%CDR	% CDR remaining	log % drug remaining
0	0	0	100	2
2	28.9175	0.069164	71.0825	1.851764
5	92.95327	0.05378	7.046737	0.847987
10	98.65825	0.10137	1.341743	0.127669
20	99.23824	0.201536	0.761743	-0.11819
30	99.33493	0.302008	0.665074	-0.17713
40	99.33493	0.402677	0.665078	-0.17713

Log % drug remaining minimum seen at 30min.

Fig 8: *In-vitro* Dissolution parameters of optimized formulation FF-11, zero order

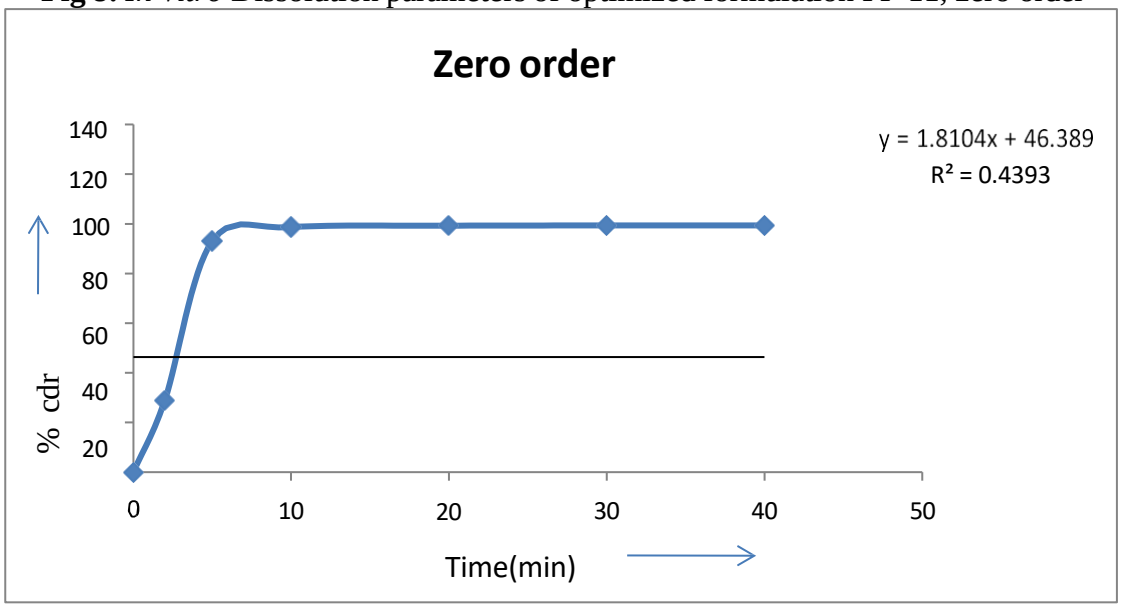
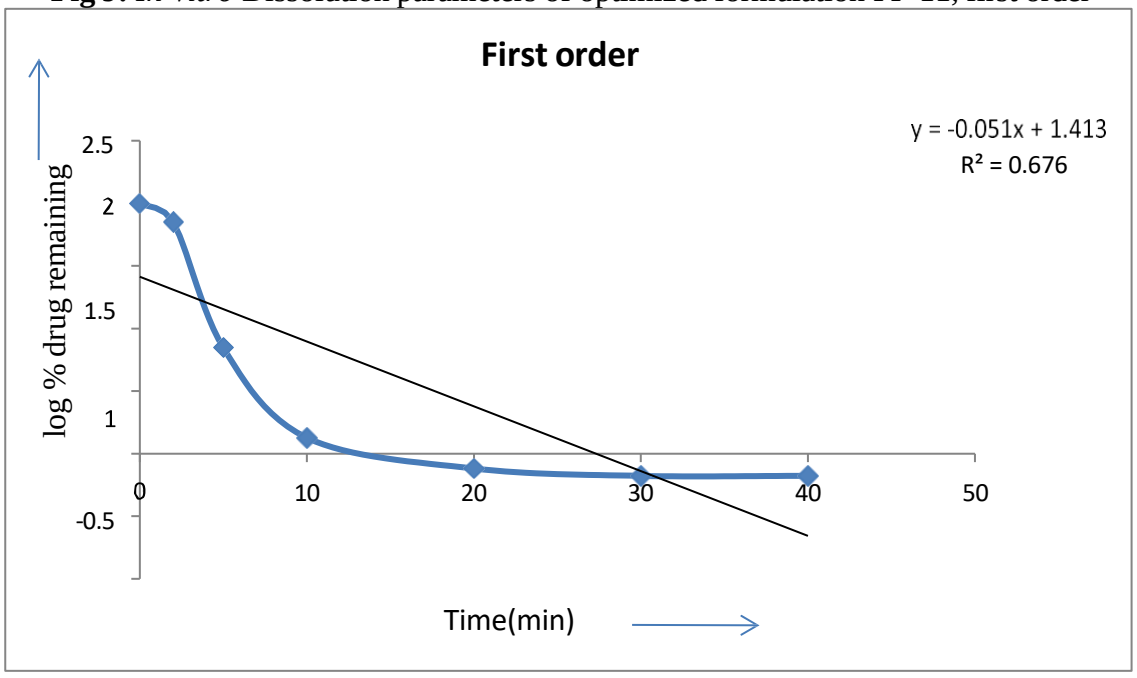


