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FORMULATION AND EVALUATION OF SUSTAINED RELEASE MATRIX TABLET QUETIAPINE FUMARATE BY USING NATURAL POLYMER

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Abstract:

The purpose of present study was to develop once a day sustained release matrix tablet of Quetiapine Fumarate by using natural polymer viz. Xanthan gum and isolated fenugreek mucilage. Varying ratios of drug and polymer like were selected for sustained release tablet by using direct compression method. After fixing the ratio of drug and polymer for Sustain the release of drug up to desired time, the release rates were modulated by combination of two different rates controlling material and triple mixture of two different rate controlling material. After evaluation of physical properties of tablet, the in vitro release study was performed in 0.1 N HCl pH 1.2 for 2 hrs and in phosphate buffer pH 6.8 up to 12 hrs. The effect of polymer concentration and polymer blend concentration were studied. Dissolution data was analyzed by Higuchi expression. It was observed that matrix tablets contained polymer blend of Xanthan gum and isolated fenugreek mucilage were successfully sustained the release of drug up to 12 hrs. Among all the formulations, formulation P3 which contains 15 % Xanthan gum and % 25 of fenugreek mucilage release the drug which follow Higuchi kinetics via, diffusion and erosion and the release profile of formulation P3 was comparable with the prepared batch products.

Key words: *Sustained release, Xanthan gum, Fenugreek mucilage, Quetiapine Fumarate, phosphate buffer.*

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INTRODUCTION:

Sustained release (SR) technology has rapidly emerged over the past three decades as a new interdisciplinary science that offers novel approaches to the delivery of bioactive agents into systemic circulation at a predetermined rate [4]. By developing a predictable and reproducible drug release rate for an extended period of time, SR formulations can achieve optimum therapeutic responses, prolonged efficacy and decreased toxicity. Hydrophilic matrix tablets are among the most popular delivery systems for oral sustained release dosage forms through the gastrointestinal (GI) route. This is largely because they offer precise modulation of drug release as a result of hydration of the constituent polymer(s), flexibility to obtain the desired drug release profiles, cost effectiveness, patient compliance and providing a constant, prolonged, and uniform therapeutic effect in blood levels of the drug unlike conventional systems [5,8].

The use of hydrophilic polymers for sustained drug delivery has attracted the attention of investigators in recent years. Among the hydrophilic polymers, natural polysaccharides are preferred due to their nontoxicity, biocompatibility, biodegradability and acceptance by the regulating agencies. Polysaccharides, like cellulose ethers, xanthan gum, scleroglucan, locust bean gum and guar gum, are some of the natural polysaccharides that have been evaluated in hydrophilic matrix tablets for drug delivery systems [1].

In the present scenario with the changing life style and busy daily tasks people of all age groups are suffering from different types of psychological disorders and hence there is an increase in demand for the psychotropic drugs. In this context many novel drugs always try to capture existing markets which offer some additional benefits in terms of safety, reducing the side effects etc. Quetiapine fumarate is one such novel second generation, atypical anti psychotic drug often clinically recommended in conditions of schizophrenia, depression, mania. It interacts with a broad range of receptors and antagonizes both dopamine and serotonin receptors to alleviate its antipsychotic activity [9]. It has mean elimination half life of 6 hours and hence there is a need for twice or thrice daily administration. Hence formulating it into sustained release dosage form can increase patient compliance and offer clinical safety [8].

Selections of polymers play an important role in designing such a drug delivery systems. Hydrophilic natural polymers are one such widely employed polymer for controlling the drug release [10]. The continual quest and maneuvering in exploring novel excipients, natural polymers came into light with a broad range of advantages. The fact for increase in importance of plant based natural material is that plant resources are renewable and if cultivated or harvested in a sustainable manner, they can provide a constant supply of raw materials.[5,11]

The past researches acknowledge the use of fenugreek mucilage as a potential non-toxic and safe pharmaceutical excipient in tablet. These particular explicate the rational, why proposed article concerns the use of fenugreek mucilage for sustained drug delivery [11].

