

Formulation and Evaluation of Sustained Release Matrix Tablets of Aceclofenac

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Abstract

This study aimed to improve the dissolution rate of aceclofenac and release the drug in a controlled manner over a period of 24 hours. Matrix tablets were prepared by direct compression method, using hydrophilic polymers (HPMC/guar gum). Matrix tablets were prepared by wet granulation method using different hydrophilic polymers (HPMC/guar gum). Tablets were evaluated for in vitro drug release profile in phosphate buffer with pH 6.8 (without enzymes). The thickness and hardness of prepared tablets were 3.23 ± 0.035 to 3.28 ± 0.008 mm and 3.26 ± 0.115 to 3.60 ± 0.200 kg/cm², respectively. The friability was within the acceptable limits of pharmacopoeial specifications (0.31 to 0.71%), which indicates the good mechanical strength of the tablets. Drug release was retarded with an increase in polymer concentration due to the gelling property of polymers. The in vitro drug release from the proposed system was best explained by Higuchi's model, indicating that drug release from tablets displayed a diffusion-controlled mechanism. The results clearly indicate that guar gum could be a potential hydrophilic carrier in developing oral controlled drug delivery systems. Based on the study results, formulations F8 was selected as the best formulation.

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INTRODUCTION

Oral drug delivery is the most widely applicable administration route among all other drug administration routes such as nasal, ophthalmic, rectal, transdermal, and parenteral routes. It has been explored for systemic delivery of drugs via pharmaceutical products of a different dosage form¹. The majority of the pharmaceutical products designed for oral delivery are immediate release or conventional release systems for rapid drug absorption². Conventional dosage forms have various limitations to deliver the dosage form via the oral route, such as poor patient compliance, increased chances

of dose missing of a drug with a short half-life for which frequent administration is necessary³.

In order to overcome the drawbacks of conventional drug delivery systems, several technical advancements have led to the development of a controlled drug delivery system that could revolutionize the method of medication and provide several therapeutic benefits⁴. Controlled drug delivery systems have been developed to control the rate of drug delivery, sustaining the duration of therapeutic activity and targeting the delivery of drugs to tissues⁵. Controlled drug delivery or modified drug delivery systems are conveniently divided into four

categories: delayed release, sustained release, site-specific targeting, and receptor targeting⁶.

A controlled drug delivery system is usually designed to deliver the drug at a particular rate. Safe and adequate blood levels are maintained for a period as long as the system continues to deliver the drug⁷. Controlled drug delivery usually results in substantially constant blood levels of the active ingredient compared to the uncontrolled fluctuations observed when multiple doses of quick releasing conventional dosage forms are administered to a patient⁸.

The introduction of matrix tablets as the sustained release (SR) has given a breakthrough for novel drug delivery systems (NDDS) in pharmaceutical technology⁹. It excludes complex production procedures such as coating and palletization during manufacturing, and the drug release rate from the dosage form is controlled mainly by the type and proportion of polymer used in the preparations¹⁰. The hydrophilic polymer matrix is widely used for formulating an SR dosage form. Because of increased complications and expense involved in the marketing of new drug entities, it has focused greater attention on developing sustained release or controlled release drug delivery systems¹¹.

Matrix systems are widely used for sustained release. It is the release system that prolongs and controls the release of the dissolved or dispersed drugs¹². A matrix is a well-mixed mixture of one or more drugs and a gelling agent, such as hydrophilic polymers. The sustained release approach allows for therapeutically efficient accumulation in the systemic circulation over a more extended period, resulting in improved patient compliance¹³.

Many SR oral dosage forms have been developed, including membrane-controlled systems, matrix with water-soluble/insoluble polymers or waxes, and osmotic systems. Recent research has concentrated on the

designation of SR systems for poorly water-soluble drugs¹⁴. The lipid waxes and related materials prepare the lipid matrix. In this system, the active compound is contained in a hydrophobic matrix that remains intact during drug release¹⁵.

The release of the active substance depends on the aqueous medium dissolving the conduit, which is released from the solids, forming a porous matrix of tortuous capillaries. The active substance dissolves in the aqueous medium and diffuses out of the matrix by way of the water-filled capillaries¹⁶. The materials used as matrix formers include hydrogenated vegetable oil, hydrogenated cottonseed oil, hydrogenated soy oil, microcrystalline wax, carnauba wax, as well as hydroxypropyl methylcellulose (HPMC)¹⁷.

