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FORMULATION AND EVALUATION OF ONCE A DAY TABLET OF CEFDINIR

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Abstract

Aim of the present study is to develop sustained release matrix tablets of cefdinir to improve its oral bioavailability and to reduce the dosing frequency. Solid dispersions of cefdinir were prepared by kneading and fusion methods employing HPMC K100M and Vit E TPGS as carriers respectively. The prepared solid dispersions were directly compressed into matrix tablets using various polymers (HPMC K100M, Xanthan gum) in different concentrations. Prepared formulations were evaluated for weight variation, friability, hardness, thickness, swelling studies and *in vitro* drug release studies. Drug and excipients interactions were studied by FTIR. The prepared solid dispersions were characterized for Differential scanning calorimetry (DSC), X-ray powder Diffractometry (XRD).Enhanced drug solubility was observed with increasing the HPMC K100M concentration in kneading method and with decreasing the Vit E TPGS concentration in fusion method. Formulations were screened based on *in vitro* drug release profiles. Matrix tablet formulation comprising 0.25% of HPMC K100M shown better *in-vitro* drug release profile compared to other formulations and the release was extended up to 24 hrs. The formulation followed peppas kinetic model with case II transport release mechanism.

Keywords: HPMC K100M, Xanthan gum,Vit E TPGS, Kneading method, Fusion method.

Introduction

The tablets are one of the most preferred dosage forms because of their ease of administration, accurate dosing and stability as compared to other oral dosage forms. Compared to past decades, now a days there has been an increasing effort to develop an extended release dosage forms in the field of pharmaceutical technology [1].

Extended release dosage forms are designed to achieve a prolonged therapeutic effect by continuously releasing drug over an extended period of time after administration of a single dose. These dosage forms allow at least two fold reduction in dosage frequency as compared to that of immediate release dosage forms.

For the treatment of chronic disease conditions, conventional tablets are required to be administered frequently, and they have several disadvantages. Sustained release (SR) tablet formulations are much enviable and chosen for such therapy because they offer better patient compliance, maintain uniform drug levels in the systemic circulation, reduce dose and side effects. To obtain a better drug release profile in oral controlled drug delivery a variety of polymer matrix systems have been used [2].

Cefdinir is a semi-synthetic third generation broad-spectrum oral cephalosporin antibiotic and is active against Gram-positive and Gram-negative rods. It is used in the treatment of acute chronic bronchitis, rhinosinusitis and Pharyngitis [3].

Formulation of poorly water soluble drugs in to a sustained release dosage forms require a combination of solid dispersion and sustain release techniques. The most promising tool for improving the dissolution of poorly water-soluble drugs is the delivery of drug through Solid dispersion via an efficient carrier.

Material and Methods

Materials

Cefdinir was obtained as a gift sample from Aurobindi laboratories, Hyderabad, India. Xanthan gum was a gift sample from lucid colloids Ltd, Mumbai, India. Hydroxy propyl methyl cellulose was a gift sample from Dr. Reddy's Laboratories, Hyderabad, India. Glyceryl monostearate was a gift sample from Qualikems Fine chem Pvt.Ltd., Vadodara. Dimethyl sulphoxide was a gift sample from Finar chemicals limited, Ahmedabad,India. Vit.E TPGS was a gift sample from Dr. Reddy's Laboratories, Hyderabad, India.

Experimental Methods

Preparation of solid dispersions

Solid dispersions of the drug were prepared by two methods i.e., kneading and fusion method using HPMC K100 M and Vit E TPGS as carriers respectively at different ratios.

Kneading method

Different ratios (1:0.125, 1:0.15, 1:0.175, 1:0.2, 1:0.225, 1:0.25) of cefdinir: HPMC K 100 M solid dispersions were prepared by taking accurately weighed amount of HPMC K 100 M in a mortar and pestle. Water was added and triturated to form a mucilaginous mass. The drug was added to the above mass, triturated for 25 minutes and dried at a temperature of 45^0C [4].

Fusion method

Solid dispersions were prepared by fusion method with different concentrations of cefdinir: vit.E TPGS (1:0.1, 1:0.2, 1:0.3, and 1:0.4) by melting the carrier in a mortar and drug was added to the molten carrier slowly by continuous trituration for homogeneity and then solidified rapidly in an ice-bath [5].

Characterization of drug and polymers

Fourier transforms infra red spectroscopy (FTIR)

FTIR study was carried out to check compatibility of drug with polymers. FTIR studies were performed on drug, excipients and the optimized formulation using FTIR spectrophotometer. The samples were analyzed by conventional KBr pellet method. The scanning range was 4000 cm^{-1} to 500 cm^{-1}.

Characterization of the Solid Dispersions

The prepared solid dispersions were characterized by using Differential Scanning calorimetry and X-Ray Diffraction methods.