Xanthan gum is another such exocellular polysaccharide obtained from *Xanthomonas campestris* and is used in oral, topical pharmaceutical formulations, cosmetics and food products [11].

In the present study, it was attempted to develop sustained release matrix tablet of Quetiapine Fumarate to be taken once a day using combination of fenugreek mucilage and xanthan gum with different ratio and other excipients Lactose, MCC, Magnesium Stearate, and Talc [12].

MATERIAL AND METHOD:

Materials

Quetiapine Fumarate was gifted by Akums Drugs & Pharmaceuticals Ltd, Haridwar. Xanthan gum was gifted by Lucid colloids Pvt Ltd, Mumbai. Microcrystalline cellulose, Magnesium stearate, Talc was gifted by Loba Chemicals, Mumbai. Lactose was obtained as MNS Laboratories, Ltd, India. Fenugreek mucilage was extracted from seeds of *Trigonella Foenum- Graecum L.*, a member of the family Fabaceae.

Tablet were compressed using tablet punching machine 8 station (A jaguar) General machinery co. Mumbai. India Model no. JMD-4.Analysis was performed using UV visible spectrophotometer, Thermo Scientifics, 2600, India.

Method

Isolation of fenugreek mucilage

Fenugreek seeds (200 g) were soaked in 1.5 L of distilled water at room temperature for 1hour and then boiled under stirring condition in a water bath until the slurry was formed. The solution was cooled and kept in a refrigerator overnight to settle out undissolved materials. The upper clear solution was decanted and centrifuged at 500 rpm for 20 minutes. The supernatant was separated and concentrated at 60^{o}C on was cooled to the room temperature and was poured into thrice the volume of acetone with continuous stirring. The precipitate was washed repeatedly with acetone and dried at 50-600 C under vacuum. The dried material was powdered and kept in a desiccator [14].

Characterization of fenugreek mucilage

Swelling Index

One gram of powder was placed in a 25 ml ground-glass- stoppered cylinder graduated over a height of about 120 to 134 mm in 5 ml divisions. The powder was moistened with 1 ml of ethanol (96% v/v), water was added up to 25 ml and the cylinder was closed. It was shaken vigorously every 10 min for 1 hour and then allowed to stand for 3 hour. The volume occupied by the powder was measured including any adhering mucilage. Three tests were carried out at the same time. Swelling index was calculated from the mean of the three tests.

Particle size distribution

The particle size of the fenugreek mucilage powder was analysed by optical microscope.

Flow property of fenugreek mucilage powder

The flow properties of fenugreek mucilage powder were characterized in terms of angle of repose, Carr's index (% Compressibility) and hausner's ratio. Angle of repose was measured by direct funnel method. The tan-1 of the (height of pile/ radious of surface) gave angle of repose.[7]

$$\%\ compressibility = \frac{Tapped\ density - Bulk\ density}{Tapped\ density} \times 100$$

$$Hausner's\ ratio = \frac{Tapped\ density}{Bulk\ density}$$

pH

The pH of each of 1% suspension was measured using a pH meter to check any hydrolysis or microbial decomposition of suspensions. The change in pH is attributed to hydrolysis or microbial decomposition.[3]

Viscosity

1 gm dried and finely powdered fenugreek mucilage was suspended in 75 ml distilled water for 5 hour. Distilled water was added upto 100 ml to produce the concentration of 1% w/v. The mixture was homogenized by mechanical stirrer for 2 hour and its viscosity was determined using a Brookfield viscometer, spindle LV2 at 20 rpm at 25ºC [2].

Total ash

The ground air-dried fenugreek mucilage powder approximately 3 g was weighed in a previously ignited and tarred crucible (usually of platinum or silica) and it was ignited by gradually increasing the heat to 500-600°C until it was white which indicate the absence of carbon. It was cooled in a desiccator and weighed. The content of total ash in mg per g of air-dried material was calculated.