Aceclofenac is a potent inhibitor of the enzyme cyclooxygenase, which is involved in the production of prostaglandins¹⁸. The drugs inhibit the synthesis of the inflammatory cytokines interleukin (IL)-1 and tumor necrosis factor (TNF) and prostaglandin E2 (PGE2) production. Effects on cell adhesion molecular from neutrophils have also been noted. *In vitro* data indicate inhibition of cyclooxygenase (COX)-1 and 2 by aceclofenac in whole blood assays, with selectivity for COX-2 being evident¹⁹.

Aceclofenac is a perfect applicant for a sustained release tablet. It reduces the frequency of drug administration and improves bioavailability, and increases patient compliance²⁰. Aceclofenac has a short biological half-life of 2-4 hours; thus, it does not show the pharmacological effect for a long time²¹. Sustained-release tablets have the properties to release slowly, and they maintain the bioavailability of drugs for a long time. Therefore, in this study, we made a sustained release tablet of aceclofenac and determined all *in vitro* parameters of sustained-release tablets.

MATERIALS AND METHODS

Materials

The material used were aceclofenac (Sigma-Aldrich), HPMC K15M, Guar gum, lactose, polyvinylpyrrolidone (PVP) K-30, isopropyl alcohol (IPA), talc, magnesium stearate, phosphate buffer pH 6.8, HCl, distilled water, and KBr. The instruments used include melting point apparatus, water bath shaker, UV spectrophotometer (Labindia), Fourier Transform Infrared (FTIR) Spectroscopy (Shimadzu), sieve #10, #18, #40, digital analytical balance, micromeritics instrument, micrometer (Mitutoyo), Monsanto tablet hardness tester, Roche friabilator, and dissolution apparatus type 1 basket.

Methods

The study was divided into three stages: preformulation, granule preparation-evaluation, and tablet formulation-evaluation. Each stage consists of several tests and evaluations. The method flow chart is presented in

Figure 1.

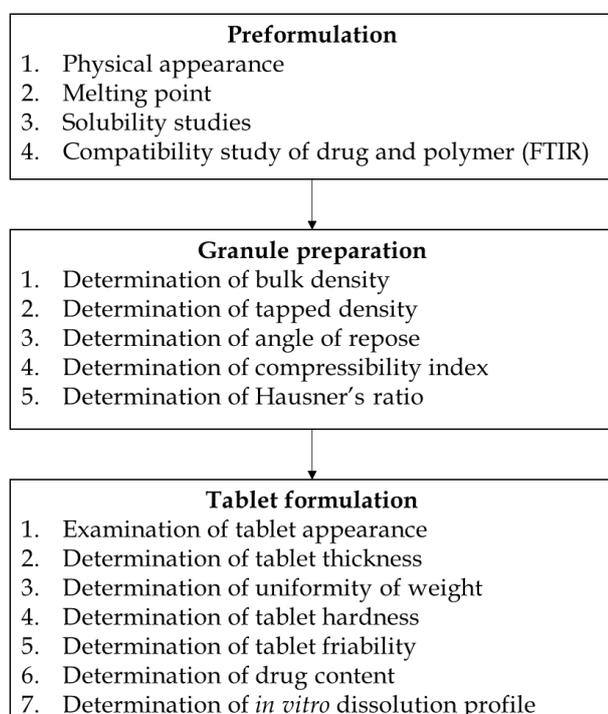


Figure 1. Flowchart for sustained release tablet preparation and evaluation parameters

Physical appearance

Aceclofenac powder was poured on light and dark backgrounds, and its physical appearance was observed. The results were compared with standard references²².

Determination of melting point

The melting point of the aceclofenac was determined by the capillary fusion method. A one-sided closed capillary was filled with drug and placed into the Remi's melting point apparatus. The temperature at which solid drug converted into liquid was recorded and compared with standard references²².

Solubility studies

The solubility of Aceclofenac was tested in different solvents. The drug (50 mg) was dissolved in 10 ml of solvent in a 10 mL solubility bottle. The bottle was adequately covered with a lid and placed in the water bath shaker maintained at 37°C for 24 hours. Samples were taken manually and filter through 0.45 µm filter paper. The UV absorbance of the solution was recorded using a UV spectrophotometer after suitable dilutions at 273.5 nm²³.