Differential scanning calorimetry

Differential Scanning Calorimetry was performed by using DSC-60. The instrument comprised of calorimeter (DSC 60), flow controller (FCL 60), thermal analyzer (TA 60) and operating software TA 60 from Shimadzu Corporation, Japan. The active ingredient was placed in aluminium pan and crimped, followed by heating under nitrogen flow (30 mL/min) at a scanning rate of 5 °C min-1 from 30 °C to 300 °C. Aluminium pan containing same quantity of indium was used as reference. The heat flow as a function of temperature was measured.

X-ray diffraction chromatography: The XRD patterns of cefdinir, physical mixture, solid dispersions with HPMC K 100M, Vit E TPGS were detected using X-Ray diffractometer with Cu at the interval of 10-$80^0/2\theta$. The degree of diffraction was measured at a scanning speed of 40/min, voltage 40.0 (kV) and current 30.0 (mA).

Preparation of sustained release matrix tablets of cefdinir

HPMC K 100M and Xanthan gum were taken as polymers for solid dispersions prepared by kneading method and fusion method respectively. These polymers were mixed with solid dispersions in different ratios for the preparation of matrix tablets. PVP k_{30} and microcrystalline cellulose were used as binder and diluent respectively, mixed well. Then the mass was sieved through sieve no #20. After addition of 2% talc and 2% magnesium stearate, tablets of 700mg were compressed using rotary tablet machine equipped with 12mm flat punch (Table 1).

Table No 1. Composition of cefdinir sustained release matrix tablets.

FORMULATIONS	SD EQUIVALENT TO DRUG (mg)	HPMC K100M(mg)	XG (mg)	PVP K_{30} (mg)	MCC (mg)
F1	337.5	37.5	-	35	262
F2	345	45	-	35	247
F3	352.5	52.5	-	35	232
F4	360	60	-	35	217
F5	367.5	67.5	-	35	202
F6	375	75	-	35	187
F7	330	-	16.5	35	290.5
F8	330	-	33	35	274
F9	330	-	66	35	241
F10	330	-	99	35	208
F11	330	-	132	35	175
F12	330	-	165	35	142
F13	300(pure drug)	37.5	-	35	262

Note: All formulations contain 2% (14 mg) Talc and 2% (14 mg) Magnesium stearate

SD=Solid dispersion, XG= Xanthan gum, MCC= Microcrystalline cellulose

Swelling studies

The extent of swelling was measured in terms of percent weight gain by the tablets. The swelling behavior of formulations F1 and F12 were studied. Tablet was placed in a petridish containing 20 ml of 6.8 pH phosphate buffer. At the end of 1 hr, it was transferred to tissue paper and re weighed. This procedure was repeated for every one hr till the end of 12 hr [6].

The % weight gain by the tablet was calculated by

Swelling index= $\{(M_t-M_0)/M_0\}$ X 100

Where,

S.I = Swelling Index,

M_t = Weight of tablet at time't'

M0 = Weight of tablet at time 0.

Evaluation of tablets

For the evaluation of tablets physical and chemical parameters must be considered.

Tablet size and Thickness

Tablet size and thickness is necessary for the consumer acceptance and tablet-tablet uniformity. Twenty tablets were taken randomly and tested for thickness and size using vernier calipers. The tablet thickness should be within a limit of ±5%.

Average weight of Tablets

Take randomly 20 tablets and weigh accurately 20 tablets and calculate the average weight.

Average weight = weight of 20 tablets /20

Weight variation test

For the Weight variation test all the tablets in a batch should be uniform in weight. If any weight variation is there, the pharmacopeial limit for percentage deviation is:

±10% for tablets weighing 130mg or less

±7.5% for tablets weighing 130mg-324mg

±5% for tablets weighing more than 324mg

The test is considered correct if not more than two tablets fall outside this range. When 20 tablets are taken for the test and not more than 1 tablet fall outside this range when only 10 tablets are taken for the test. The difference in weight of tablets can lead to variation in doses. For carrying out this test 20 tablets at random are taken and weighed. The weights of individual tablets are then compared to be equal to average weight.

Friability: This test is performed to evaluate the ability of tablets to withstand abrasion during packing, handling and transporting. Initial weight of 20 tablets is taken and these are placed in the Roche friabilator, rotating at a speed of

25rpm for 4min. The difference in the weight is measured and expressed in percentage. The deviation should be between 0.1 to 1.0% [7].

Hardness test

The tablet requires a certain amount of mechanical strength to withstand the shocks of handling during manufacturing, packing, transport and dispensing. Ten tablets from each batch were selected randomly and Crushing strength was determined using Monsanto hardness tester.

Drug content

Drug content was determined by accurately weighing 5 tablets and crushing them in a mortar with the help of pestle. Then an accurately weighed quantity powder equivalent to 300mg of drug was transferred to a 100ml volumetric flask. 20ml of dimethyl sulphoxide was added and shaken. Volume was made up to 100ml with 6.8 ph phosphate buffer. First few ml of the filtrate was discarded. 1 ml of the filtrate was diluted to 100ml with 6.8 pH phosphate buffer. From the above solution 1ml was withdrawn and diluted to 10 ml with 6.8 pH phosphate buffer. The absorbance of the resulting solution was recorded at 288nm.