Acid-insoluble ash

To the crucible containing 1 g of total ash, 25 ml of hydrochloric acid (~70g/l) was added and it was covered with a watch-glass and boiled for 5 minutes. The watch-glass was rinsed with 5 ml of hot water and this liquid was added to the crucible. The insoluble matter was collected on an ash less filter-paper and washed with hot water until the filtrate was neutral. The filter-paper containing the insoluble matter to the original crucible was dried on a hot-plate and ignited to constant weight. The residues were allowed to cool in a suitable desiccator for 30 minutes and then weighed. The content of acid-insoluble ash in mg per g of air-dried material was calculated.

Water-soluble ash

To the crucible containing 1 g of total ash, 25 ml of water was added and boiled for 5 minutes. Insoluble matter was collected on an ash less filter-paper, washed with hot water and ignited in a crucible for 15 minutes at a temperature not exceeding 450°C. The content of water-soluble ash in mg per g of air-dried material was calculated by subtracting the weight of this residue in mg from the weight of total ash.

Drug excipient compatibility studies

I.R Spectroscopy of Quetiapine Fumarate and polymer mixture

IR spectroscopy is one of the analytical techniques useful in detecting chemical interactions. The IR spectra of Quetiapine fumarate and formulation were determined by FT-IR using KBr dispersion method. The base line correction was done using dried KBr. Then the spectrum of dried mixture of drug and KBr was run on FT-IR JASCO (MODEL No.4100).The spectra were scanned over wavelength region of 4000 to 400 cm^{-1}. The procedure consisted of dispersing a sample (drug alone, fenugreek mucilage, xanthan gum & mixture of drug and polymer).

Differential Scanning Calorimetric (DSC)

DSC analysis of pure Quetiapine Fumarate, polymer & physical mixture of Quetiapine Fumarate with formulation excipients was performed using Shimadzu-Thermal Analyzer DSC 60 on 2-5mg samples. Samples were heated in an open aluminum pan at a rate of 10°C/min conducted over a temperature range of 40 to 280°C under a nitrogen flow of 2-bar pressure.

Table No.1: Formulation Table according to 3^2 factorial designs

Formulation code / Ingredients	F1	F2	F3	F4	F5	F6	F7	F8	F9
Quetiapine Fumarate	200	200	200	200	200	200	200	200	200 (mg)
Xanthan Gum	75	75	75	100	100	100	125	125	125
Fenugreek Mucilage	75	100	125	75	100	125	75	100	125
MCC	71	58.5	46	58.5	46	33.5	46	33.5	21
Lactose	71	58.5	46	58.5	46	33.5	46	33.5	21
Mg. Stearate	4	4	4	4	4	4	4	4	4
Talc	4	4	4	4	4	4	4	4	4

Formulation of tablets

Tablets were prepared using direct compression method. The formulations are composed of various concentrations of Xanthan gum and fenugreek mucilage in the ratios as drug and polymers in various percentages. **(Table no.1)** All powders were passed through 100- mesh sieve. The lactose and the polymer were mixed uniformly. Drug was added to the lactose and the polymer mixture and the blended for 20 min. Blend were then passed through sieve no.12 .The resulting mass were mixed with magnesium stearate and talc. The lubricated mass was compressed using 12mm die punch (KBr Press) in to tablets. Compression pressure was adjusted during tableting of each formula to get the tablet hardness in the range of 6 to 7 kg/cm^2. The total weight of tablet was kept at 500 mg [15].

Evaluations of powder blend

Powder blend was characterized for its flow property by evaluating angle of repose, carr's index and hausner's ratio.

Evaluation of formulation [7,15]

Weight variation

In this 20 tablets of each formulation were selected and weighed with the use of electron balance. Individual tablets were weighed and the individual weight was compared with an average weight.

Hardness:

Tablets were selected at random form each formulation and hardness was determined using Monsanto Hardness Tester.

Thickness:

Thickness of tablet was determined using vernier caliper. Three tablets from each formulation batch were used; mean thickness value and standard deviation were calculated.

Friability:

20 tablets of each formulation were weighed accurately and then placed in Roche friablator which was rotated for 100 revolutions at 25 rpm. Tablets were then dusted and reweighed.

$$\% F = \frac{W0 - W}{W0} \times 100$$

Where,

F = Friability. W0 = Initial weight of 20 tablets, W = Final weight of 20 tablets.