Compatibility study of drug and polymer (FTIR)

The sample was mixed with a suitable amount of KBr and converted into pellets using KBr press at 15 tons hydraulic pressure. The IR scanning of samples was done in between 4000 and 400 cm⁻¹ and spectrum observed for any occurrence and disappearance of characteristic drug peak and compared with the standard references²³.

Tablet preparation

The tablet formulation was carried out by varying the matrix formers: HPMC and Guar gum. In total, there were nine formulas for tablets, as shown in **Table I**. The corresponding amounts of the drug were accurately weighed and passed through the #40 sieve. The corresponding amounts of polymers (HPMC/Guar gum) and lactose were accurately weighed, screened

through screen #40. The screened mass was transferred into a clean and dry mortar and mixed gently for 5 minutes. Alcoholic solution (IPA) of PVP K 30 (5% w/v) was added to the powder mixture blended to form a wet mass. The wet mass was passed through sieve no. #10 and the resulting granules were placed on a tray for drying into the oven at 50°C for 10 minutes. The dried granules were passed through sieve no—#18. The corresponding magnesium stearate and talc were accurately weighed and then mixed with dried granules for 3 minutes. The granules were compressed into tablets using a single station hand operated tablet compression machine, and the tablets were collected²³.

Table I. Composition of the sustained release matrix tablets containing aceclofenac

Materials (mg)	Formula								
	F1	F2	F3	F4	F5	F6	F7	F8	F9
Aceclofenac	200	200	200	200	200	200	200	200	200
HPMC	50	100	150	200	-	-	-	-	100
Guar gum	-	-	-	-	50	100	150	200	100
Lactose	200	150	100	50	200	150	100	50	50
PVP K30	25	25	25	25	25	25	25	25	25
IPA	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.
Talc	20	20	20	20	20	20	20	20	20
Mg Stearate	5	5	5	5	5	5	5	5	5

Determination of bulk density

Bulk density was defined as the mass of the powder divided by the bulk volume and expressed as g/cm³. It depends upon particle size distribution, particle shape, and particle adhere. Apparent bulk density was determined by pouring the blend into a 10 mL graduated cylinder and calculated based on the equation as reported by Yasmin *et al*²⁴.

Determination of tapped density

The measuring cylinder containing a known mass of powder blend was tapped 100 times using density apparatus. The minimum volume occupied by the powder in the cylinder was measured. The tapped density was calculated based on the equation as reported by Yasmin *et al*²⁴.

Determination of angle of repose

The angle of repose (θ) was determined using the funnel method. Briefly, the powder blend was poured through a funnel that can be raised vertically until a maximum cone height was obtained. The radius of the heap was measured, and the angle of repose was calculated based on the equation as reported by Yasmin *et al*²⁴. The values of angle of repose indicating flow properties have been recommended as <25 indicating excellent flow, 25-30 indicating good flow, 30-40 indicating passable, and >40 indicated the very poor flow.

Determination of compressibility index

Determination of compressibility index was the simplest way to measure the flow property of powder to determine its compressibility. Compressibility index indicates the ease with which a material could induce flow, which was calculated using the equation as reported by Yasmin *et al*²⁴. The values of compressibility index indicating flow properties have been recommended as <12 indicating excellent flow, 12 – 16 indicating good flow, 18 – 21 indicating fair to passable, 25 – 35 indicating poor, 33 – 38 indicating very poor, and >40 indicated the extremely poor flow.

Determination of Hausner's ratio

Hausner's ratio was an indirect index of ease of powder flow. Density determinations were used to calculate the Hausner's ratio using the equation as reported by Yasmin *et al*²⁴. Lower Hausner's ratio (<1.25) indicates better flow properties than higher ones (>1.25).

Examination of tablet appearance

Twenty tablets of each formulation were randomly taken and examined to check any physical or surface roughness in the tablets.

Determination of tablet thickness

Tablet thickness was an essential parameter in reproducing appearance and also in counting by using

filling equipment. Many tablet filling/packaging equipment utilizes the uniform thickness of the tablets as a counting mechanism²⁵. In the present study, 10 tablets were randomly selected, and their thickness was recorded using a micrometer.