***In-vitro* dissolution studies**

The *in-vitro* dissolution studies were performed using USP type II dissolution apparatus at 50 rpm. Dissolution test was carried out for a total period of 24hrs using 0.1 N HCl (p^H 1.2) solution (900ml) as dissolution medium at 37±0.5^oC for first 2 hrs and 6.8 p^H phosphate buffer solution (900ml) for the rest of the period. An aliquot (5ml) sample was withdrawn at specific time intervals and replaced with fresh medium to maintain a constant volume. The samples were filtered, and analyzed by UV spectrophotometer at 288nm. The concentration was calculated using standard calibration curve.

Results and Discussion

Preparation of solid dispersions: Significant solubility improvement was observed with solid dispersions prepared with HPMC K 100M and Vit. E TPGS. With kneading and fusion methods, the solubility of drug was found high for 1:0.25 ratio of HPMC K 100M and 1:0.1 ratio of Vit. E TPGS respectively compared to other solid dispersions (Table 2) [8].

Table No 2. Preparation of solid dispersions by kneading and fusion method.

Drug:Carrier ratio	Solubility (mg/ml)	
	Kneading method (HPMC K 100 M)	Fusion method (Vit. E TPGS)
1:0.125	0.684	-
1:0.15	0.692	-
1:0.175	0.754	-
1:0.2	0.815	-
1:0.225	0.919	-
1:0.25	1.069	-
1:0.1	-	1.17
1:0.2	-	0.905
1:0.3	-	0.772
1:0.4	-	0.693
1:0.5	-	0.616

Fourier transform infra red spectroscopy (FTIR)

Drug Excipient interactions are effectively analyzed by Fourier transform infrared (FTIR) spectroscopy (Shimadzu). FTIR spectra of cefdinir pure (Figure.1) drug displayed principal bands at wave number of 3124.79 $cm^{-1}$for amino group ($-NH_2$), 1622.19 $cm^{-1}$for oxime group (C=N-OH),1764.93 $cm^{-1}$for carbonyl group (C=O) cm^{-1} in carboxylic acid functional group,2916.47 cm^{-1} for hydroxyl group (O–H) in carboxylic acid functional group,1599.04 cm^{-1} for C=C stretching in aromatic ring,1354.07 cm^{-1} for C–N stretching in aromatic ring. FTIR spectra of Xanthan gum display characteristic band at wave number of 1592.24 cm^{-1} for carbonyl group (C=O) in carboxylic acid functional group, Carboxylic acid contains –OH group shows bands at wave number of 3439.22 cm^{-1}, alcohol contains –OH group display band at wave number of 1051.29 cm^{-1}.FTIR spectra of HPMC K100M display band at wave number of 3424.43 cm^{-1} for hydroxyl group, ether group display band at wave number of 1051.58 cm^{-1}, alkane group display band at wave number of 2922.90 cm^{-1}. FTIR spectra Glyceryl monostearate display bands at wave number of 1732.13 for C=O in ester group, 1182.40 for C–O group, 2956.97 for C–H stretching in aliphatic chain.

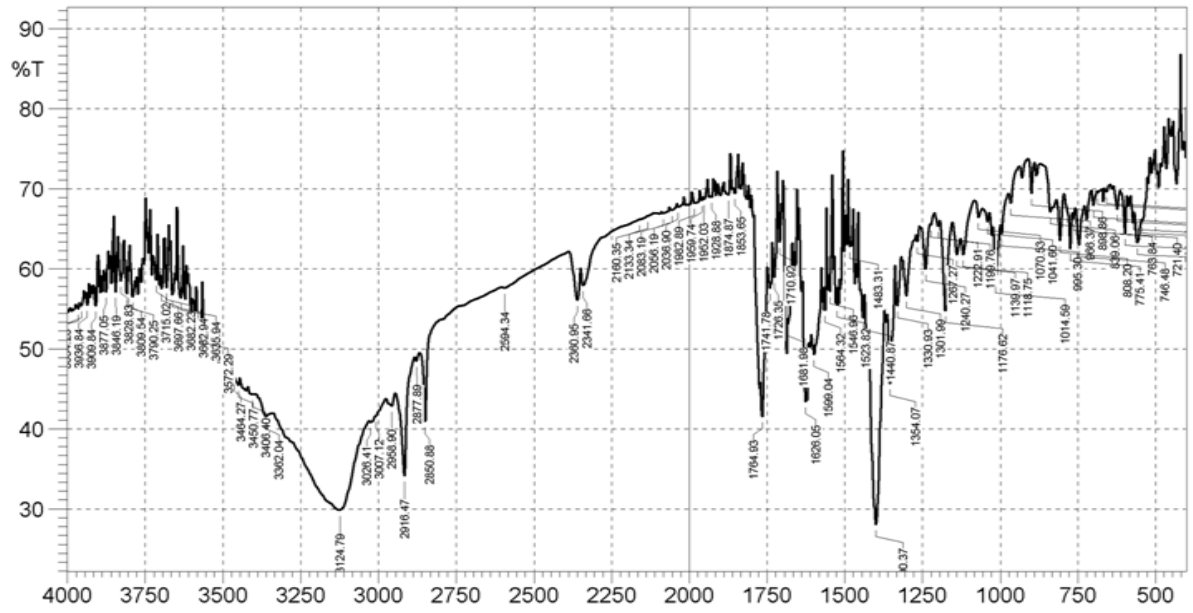

Figure 1: FT-IR spectrum of Cefdinir.