Drug Content:

Drug content for all formulation batches were determined. Five tablets were weighed and crushed in glass mortar pestel. The powder was weighed to get 100 mg of quetiapine fumarate, and transferred to 250 ml of conical flask containing 100 ml of phosphate buffer pH 6.8 and stirred for 8 hours on magnetic stirrer. Dispersion was filtered through Whatman filter paper (0.45µm) and filtrate obtained was analyzed spectrophoto-metrically at 248 nm and drug content was determined.

***In Vitro* Dissolution study**

In vitro drug release study for the prepared matrix tablets were conducted for period of 12 hours using a six station USP XXVII type II (paddle) apparatus at 37 ^{0}C ± 0.5 ^{0}C and 50 rpm using 0.1 HCL in the initial 2 hours and phosphate buffer solution, pH (PBS) till the end of the study, as the dissolution media. Dissolution studies were carried out in triplicate. A 10 ml aliquot of sample was withdrawn at regular time intervals, filtered and then these samples were diluted 10 folds with dissolution medium and then assayed spectrophotometrically at 248 nm. The cumulative % drug release was calculated for the formulation and the drug [10].

Dissimilarity and Similarity Factors

Dissimilarity factor (f1) of test product was calculated in comparison with reference product to observe the dissimilarity in drug release. It calculates the percent (%) difference between the two curves at each time point and is a measurable of the relative error between the two curves.

$$f1 = 100*\Sigma (Rt - Tt)/ \Sigma Rt$$

Where Rt and Tt are the mean % dissolution of reference and test product, respectively.

Where Rt and Tt are the mean % dissolution of reference and test product, respectively.

Similarity factor (f2) is defined as the logarithmic reciprocal square root transformation of one plus the mean squared difference in percent dissolved between the test and the reference products. This was calculated to compare the test sample with reference release profile.

$$f2 = 50 \times \log10 \{100/[1 + 1/n \times \Sigma(Rt - Tt)2]0.5\}$$

Where n = number of sampling points release data were curve fitted using PCP disso software.

Stability studies

The formulated Quetiapine fumarate sustained release tablet containing 100 mg of drug were kept in bottles and stored at 25^{0}C-60% RH and 40^{0}C - 75% RH. Tablets were analyzed after three month for physical parameter and Thickness, Hardness, Friability, % drug content, drug release profile [10].

RESULTS AND DISCUSSION:

Phytochemical and microbial properties of fenugreek mucilage

A phytochemical and microbial property of fenugreek mucilage was studied in that chemical properties and other parameters are studied. The results are presented in Table no 2, 3. Drug excipient compatibility study

Differential Scanning Calorimetric (DSC)

Thermal analysis of drug was carried out using DSC. The DSC curve of Quetiapine Fumarate profiles a sharp endothermic peak at 177.06 °C corresponding to its melting, and indicating its crystalline nature and purity of sample. The heat required for melting was -113.95mJ. The DSC thermogram is shown in Figure no.1.

FT-IR spectrum

The FTIR spectra of pure Quetiapine Fumarate showed in Figure no.2 peaks at wave numbers (cm^{-1}) which correspond to the functional groups present in the structure of the drug. The absorption bands shown by Quetiapine Fumarate are characteristic of the groups present in its molecular structure. The IR spectra of QF showed the principle peaks at wave numbers 3750, 3080, 2880, 2380, 1600, 1340, 1030, 791 cm−1. Broad peak at 3750 cm-1 may be due to O-H stretching, 3080 cm-1Ar-H stretching and 2880 cm-1 C-H stretching, 2380 cm-1 may be due to aromatic C=C stretching, 1600 cm−1 may be due to C-N stretching, 1340 cm-1 may be due to C-H bending, 1030 cm-1 may be due to –C-O-C group, 791 cm-1 may be due to substituted benzene ring.

Evaluations of powder blend

Flowability of powder blend was evaluated by determining carr's index and angle of repose, hausner,s ratio as it is prerequisites to obtain solid dosage form with an acceptable weight variation.