Determination of uniformity of weight

The weight variation test would be a satisfactory method of determining the drug content uniformity. USP procedure for uniformity of weight was followed. The allowed weight variation limits were 10%, 7.5%, and 5% for tablets having weight 130 mg or less, 130-324 mg, and >324 mg, respectively²⁶. Briefly, 20 tablets were taken and weighed individually and collectively using a digital analytical balance. The average weight of one tablet was determined from the collective weight.

Determination of tablet hardness

The hardness of the tablet was defined as the force applied across the diameter of the tablet to break it. The resistance of a tablet to chipping, abrasion, or breakage under the condition of storage, transportation, and handling before use depends on its hardness or strength²⁷. For the determination of tablet hardness, 10 tablets from each batch were randomly selected, and hardness was determined using Monsanto tablet hardness tester.

Determination of tablet friability

The friability of the prepared tablets was determined using Roche friabilator. This device subjects the tablets to the combined effect of abrasions and shock in a plastic chamber revolving at 25 rpm and dropping the tablets at the height of 6 inches in each revolution. Previously weighed, 20 tablets were placed in the friabilator and subjected to 100 revolutions. Tablets were de-dusted using a soft muslin cloth and re-weighed. The percentage friability was determined using the equation as reported by Ahmed *et al*²⁸.

Determination of drug content

Six tablets from each batch were weighed and finely powdered using a clean and dry mortar and pestle. Powder equivalent to the weight of one tablet was transferred to a 100 mL volumetric flask and shaken with 60 mL of phosphate buffer for 10 minutes. The volume of the resulting solution was made to 100 mL and kept for 24 hours. After 24 hours, the content was filtered. An aliquot of 1.0 mL from the filtrate was diluted to 100 mL with phosphate buffer in a volumetric flask, and then further 1 mL from this solution was diluted up to 10 mL phosphate buffer in a 10 mL volumetric flask²⁹. The sample was analyzed by a UV spectrophotometer at 273.5 nm.

Determination of in vitro dissolution profile

The *in vitro* dissolution studies were carried out in the USP tablet dissolution test apparatus, type 1 (basket). As much as 900 mL of phosphate buffer (without enzymes) was used as a dissolution medium. Dissolution studies were carried out for 24 hours. The temperature of the dissolution medium was maintained at $37 \pm 0.5^\circ\text{C}$. The paddle was rotated at 75 rpm. Sample (5 mL) was withdrawn data predetermined interval for 24 hours. Complete sink condition was maintained by replacing the same volume of fresh dissolution medium after each sampling. The samples were diluted to a suitable volume with phosphate buffer, and the absorbance was recorded at 273.5 nm using a UV spectrophotometer²³.

RESULTS AND DISCUSSION

Physical appearance

Pure aceclofenac used in the form of a faded white crystalline powder as stated in the physical identification results of the drug sample was identical to the reference standard. These results confirm the identity of aceclofenac.

Determination of melting point

The melting point value observed was 149°C. These values match the values mentioned in standard references (149-153°C)²², confirming that the drugs used in this study were in their pure form.

Solubility studies

Aceclofenac has better solubility in phosphate buffer and does not have good solubility in distilled water and 0.1 N HCl, as presented in **Table II**.

Table II. Solubility of aceclofenac

Solvent	Solubility (mg/mL)	Remark
Distilled water	0.187	practically insoluble
0.1N HCl	0.283	practically insoluble
Phosphate buffer	0.841	slightly soluble

Compatibility study of drug and polymer (FTIR)

The peaks at 3319 cm⁻¹ and 3267 cm⁻¹ in the FTIR spectrum of aceclofenac (**Figure 2**) are associated with OH hydrogen bonds. This peak at 2970 cm⁻¹ was due to the aromatic stretching of NH. The stick peak character near 2937 cm⁻¹ may be due to the stretching of the CH from the CH groups. The peak at 1750 cm⁻¹ indicates the presence of carboxylic acids in the compound. The peaks at 1589 cm⁻¹, 1577 cm⁻¹, and 1508 cm⁻¹ indicate a stretch of the C = C ring. The overall functional group analysis is presented in **Table III**.

Table III. FTIR spectrum of aceclofenac and its functional groups

Peak (cm ⁻¹)	Remark
3319	OH hydrogen bonding
3267	OH hydrogen bonding
2970	NH aromatic stretching
2937	CH stretching
1750	C=O stretching
1589	C=C stretching
1577	C=C stretching
1508	C=C stretching

Micromeritic properties

The flow property of granules was estimated based on different micromeritic properties. The bulk density and tapped density were determined using USP bulk density

apparatus, and the results are represented in **Table IV**.