FTIR spectra of optimized formulation (Figure.2) show bands for specific functional group in cefdinir and HPMC K100M. Spectrum illustrates bands at wave number 3120.57 cm^{-1} (amino group), 1622.19 cm^{-1} (oxime group), 1766.85 cm^{-1} (carbonyl group), 1354.07 cm^{-1} (C–N stretching) which are represents cefdinir. HPMC K100M contain functional groups shows bands at wave number 3427.67 cm^{-1} (hydroxyl group), 1051.58 cm^{-1}(ether group), 2922.90 cm^{-1}(alkane group). There is no significant interactions are observed as per this FT IR studies.

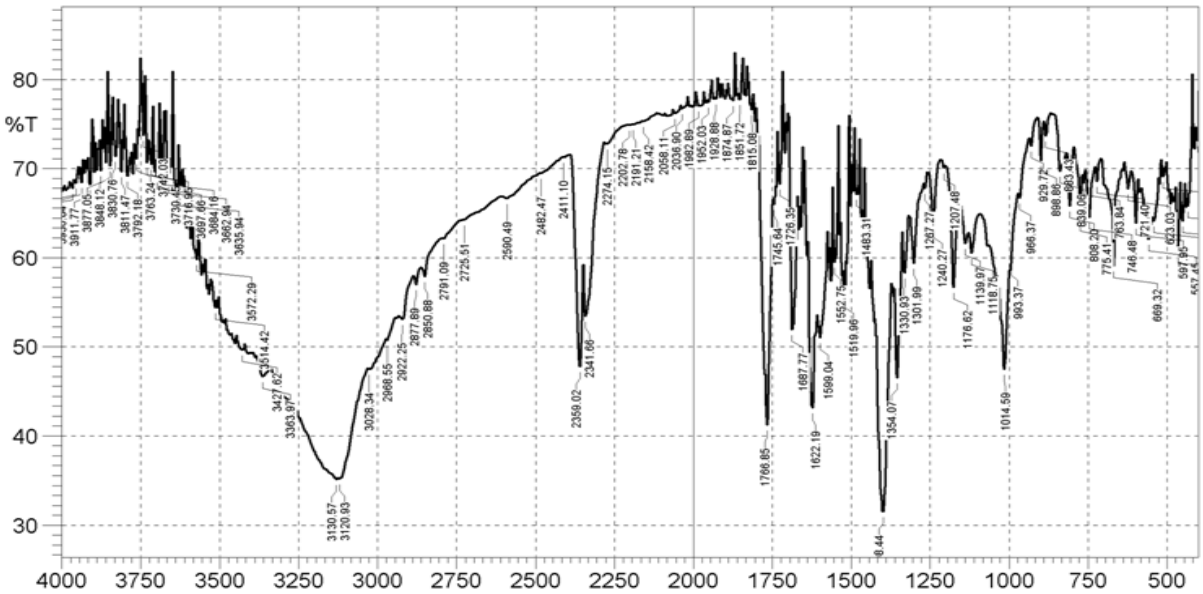

Figure 2: FT-IR spectrum of Optimized formulation.

Characterization of the solid dispersions

Differential Scanning Calorimetry

Exothermic peak of pure drug was found at 237.18^{0}C.The peak obtained for the physical mixture was at 233.07^{0}C, for the solid dispersion with HPMC K 100M is at 237.42^{0}C and for the solid dispersion with Vit.E TPGS was at 233.38^{0}C. Hence there was no significant change in the position of peak of the drug in the solid dispersions and the relative intensity of peaks was decreased, this indicates there was no interaction between drug and carriers (Figure. 3).

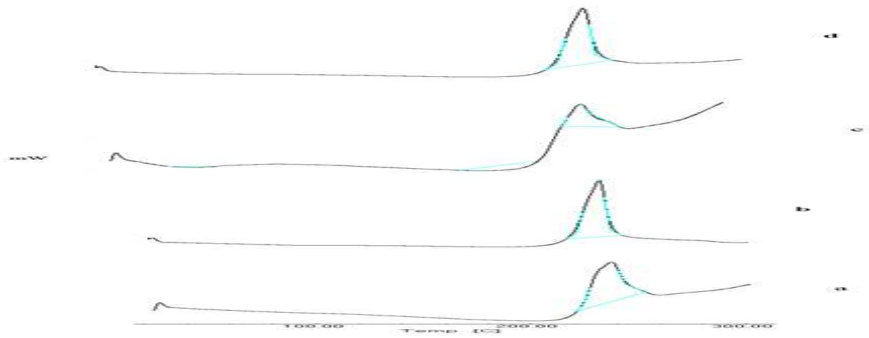

Figure 3: DSC thermograph of Cefdinir(a), physical mixture (b),solid dispersion of Cefdinir with HPMC K100 M(c) and solid dispersion of Cefdinir with Vit. E TPGS (d).