Table No.4 depicts the result of evaluation parameters of powder blend of all formulation. The bulk density & tapped density for all formulation varied in the range of 0.45 ± 0.01 to 0.51 ± 0.01 and 0.39 ± 0.01 to 0.44 ± 0.01 respectively. The % compressibility for all formulation was found to be in the range of 15.90 ± 0.3 to 12.36 ± 0.4. Hausner's ratio for all powder blends was found to be in the range 1.25 ± 0.0 to 1.28 ± 0.3, also the angle of repose for powder blend of all formulation range between 25.50 ± 0.03 and 29.68 ± 0.03.thus, it showed that all formulations showed good compressibility and good flow properties. Result shown in table no.3

Table 2: Phytochemical and microbial properties of fenugreek mucilage

Properties	Fenugreek mucilage	
Chemical Test	Reuthenium Red	Red color mucilage present
	Molisch Red	Violet ring at junction of two liquid presence of carbohydrate
	Fehling Solution	Negative no reducing sugar
Other Parameters	Swelling Index	4.3
	Partical Size	47.3 μm
	pH	2
	Viscosity	500 cp

Table 3: Physical properties of fenugreek mucilage

Physical property	Practically found value	Physical property	Practically found value
Carr's index	15%	Water soluble ash	0.35%
Hausner's ratio	1.23	Angle of repose	22.25^0
Total Ash	0.85%	Tapped density	0.66 g/ml
Acid insoluble ash	0.25%	% LOD	0.47%

Table 4: Evaluation of Powder Blend

Formulations	Angle of Repose ± SD (degrees)	Bulk Density ± SD (gm/ml)	Tapped Density± SD(gm/ml)	Compressibility Index± SD (%)	Hausner's Ratio ± SD
F1	29.68 ± 0.03	0.50±0.01	0.44±0.01	13.5±0.01	1.25±0.0
F2	28.36 ± 0.03	0.49±0.03	0.43±0.01	13.94±0.4	1.28±0.23
F3	27.47 ± 0.02	0.51±0.01	0.44±0.01	15.90±0.3	1.25±0.01
F4	28.30 ± 0.03	0.45±0.01	0.39±0.01	15.38±0.2	1.27±0.2
F5	27.30 ± 0.03	0.49±0.04	0.43±0.03	13.95±0.1	1.26±0.15
F6	26.40 ± 0.04	0.46±0.02	0.41±0.02	12.36±0.4	1.25±0.10
F7	25.50 ± 0.03	0.49±0.01	0.43±0.01	14.40±0.1	1.26±0.0
F8	26.60 ± 0.03	0.48±0.03	0.42±0.02	14.28±0.3	1.28±0.3
F9	28.40 ± 0.04	0.50±0.04	0.44±0.03	13.5±0.01	1.30±0.21

Table 5: Evaluation of Compressed Tablets

Formulation code	Thickness (mm)	Hardness (kg/cm^2)	Wt. variation (mg)	Friability (%)	Drug content (%)
F1	5.4±0.05	6.0±0.01	500±0.15	0.205	97.96
F2	5.4±0.07	6.0±0.01	498±0.16	0.185	95.03
F3	5.5±0.04	6.1±0.03	498±0.17	0.235	98.26
F4	5.4±0.06	6.3±0.04	501±0.15	0.456	95.56
F5	5.5±0.06	6.0±0.01	505±0.14	0.126	97.03
F6	5.4±0.07	6.0±0.05	500±0.15	0.354	98.01
F7	5.4±0.06	6.0±0.01	500±0.15	0.235	94.04
F8	5.4±0.06	6.2±0.02	495±0.17	0.274	95.54
F9	5.4±0.07	6.1±0.03	498±0.16	0.135	95.23