The bulk density and tapped density were found to be almost similar, indicating similar flow properties. The differences in bulk density and tapped density were minimal, indicating that the change volume is significantly less even after 100 tapping³⁰, which confirms uniform particle size range and reproducibility in drug. Hausner's ratio is related to inter-particle friction. Hausner's ratio is indirect measures of bulk density, size, and shape, surface area, moisture content, and cohesiveness of granules. A higher Hausner's ratio and more fine particles indicate greater cohesion between particles, while a low range of Hausner's ratio indicates good flowability. The desirable value of Hausner's ratio is <1.25 for a good flow of materials. The Hausner's ratio of granules was determined and found to be in the range of 1.12±0.040 to 1.19±0.035. An increase in Hausner's ratio is due to an increase in granule size, and this might be due to increased void space between the particles³¹.

It is well known that particle size and shape influence flowability. The fine particles (<100 mm) tend to be more cohesive and therefore less free-flowing, whereas larger denser particles tend to be free-flowing. The rougher and more irregular the surface of the particles, the higher will be the angle of repose³². In the present study, the angle of repose increased from 26.78±0.600 to 30.60±0.566° as the particle size increased, indicating the decrease in flowability of granules³³. This is also supported by the results of Hausner's ratio study.

A high compressibility index is indicative of the tendency to form bridges between the particles. The smaller the compressibility index, the better the flow properties; for example, a value of 5 to 15 indicates excellent, 12 to 18 good, 19 to 21 fair and 22 to 35 poor, 36 to 40 very poor, and >40 extremely poor flow³⁴. The results show a compressibility index in the range of 10.93±0.150 to 14.76±0.462, which indicates excellent flow property.