X-ray diffraction chromatography

X-ray diffraction patterns of cefdinir (pure drug) and solid dispersions were shown in (Figure. 4). The number of intense peaks was less in case of solid dispersions compared to pure drug indicating the conversion of crystalline form of drug in to amorphous form. Formulations prepared with HPMC K 100M and Vit. E TPGS were compared the peaks were less intense with HPMC K 100M compared to that of Vit. E TPGS.

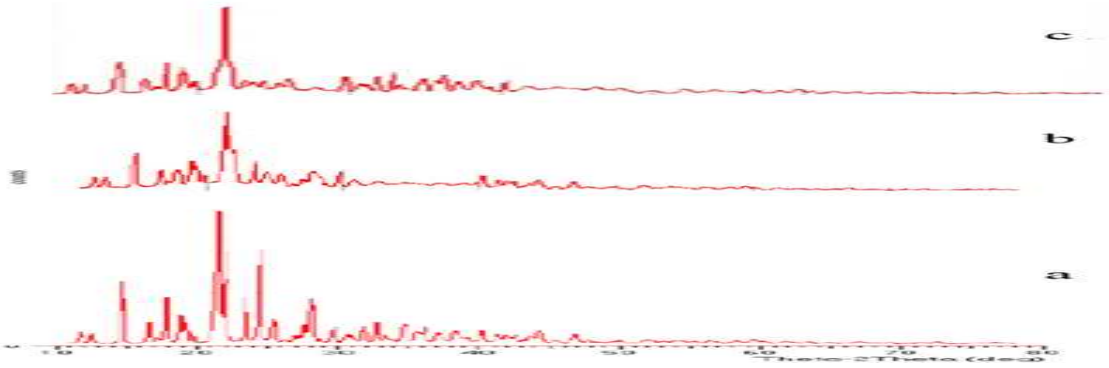

Figure 4: X-ray diffraction pattern of Cefdinir (a),solid dispersion of Cefdinir with HPMC K 100M (b), solid dispersion of Cefdinir with Vit. E TPGS (c).

Evaluation of tablets

The tablets of different formulations were evaluated for thickness, uniformity of weight, drug content, hardness, friability, and *in-vitro* dissolution studies. All the formulations showed uniform thickness. The thickness of the tablets ranged from 4.6±0.02mm to 5.3±0.06mm. In a weight variation test, the percentage deviation for tablets of more than 324 mg is ±5%. Average percentage deviation of all tablet formulations were found to be within the limit, and the weights of all tablets were ranged from 679±2.4 to 708±1.45.Good uniformity in drug content was found with different formulations of tablets and the percentage of drug content ranged from 93.4±0.47% to 102.5±0.73%. Percentage friability for all formulations was ranged from0.32% to 0.66%, hardness in the range of 6.1±0.27 Kg/cm^2 to 6.9±0.37 Kg/cm^2.

***In-vitro* dissolution studies**

All formulations were evaluated for the cumulative drug release. The cumulative percentage drug release after 24hrs was found to be 91.57%and 65.43% for formulations F_1 and F_{12} respectively. The release profile was gradually decreased by increasing the polymer ratio.

The release rate of drug from F_1 to F_6 formulations was decreased with increase in the polymer concentration due to increase in the gel strength of the polymer that retards drug release (Table 3). Increase in the viscosity of the polymer in the matrix formulation increase the gel viscosity, thus decrease the drug dissolution (Figure.5). When a hydrophilic polymer is exposed to aqueous medium it undergoes swelling as well as erosion during dissolution and it undergoes chain relaxation, we can see especially polymers like HPMC [9].

Table No 3. *in-vitro* Cumulative % Drug release of Cefdinir from formulations F_1 to F_6.

Time(hr)	F_1	F_2	F_3	F_4	F_5	F_6
0	0±0	0±0	0±0	0±0	0±0	0±0
1	4.19±1.37	3.13±1.67	2.88±1.95	2.65±2.42	2.19±1.76	2.08±0.75
2	10.76±1.75	6.06±1.62	5.40±1.34	5.09±1.75	4.83±1.58	3.52±1.63
3	24.19±1.52	14.03±1.96	12.64±2.43	11.46±1.45	10.72±2.64	9.35±2.12
4	32.87±2.26	27.54±2.83	21.73±1.92	19.67±1.79	19.63±2.72	12.53±1.78
5	39.76±2.16	34.82±2.34	28.63±1.65	25.64±1.73	23.67±1.67	18.63±0.63
6	46.98±1.93	38.65±1.28	32.43±1.92	34.73±1.68	28.74±1.94	22.63±0.82
7	56.54±1.54	42.98±1.74	39.69±2.72	38.43±1.81	34.87±1.92	32.84±2.71