Table 6: Kinetic treatment to dissolution data for SR tablet

Formulations	Regression Coefficient (R^2)					Best fit Model
	Zero order Plot	First order Plot	Korsmeyer- Peppas Plot		Higuchi plot	
			(R^2)	n (release exponent)		
F1	0.9735	0.8916	0.8208	0.602	0.9960	Higuchi
F2	0.9785	0.9985	0.8126	0.633	0.9816	Higuchi
F3	0.9783	0.8675	0.8126	0.654	0.9941	Higuchi
F4	0.9776	0.8718	0.8336	0.608	0.9821	Higuchi
F5	0.9874	0.9161	0.8106	0.632	0.9731	Zero order
F6	0.9785	0.8983	0.8050	0.661	0.9811	Higuchi
F7	0.9747	0.9114	0.8357	0.586	0.9876	Higuchi
F8	0.9863	0.9103	0.8139	0.614	0.9938	Higuchi
F9	0.9947	0.9734	0.8390	0.583	0.9763	Zero order

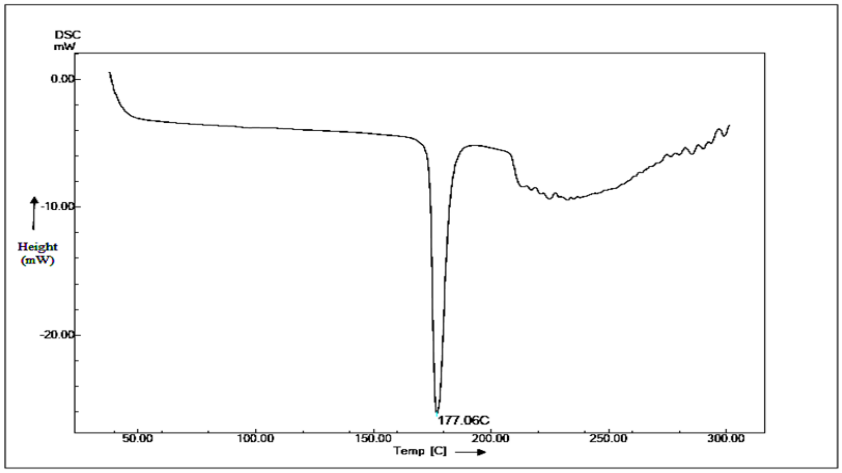

Fig.1: DSC of Quetiapine Fumarate

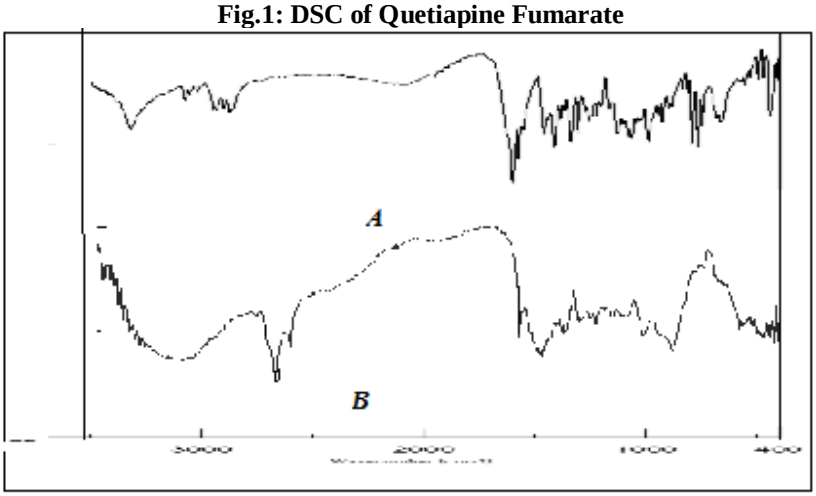

Fig. 2: FT-IR spectrum of (A) pure QF (B) fenugreek mucilage

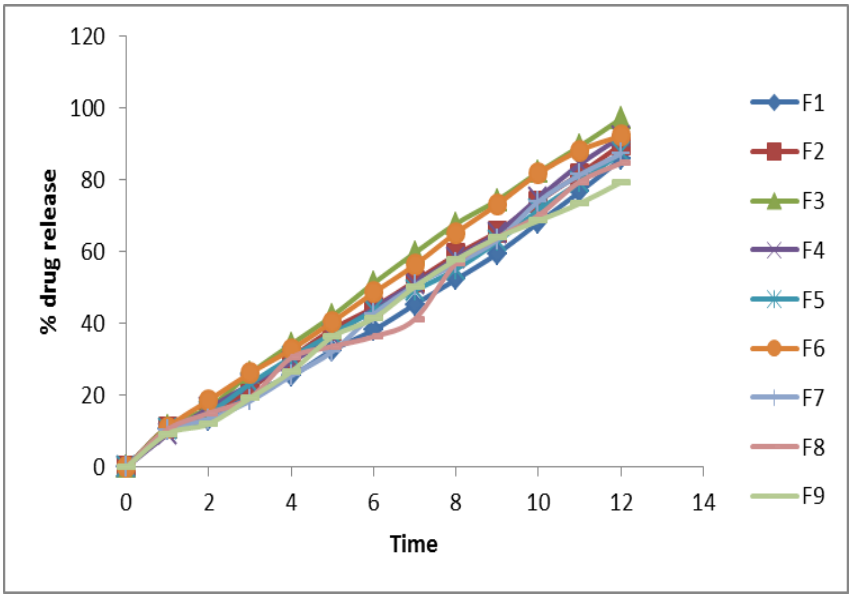

Fig.3: Dissolution profile for all formulation

Evaluation of Compressed Tablets

Evaluation of compressed tablets in that study thickness, hardness, weight variation, friability, and drug content. The hardness value of the tablet formulation was within the range of 6.0 ± 0.01 to 6.1 ± 0.03 kg/cm^2. The concentration of fenugreek mucilage increases there is increases in hardness value. Another measure of tablet strength is friability.in present study friability was below 1% indicating friability was within pharmacopoeia limit. Thickness of F1 to F9 formulation was found in the range of 5.4 ± 0.07 to 5.5 ± 0.06 mm. Result shown in Table no.5

***In vitro* drug release study**

As the drug in study had a slight solubility in water moderate molecular weight Xanthan gum and Fenugreek mucilage are used as a rate controlling polymers to retard the release of drug from a matrix at levels of 15 to 25% w/w in tablets prepared. The effect of polymer level on the release of the drug from matrix tablets was studied for tablets containing 15%, 20% and 25% of the polymer (Formulations F1 to F9). The amount of Xanthan gum and as well as Fenugreek mucilage used affects the release rate of the drug. This may be due to the erosion