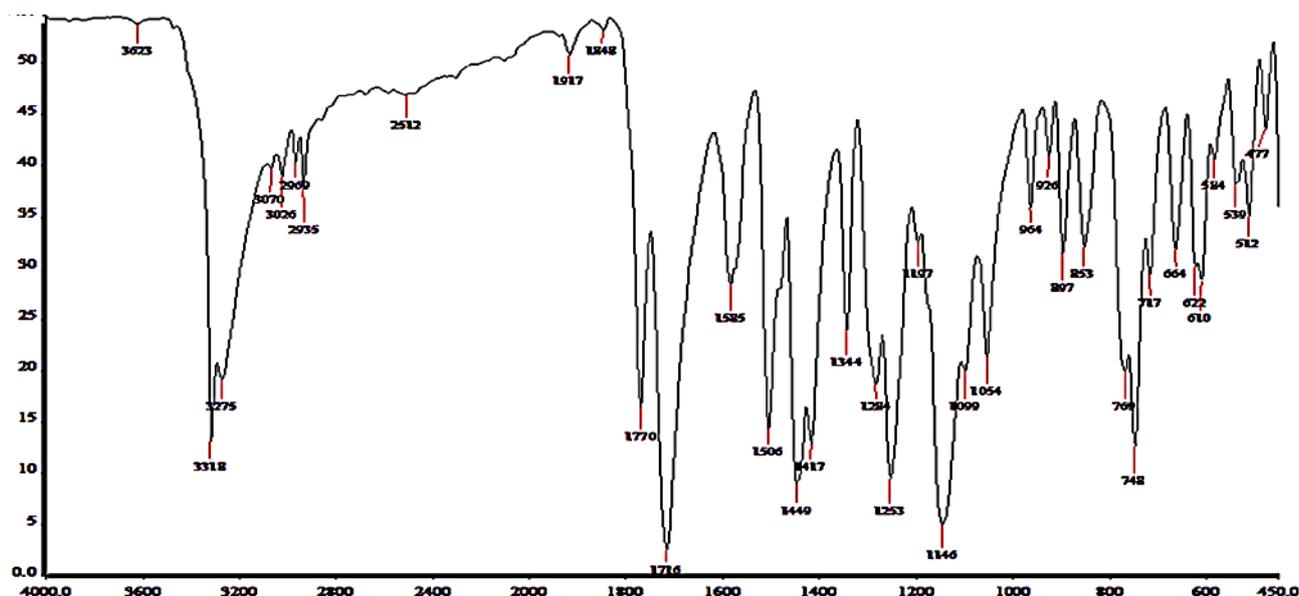


Figure 2. FTIR spectrum of aceclofenac

Table IV. Results of micromeritic characterization of aceclofenac granules

Formula	Bulk density (g/cm ³)	Tapped density (g/cm ³)	Compressibility index (%)	Hausner's ratio	Angle of repose (°)
F1	0.438±0.002	0.503±0.006	12.4±0.346	1.14±0.046	30.60±0.566
F2	0.429±0.007	0.479±0.009	12.65±0.618	1.12±0.040	30.00±0.173
F3	0.477±0.019	0.560±0.023	14.76±1.721	1.17±0.023	28.03±0.208
F4	0.491±0.010	0.551±0.013	10.93±0.150	1.12±0.003	28.30±0.346
F5	0.416±0.007	0.471±0.009	11.74±0.248	1.13±0.004	27.24±0.295
F6	0.412±0.027	0.479±0.018	14.0±1.212	1.16±0.015	26.78±0.600
F7	0.477±0.010	0.556±0.010	14.20±0.266	1.166±0.004	27.77±0.546
F8	0.466±0.003	0.541±0.001	14.05±0.531	1.623±0.064	27.29±0.272
F9	0.478±0.003	0.561±0.001	14.76±0.462	1.19±0.035	27.34±0.140

Post compression results

The tablets were evaluated for weight variation, thickness, hardness, friability drug content, and *in vitro* drug release profiles. Weight variation data indicates no significant difference in individual tablet weight from the average weight (500.333±0.577 to 502.33±0.577). Tablet hardness was observed within the range of 3.26±0.115 to 3.60±0.200 kg/cm². A uniform thickness of the tablets

was observed in the range of 3.23±0.004 to 3.28±0.008. The Friability of all the formulations was below 1%, indicating good mechanical strength of the tablets (Table V). From the *in vitro* drug release data, it was clear that the drug release was decreased with an increase in polymer concentration. The drug release was found to occur through a swelling process³⁵.

Table VI was to find out the mechanism of drug release, and also to verify the fact that whether diffusion was Fickian or non-Fickian. The *in vitro* dissolution data of all the batches was plotted according to the Peppas' equation, in which cumulative log percentage of drug release was plotted against log time. From the kinetic data, it was evident that the drug release was found to follow Peppas' model for all the formulations, and the release was diffusion controlled. The calculated slope values of Peppas' equations gave a value close to 1 but less than 1, which confirmed that the release mechanism of aceclofenac from the hollow beads was Fickian diffusion with swelling in both the media³⁶. From Table VII, it was clear that all the formulations had 'n' values greater than 0.5 and less than 1, which confirms that the release mechanism of aceclofenac from the prepared

matrix tablets in phosphate buffer was Fickian diffusion with swelling³⁷.

Table V. Post compression results of aceclofenac sustained release matrix tablets

Formula	Weight (mg)	Thickness (mm)	Hardness (kg/cm ²)	Friability (%)	Drug content (%)
F1	501.33±0.577	3.23±0.035	3.53±0.115	0.31	97.89
F2	501.67±0.535	3.26±0.010	3.60±0.200	0.48	100.59
F3	500.67±1.528	3.25±0.005	3.46±0.115	0.64	96.32
F4	502.33±0.577	3.27±0.006	3.40±0.200	0.71	97.99
F5	500.68±0.438	3.28±0.008	3.26±0.115	0.33	96.32
F6	501.33±1.155	3.25±0.012	3.33±0.120	0.47	100.11
F7	501.23±1.535	3.24±0.007	3.33±0.115	0.63	99.15
F8	502.33±0.577	3.27±0.007	3.40±0.200	0.68	99.14
F9	500.33±0.577	3.23±0.004	3.50±0.115	0.65	100.11

Table VI. *In vitro* drug release of aceclofenac from sustained release matrix tablets in phosphate buffer