Fig 9: *In-vitro* Dissolution parameters of optimized formulation FF-11, first order



The graphs here show zero and first order drug release where greater R^2 value was seen for first order (0.676) than zero order drug (0.439) release, so the mouth dissolving tablet followedfirst order drug release.

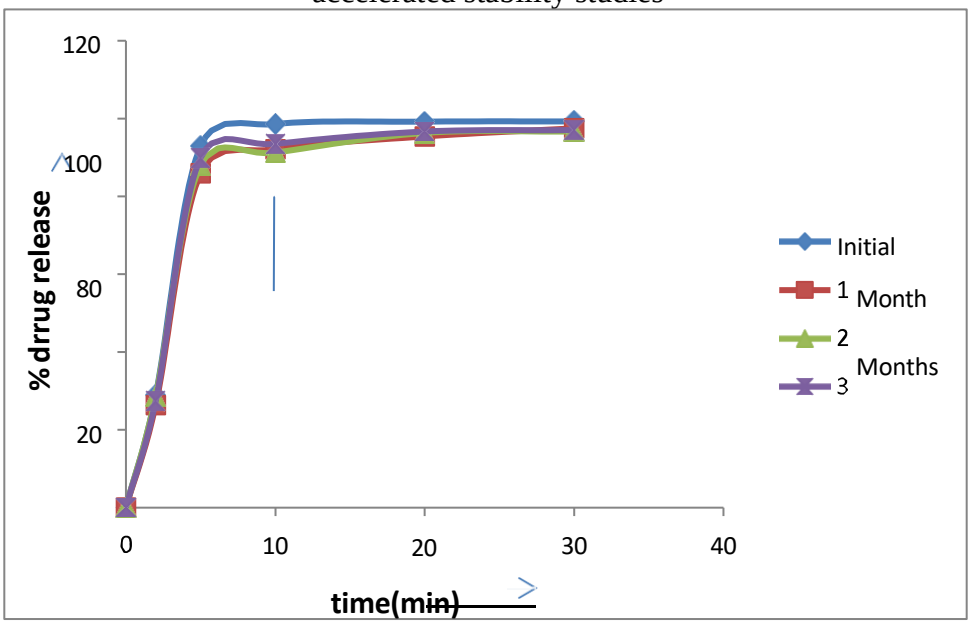
Table 11: Evaluation parameters of optimized (FF-11) mouth dissolving tablet afterstability studies

Evaluationparameters	**Initial**	**1 Month**	**2 Months**	**3 Months**
Hardness (kg/cm^2)	3.5±0.34	3.5±0.54	3.5±0.12	3.4±0.89
Disintegrationtime (sec)	16.5±2.2	14.2±2.54	16.2±1.33	16.47±1.98
Drug content (%)	98.33±0.09	97.54±0.12	98.2±0.21	97.59±0.5
***Invitro* Dissolution**	99.3±0.234	97.51±0.642	96.69±1.1	97.03±0.524

Table 12: *In-vitro* Dissolution profile of Optimized (FF-11) mouth dissolving tabletsafter stability studies