of the polymer as it is of a very low viscosity. Thus, indicating that higher the percentage of the polymer more is the drug release retardation. The obtained release data from the in-vitro dissolution study from various formulations was fitted to the mathematical models. The kinetic models included First order, Higuchi equation (matrix system) and Korsmeyer- Peppas model. Above graph shows the data obtained from the model fitting, for all the 9 formulations studied (F1-F9). The overall curve fitting showed that the drug release from the sustained release matrix tablets followed either Higuchi equation or the Korsmeyer-Peppas model.

The dissolution data of batches F1 to F9 was fitted to Zero order, First order, Higuchi, Hixson crowell and Korsmeyer-Peppas models. The coefficient of regression (R^2) value was used as criteria to choose the best model to describe drug release from the tablets. The R^2 values of various models are given in **Table no.6**

The mean diffusional exponent values **(n)** obtained from Korsmeyer equation ranged from 0.583 to 0.661 indicating that all these formulations presented a dissolution behavior controlled by Non Fickian Diffusion (When n tends towards< 0.5).The results for formulation F3 with R^2 value of 0.9783 confirmed that the formulation followed Higuchi matrix model indicating Quetiapine Fumarate release from controlled drug delivery system were by both diffusion and erosion mechanism.

To confirm the diffusion mechanism the data were fitted into korsmeyer-Peppas equation. For matrix tablet, n value less than 0.5 indicate fickian diffusion and n value in between 0.5 to 1 indicate Non-fickian diffusion. (erosion).

Stability study

The results of accelerated stability studies carried out according to ICH guidelines; indicate that optimized QF sustained release tablet did not show any changes physical parameter and the drug content. Furthermore, in vitro release studies carried out on the optimized formulation stored at accelerated test conditions indicating no statistically significant change in the drug release profile.