Time (hours)	Formula								
	F1	F2	F3	F4	F5	F6	F7	F8	F9
0	0	0	0	0	0	0	0	0	0
0.5	2.57±0.76	2.05±0.56	1.91±0.87	1.77±0.32	2.44±0.56	1.86±0.03	1.82±0.54	1.44±0.54	1.5±0.45
1	2.47±0.54	1.99±0.87	1.83±0.77	1.56±0.32	2.38±0.65	1.83±0.09	1.71±0.54	1.33±0.76	0.98±0.33
2	2.69±0.34	2.11±0.98	1.88±0.66	1.69±0.54	2.53±0.01	1.94±0.34	1.86±0.65	1.8±0.54	1.28±0.34
4	42.8±0.12	39.11±0.45	36.73±0.87	32.39±0.65	40.58±0.08	39.23±0.87	36.34±0.65	31.27±1.8±	20.86±0.43
6	51.34±0.03	51.46±0.32	52.69±0.56	46.88±0.55	53.07±0.32	52.5±0.98	51.73±0.07	46.35±0.98	29.56±0.66
8	63.65±0.09	62.47±0.22	61.15±0.67	56.42±0.43	62.46±0.43	63.07±0.67	59.81±0.09	54.54±0.97	43.8±0.66
10	78.26±0.07	74.12±0.08	70.38±0.08	66.73±0.55	76.54±0.03	74.04±0.34	68.85±0.08	63.26±0.65	51.16±0.55
12	96.34±0.94	86.59±0.44	81.73±0.66	76.59±0.65	95.58±0.32	85.38±0.45	80.58±0.05	72.12±0.09	59.04±0.07
16	-	100.34±0.44	89.6±0.66	86.31±0.76	-	100.38±0.54	87.88±0.04	82.19±0.09	70.77±0.66
20	-	-	99.61±0.32	95.76±0.76	-	-	99.81±0.04	92.81±0.09	84.03±0.07
24	-	-	-	100.19±0.43	-	-	99.8±0.05	99.04±0.05	99.04±0.55

In this work, an attempt was made to formulate and evaluate sustained release matrix tablets of aceclofenac to maintain the plasma drug concentration constant for the

whole day. It also helps in decreasing the dosing frequency by which the patient compliance increases. Aceclofenac has a very short half-life ($t_{1/2}$ 2-4 hours), so in conventional tablets, aceclofenac dosing frequency is more. Drugs with a short half-life cannot maintain the plasma drug concentration at the therapeutic levels for a more extended period³⁸. Thus, to decrease the dosing frequency and increase patient compliance, sustained release matrix tablets were formulated.

In the preformulation studies, aceclofenac was characterized based on its physicochemical properties by determining melting point, solubility, UV spectroscopy, and FTIR studies. There were no physical changes after, and also no significant interaction of drug with polymers was observed in the UV and FTIR analysis after four weeks as the drug and polymers were compatible and thus were finalized to use in the formulation of sustained-release tablets²⁹. Quality parameters such as tablet diameter, thickness, hardness, friability, and dissolution profile were evaluated. The best release profile was obtained from tablets containing Guar gum matrix former without HPMC in an equivalent proportion to the drug (F8). The best-selected tablet formulation had friability 0.68%, hardness 3.40±0.200 kg/cm², and 99.8±0.05 drug release after 24 hours of the dissolution study.

Table VII. Estimated values of diffusional exponent and correlation coefficient from the dissolution data of aceclofenac in phosphate buffer

Formula	Zero order (r ²)	First order (r ²)	Higuchi's model (r ²)	Peppas' model	
				r ²	n
F1	0.9711	0.9118	0.9973	0.9813	0.612
F2	0.9709	0.8666	0.9964	0.9674	0.598
F3	0.9687	0.8412	0.9959	0.9784	0.632
F4	0.9770	0.8204	0.9957	0.9809	0.618
F5	0.9771	0.8070	0.9934	0.9712	0.545
F6	0.9718	0.8296	0.9950	0.9778	0.625
F7	0.9770	0.8066	0.9964	0.9840	0.559
F8	0.9696	0.8079	0.9947	0.9824	0.573
F9	0.9712	0.8400	0.9978	0.9785	0.632

CONCLUSION

In this study, the prepared matrix aceclofenac tablet showed significant drug release property. It maintains the constant concentration for a long time means that it increases the half-life and bioavailability of the drug.

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AUTHORS' CONTRIBUTION

All authors made substantial contributions to the conception and design of the study. All authors took responsibility for data analysis, interpretation, and discussion of results. All authors read and approved the final manuscript.

DATA AVAILABILITY

All data are available from the authors.

CONFLICT OF INTEREST

There are no conflicts of interest.

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