12	65.93±2.65	54.63±1.84	56.82±2.53	52.92±2.19	49.63±2.23	42.14±1.45
18	79.43±1.98	67.89±1.76	62.48±1.61	59.75±1.85	52.68±2.65	49.53±1.68

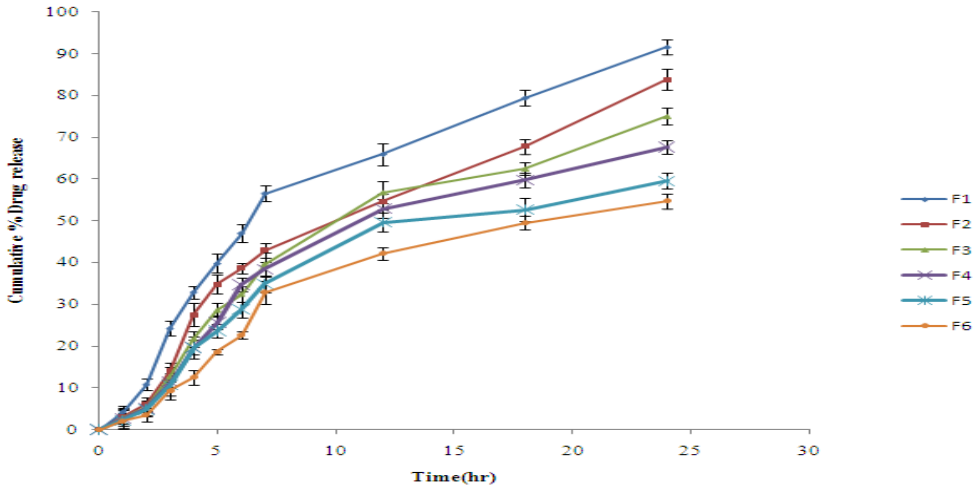

Figure 5: Comparative Cumulative % Drug release for formulations F_1 to F_6

The release rate of drug from F_7 to F_{12} (for Xanthan gum) formulations was decreased with increasing polymer concentrations (Table 4). The increase in polymer concentration in tablets produce dense matrix around the particles, provide more barriers for them to have the access with dissolution medium (Figure. 6). The decrease in release rate of drug from tablets is due to higher water uptake but lower erosion of tablet [10].

Table No 4. *in-vitro* Cumulative % Drug release of Cefdinir from formulations F_7 to F_{12}.

Time(hr)	F_7	F_8	F_9	F_{10}	F_{11}	F_{12}
0	0±0	0±0	0±0	0±0	0±0	0±0
1	3.53±1.54	2.47±1.21	2.34±1.71	2.56±1.18	1.89±1.45	1.58±1.84
2	5.4±1.62	4.34±1.68	4.13±1.57	3.83±1.94	2.69±1.61	2.55±1.4
3	17.99±1.84	14.53±1.41	10.87±1.83	9.85±1.15	8.54±1.94	6.94±1.73
4	24.53±1.93	21.87±1.83	12.34±1.75	13.76±1.72	12.67±1.78	10.84±1.92
5	30.28±1.45	25.24±1.49	19.25±1.95	18.59±1.28	15.56±1.53	19.54±2.41
6	35.54±1.52	28.44±1.58	28.57±2.64	21.87±1.62	20.54±2.17	21.75±2.16
7	40.53±2.41	30.64±1.71	30.43±1.84	32.64±2.52	22.86±1.46	25.47±1.61
12	47.94±1.83	41.65±1.69	45.65±1.43	40.48±1.85	31.72±1.59	34.75±1.94
18	57.75±1.91	50.76±2.45	48.46±1.32	44.43±1.64	39.64±1.82	37.98±1.55
24	65.43±1.75	59.46±1.94	51.86±1.89	49.13±1.15	45.82±1.48	41.54±1.67