CONCLUSION:

Finally, it may be concluded that the formulations prepared with xanthan gum & fenugreek mucilage polymer show drug release in 12hrs and formulations could retard the drug release up to desired time period. The tablets containing polymer blend of xanthan gum and fenugreek mucilage retard the drug release because both are swellable polymer. From the release study it is observed that as we increase the concentration of xanthan gum the release of drug is decreased. This is possibly due to slower erosion of xanthan gum and increased viscosity which might have helped to keep the hydrated gel intact thus releasing the drug for 12 hrs. Among these formulations F3 contain the ratio of 15:25 % of xanthan gum: fenugreek mucilage showed 95.86% release in 12 hrs and the release profile follows higuchi kinetics.

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REFERENCES:

1.Kaliaperumal Krishnaraj. Development of sustained release antipsychotic tablets using novel polysaccharide isolated from Delonix regia seeds and its pharmacokinetic studies. Saudi Pharma J. 2012; 20: 239-48.

2.Ratnaparkhi M. P. Sustained Release Oral Drug Delivery System.An Overview. Int J Pharma Res Rev.2013; 2(3): 11-21.

3.Pawan Prakash, Mayur Porwal.Role of natural polymers in SR drug delivery system:Application & recent approaches: A Review. International research journal of pharmacy 2011;2(9); 6-11.

4.Thakkar Vaishali, Shaikh Yasmin. Design and Evaluation of a sustained release enteric coated dosage form of fluoxetine hydrochloride. Ind J Pharma Edu Res.,2012; 46(4): 330-39.

5.Sahu Deepak, A.C.Rana. Development and in vitro evaluation of Quetiapine Fumarate Sustain release tablets. Int.J. PharmTech Res.2010;2(4): 2535-43.

6.Kaliaperumal Krishnaraj, Mulla Joghi Nanjan. Development of sustained release antipsychotic tablets using novel polysaccharide isolated from Delonix regia seeds and its pharmacokinetic studies. Saudi Pharma J. 2012;20: 239-48.

7.Lachman L, Lieberman HA, Kaing JL, editors, The theory and practice of industrial pharmacy. 3rd ed. Bombay: Varghese Publishing House; 1987; 185, 209, 430.

8.Deepthi B, Manikiran S. An Investigation of Hydrophilic Natural Gums In The Formulation Of Quetiapine Fumarate Matrix Tablets Int J Pharm Pharm Sci, 2012; 4(4): 569-574.

9.Wadher Kamlesh, Kakde Rajendra B. Formulation of Sustained Release Metformin Hydrochloride Matrix Tablets: Influence of Hydrophilic Polymers on the Release Rate And In Vitro Evaluation, Int J of Res in CR.2011;1 (1): 9-16.

10.Indian Pharmacopoeia 2010, Vol. III, a publication of the I.P. commission, Ministry of Health & Family Welfare Government of India ; 2013-2014

11.Gaikwad Pranita, Patil Reshma. Formulation and evaluation of Quetiapine Fumarate sustained release matrix tablet, pharma tutor ., 2013.

12.Bramankar DM, Jaiswal SB. Biopharmaceutics and pharmacokinetics: a treatise. 1st ed. New Delhi: Vallabh Prakashan. 1995: 337-41.

13.Deogade Umeshkumar M.,Deshmukh Vilas, Natural Gums and Mucilage's in NDDS: Applications and Recent approaches: A Review. International Journal of PharmTech Research 2012;4(2):799-814.

14.Kulkarni Vishakha S, Butte Kishor D. Natural Polymers – A Comprehensive Review International Journal of Research in Pharmaceutical and Biomedical Sciences2012;3(4):1597-98.

15.Ansel HC, Allen LV, Popvich NG. In. Lippincott. Williams and Wilkins. Pharmaceutical dosage forms and drug delivery system, 7th ed, 2000.; 229-43.

16.Ratnaparkhi M. P., Gupta Jyoti P. Sustained Release Oral Drug Delivery System - An Overview. Int J Pharma Res Rev.2013; 2(3): p.11-21.

17.Chien YW.Novel drug delivery systems. 2nd ed. New York: Marcel Dekker Inc; 1992