Time	Initial	1 Month	2 Months	3 Months
0	0	0	0	0
2	28.9±1.46	26.36±1.23	28.63±1.55	27.32±1.24
5	92.9±2.87	85.97±1.55	88.02±2.24	89.8±1.45
10	98.61±0.98	92.12±1.62	91.24±1.12	93.46±1.56
20	99.23±0.305	95.43±0.99	96.34±0.89	96.64±0.98
30	99.3±0.234	97.51±0.642	96.69±1.1	97.03±0.524

Fig 10 : *In-vitro* Dissolution profile of Flurbiprofen (FF-11) mouth dissolvingtablets after accelerated stability studies



DISCUSSION

The present study aimed to develop mouth dissolving tablets (MDTs) of Flurbiprofen, a nonsteroidal anti-inflammatory drug (NSAID) used for the treatment of rheumatoid arthritis and osteoarthritis. MDTs are an alternative dosage form specifically designed to improve patient compliance, particularly in populations such as pediatrics and geriatrics, who may have difficulty swallowing conventional solid tablets or capsules. During the preformulation stage, organoleptic properties of Flurbiprofen were evaluated, including color and odor, which were found to be within acceptable limits. This indicated that the drug was suitable for further formulation development. Additionally, a standard calibration curve of Flurbiprofen was established using UV spectrophotometry, showing a linear relationship between concentration and absorbance. This allowed for accurate determination of Flurbiprofen concentrations within the specified range. Furthermore, drug-excipient compatibility studies using FTIR spectroscopy confirmed that the chosen excipients were compatible with Flurbiprofen, ensuring the stability and integrity of the formulated MDTs. The formulation development phase involved the selection of suitable superdisintegrants, namely sodium starch glycolate, crospovidone, croscarmellose sodium, and L-hydroxy propyl cellulose. These superdisintegrants aid in the rapid disintegration of tablets in the oral cavity, promoting quick drug release and absorption. Various evaluation parameters were assessed, including pre-compression and post-compression properties of the tablet formulations.

The pre-compression parameters, such as bulk density, tapped density, Carr's index, and Hausner's ratio, provided insights into the flowability and compressibility of the powder blends. The results obtained indicated good flow properties for the formulations. Post-compression characterization

evaluated parameters such as weight variation, thickness, hardness, friability, drug content, wetting time, water absorption ratio, and disintegration time. These parameters are important indicators of the quality and performance of the tablets. The optimized formulation, FF-11, demonstrated desirable characteristics such as uniform weight, suitable thickness, appropriate hardness, minimal friability, high drug content, fast wetting time, efficient water absorption, and rapid disintegration time. The in vitro dissolution studies assessed the drug release profile of Flurbiprofen from the MDTs. The dissolution profiles of the different formulations showed variations in drug release kinetics due to the use of different superdisintegrants. Croscarmellose sodium exhibited the highest drug release rate among the tested superdisintegrants. The optimized formulation, FF-11, exhibited a favorable dissolution profile with rapid drug release. The dissolution parameters, including dissolution rate constant, half-life, regression value, and drug release at 10 minutes, further supported the effectiveness of FF-11 in achieving the desired drug release characteristics. The first-order drug release kinetics of FF-11 confirmed that the release of Flurbiprofen primarily followed a first-order mechanism. Stability studies were conducted on the optimized formulation, FF-11, to assess its long-term stability. The hardness, disintegration time, drug content, and dissolution profile were monitored over a 3-month period. The results indicated that FF-11 maintained its key physicochemical properties throughout the stability study, suggesting the formulation's robustness and suitability for storage.

CONCLUSION

In conclusion, the formulation and evaluation of Flurbiprofen mouth dissolving tablets using different Superdisintegrants showcased the potential of this dosage form as a patient-friendly alternative for individuals who have difficulty swallowing conventional tablets or capsules. The optimized formulation, FF-11, demonstrated desirable characteristics and rapid drug release, which may contribute to improved patient compliance. The stability studies further validated the suitability of FF-11 for long-term storage. This study provides valuable insights into the design and evaluation of mouth dissolving tablets of Flurbiprofen, highlighting their potential in enhancing patient acceptance and therapeutic outcomes.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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