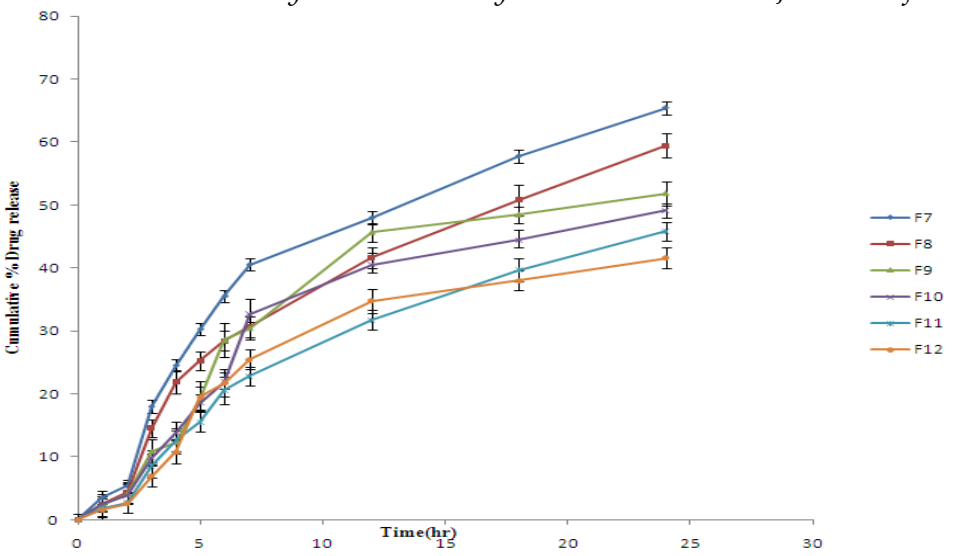

Figure 6: Comparative Cumulative % Drug release for formulations F_7 to F_{12}.

Poor drug release was observed with formulation containing xanthan gum compared to HPMC K 100M. As xanthan gum forms more viscous gels and has the higher capacity to retard drug release through its gel layer, drug release was retarded to a larger extent compared to that of HPMC K 100M (Table 5). This was confirmed by the swelling studies. The bioavailability was expected to be increased by comparing the in-vitro drug release profiles of formulation F1 (containing solid dispersion) with formulation F_{13} (which contains only pure drug) (Table 6 & Figure. 7).

Table No 5. *in-vitro* Cumulative % Drug release of Cefdinir from formulations F_1 & F_7.

Time(hr)	F_1	F_7
0	0±0	0±0
1	4.19±1.37	3.53±1.54
2	10.76±1.75	5.4±1.62
3	24.19±1.52	17.99±1.84
4	32.87±2.26	24.53±1.93
5	39.76±2.16	30.28±1.45
6	46.98±1.93	35.54±1.52
7	56.54±1.54	40.53±2.41
12	65.93±2.65	47.94±1.83
18	79.43±1.98	57.75±1.91
24	91.57±1.76	65.43±1.75

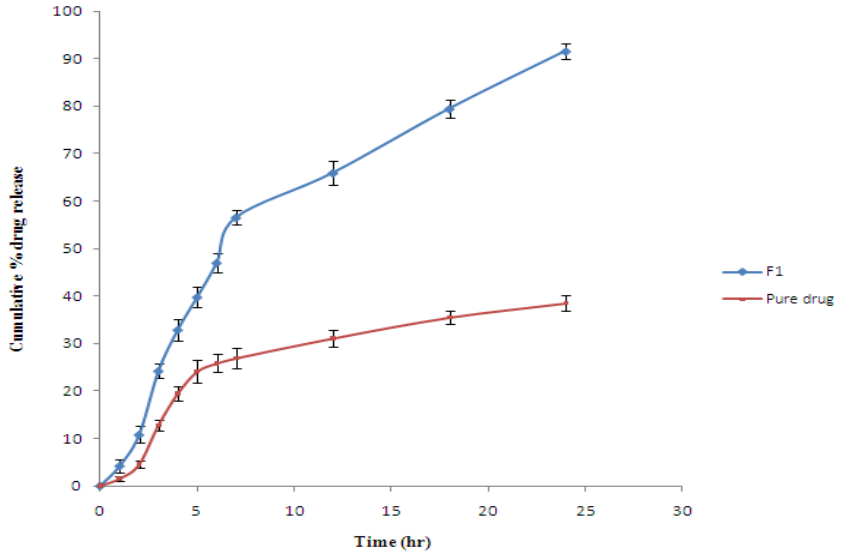

Figure 7: Comparative Cumulative % Drug release for formulations F_1 and Pure drug.

Table No 6. Comparative drug release profiles of tablets with and without solid dispersion.

Time(hr)	F_1	F_{13} (Pure drug)
0	0±0	0±0
1	3.57±1.37	1.5±0.5
2	6.67±1.75	4.5±0.7
3	16.44±1.52	12.8±1.2
4	28.65±2.26	19.5±1.5
5	32.67±2.16	24.1±2.3
6	39.76±1.93	25.8±1.9
7	47.83±1.54	26.9±2.2
12	65.93±2.65	31.1±1.8
18	74.76±1.98	35.5±1.4
24	91.57±1.76	38.5±1.7

Swelling studies

Swelling behaviour in hydrophilic matrices indicates the rate at which the tablet absorbs water from dissolution medium. As the time proceeds the swelling of matrix tablet was increased because the tablet imbibes water and forms a viscous gel barrier after contact with water (Table 7). The increase in polymer concentration increases the swelling index and the drug release was decreased, which is due to the formation of thick viscous gel layer around the matrix tablet. The swelling was decreased in case of HPMC k 100M due to the dissolution of the outermost gel layer of tablet (Figure. 8) [11].

Table No 7. Swelling index for formulation F_1 and F_7.

Time(hr)	S.I for HPMC K 100M	S.I for Xanthan gum
0	0±0	0±0
1	4.8±1.1	8.76±1.21
2	6.4±1.23	10.77±1.15
3	7.3±1.16	11.63±1.24
4	7.7±1.08	13.79±1.31
5	8.3±1.05	15.55±1.08
6	8.7±1.24	16.08±1.33
7	9.4±1.02	17.09±1.27
8	11.0±1.09	20.7±1.12
9	13.3±1.21	23.7±1.29
10	14.6±1.14	24.8±1.22
11	15.4±1.13	25.05±1.24
12	16.8±1.05	27.6±1.22

Note: S.I = Swelling Index

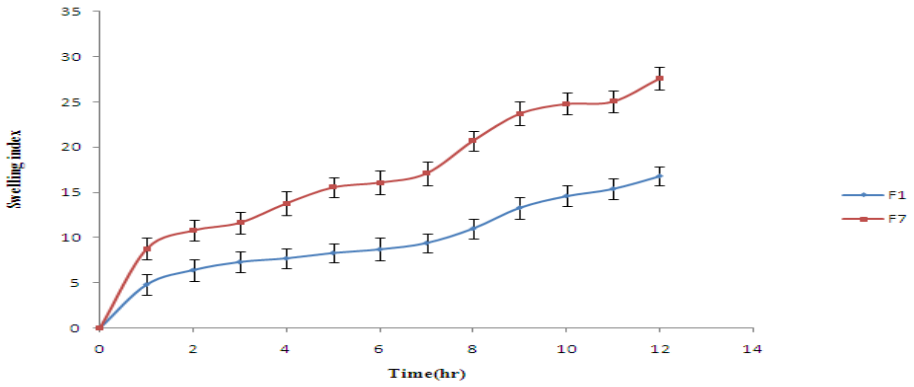

Figure 8: Swelling index profile for formulations F_1 and F_7.

Drug release kinetics

In-vitro drug release data of various formulations were fitted into the different kinetic models like zero order, first order, higuchi, koreymer-peppas and hixson-crowell. The regression coefficients for different drug release kinetic models were shown in table no.8. Models with the highest regression coefficient values were taken to be the most appropriate model to explain the dissolution data (Table 8).

The data of the various models revealed that formulation F_1, F_3, F_4, F_5, F_6, F_7, F_9, F_{10} and F_{12} follows Peppas model with n value is above 1 and thus release can be concluded as case II transport and formulation F_2, F_8, F_{11} follows first order release model with n value is above 1 and thus release can be concluded as Case II Transport.

Table No 8. Release kinetic values for various formulations.

Batch	Zero order		Higuchi		Peppas model			First order		Hixson-Crowell	
	r^2	k	r^2	k	r^2	k-A	n	r^2	k	r^2	k
F1	0.8771	3.861	0.9584	20.98	0.9853	13.52	1.131	0.9839	0.0974	0.9734	0.106
F2	0.9130	3.454	0.9542	18.29	0.9723	13.55	1.132	0.9793	0.072	0.9737	0.0853
F3	0.9119	3.219	0.9500	17.51	0.9811	14.32	1.156	0.9787	0.0584	0.9631	0.0732
F4	0.8886	2.96	0.9477	16.24	0.9851	14.89	1.173	0.9593	0.0495	0.9392	0.064
F5	0.8759	2.609	0.9387	14.4	0.9874	15.13	1.180	0.9340	0.04	0.9168	0.0534
F6	0.9034	2.458	0.9335	13.32	0.9759	15.84	1. 20	0.9476	0.0359	0.9344	0.0487
F7	0.8593	2.702	0.9486	15.13	0.9499	10.96	1.04	0.9457	0.0444	0.9026	0.0578
F8	0.9035	2.464	0.9616	13.55	0.9410	12.30	1.09	0.9662	0.0375	0.9488	0.0502
F9	0.8617	2.348	0.9217	12.95	0.9743	14.12	1.15	0.9046	0.0338	0.8914	0.0461
F10	0.8690	2.172	0.9277	11.96	0.9667	12.58	1.10	0.9113	0.0301	0.8981	0.0418
F11	0.9338	1.978	0.9566	10.67	0.9535	14.12	1.15	0.9689	0.0264	0.9586	0.0371
F12	0.8528	1.854	0.9210	10.27	0.9653	16.98	1. 23	0.8929	0.0241	0.8801	0.0342
F13	0.8930	2.422	0.9523	13.33	0.9688	10.96	1.04	0.9399	0.0361	0.9262	0.0487

Conclusion

The present study confirmed the successful preparation of Sustained release matrix tablets of Cefdinir using hydrophilic and hydrophobic polymers. Significant improvement in solubility was observed with prepared solid dispersions. All the formulations showed slow drug release depending upon the type and concentration of the polymer and increased concentration of polymer lead to decrease in drug release. Among all the formulations, F_1 formulation showed better drug release and the release was extended up to 24hrs with effective retardation of drug release. Drug release from this formulation followed Peppas model kinetics with case II transport release mechanism involving both diffusion and chain relaxation.

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