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FORMULATION AND EVALUATION OF ROPINIROLE SUSTAINED RELEASED TABLETS BY USING NATURAL AND SYNTHETIC POLYMERS

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ABSTRACT

The main aim of proposed work was to develop Ropinirole matrix tablets sustained release dosage form, Ropinirole is Parkinson's disease the sustained release formulation is the drug delivery system that is designed to achieve a prolonged therapeutic effect by continuously releasing medication over an extended period of time after administration of single dose. The sustained release tablets were prepared by direct compression method using Hydroxy propylmethyl cellulose (K15M, K100M), sodium alginate, and guar gum, in varying ratios. Tablets blends were evaluated for loose bulk density, tapped bulk density, compressibility index and angle of repose, shows satisfactory results. The compressed tablets were then evaluated for various physical tests like diameter, thickness, uniformity of weight, hardness, friability, and drug content. The granules exhibited satisfactory rheological demeanor. The results of all these tests were found to be satisfactory. The in *vitro* dissolution study was carried out for 24 hours. 500 RPM using paddle after 4hrs 0.1N HCL was replaced in phosphate buffer (pH 6.8) as dissolution media. Formulation F1 to F12direct compression method, sustain release and among all the formulation. This finding reveals that above a particular concentration of HPMCK100M, K15M, sodium alginate and Guar gum, Mg stearate are capable of providing sustained drug release.

Key words: Sustained release, HPMCK-100 M, K15M, Sodium alginate, Guar gum, Magnesium stearate, Microcrystalline cellulose and Talc.

INTRODUCTION

Most conventional oral drug products, such as tablets and capsules, are formulated to release the active drug immediately after oral administration, to obtain rapid and complete systemic drug absorption. Such immediate-release products result in relatively rapid drug absorption and onset of accompanying pharmacodynamic effects. However, after absorption of the drug from the dosage form is complete, plasma drug concentrations decline according to the drug's pharmacokinetic profile. Eventually, plasma drug concentrations fall below the minimum effective plasma concentration (MEC), resulting in loss of therapeutic activity. Before this point is reached, another dose is usually given if a sustained therapeutic effect is desired. An alternative to administering another dose is to use a dosage form that will provide sustained drug release, and therefore maintain plasma drug concentrations , beyond what is typically seen using immediate-release dosage forms. In recent years, various modified-release drug products have been developed to control the release rate of the drug and/or the time for drug release [1].

The term modified-release drug productis used to describe products that alter the timing and/or the rate of release of the drug substance. A modified-release dosage form is defined "as one for which the drug-release characteristics of time course and/or location are chosen to accomplish therapeutic or convenience objectives not offered by conventional dosage forms such as solutions, ointments, or promptly dissolving dosage forms as presently recognized"[2].

MATERIAL AND METHOD

Material: Ropinirole, HPMC K15M, HPMC K100M CR, Sodium Alginate, Guar Gum, Microcrystalline

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cellulose, Talc, Magnesium Stearate[1-2].

Methods: Preparation of Ropinirole HCl Matrix Tablets

All the matrix tablets, each containing 5 mg of Ropinirole HCl, were prepared by direct compression method.

Direct compression: Accurately weighed amounts of drug, polymer, and diluent were mixed geometrically in a mortar. This mixture was passed through No.40 sieve and thoroughly mixed in a polythene bag for 15 minutes. The powder blend was then lubricated with magnesium stearate and talc for 2 minutes and compressed into tablets on a 16-station rotary tableting machine using 6-mm round, flat-faced punches.

The drug polymer ratio was developed to adjust drug release as per theoretical release profile and to keep total weight of tablet constant for all the fabricated batches under experimental conditions of preparations. The total weight of the matrix tablets was 200mg with different drug polymer ratios like 0.25:1; 0.16:1; 0.125:1. The various polymers used were HPMC K15M, HPMC K100M CR, Sodium alginate and Guar gum. Diluents like MCC (water-insoluble) is used for the preparation of matrix tablets[3].

Evaluation of Pre-compression Blend

a) Angle of Repose

The angle of repose of granules was determined by the funnel-method. The accurately weighed granules were taken in a funnel. The height of the funnel was adjusted in such a manner that the tip of the funnel just touched the apex of the heap of the granules. The granules were allowed to flow through the funnel freely onto the surface. The diameter of the powder cone measured and angle of repose was calculated using the following equation [4]

$$\tan \theta = h/r$$

where,h and r are the height and radius of the powder cone,

θ is the angle of repose.

Angle of repose values less than 25, 25-30, 30-40, and more than 40 indicates excellent, good, passable, and poor flow properties respectively.

b) Determination of Bulk Density and Tapped Density:

An accurately weighed quantity of the granules/ powder (W) was carefully poured into the graduated cylinder and volume (V_0) was measured. Then the graduated cylinder was closed with lid and set into the tap density tester (USP). The density apparatus was set for 100 tabs and after that the volume (V_f) was measured and continued operation till the two consecutive readings were equal [5].

The bulk density and the tapped density were calculated using the following formulae.

$$\text{Bulk density} = W/V_0$$

$$\text{Tapped density} = W/V_f$$

where,W= Weight of the powder

V_0 = Initial volume

V_f = final volume

c) Compressibility Index (Carr's Index)

Carr's index (CI) is an important measure that can be obtained from the bulk and tapped densities. In theory, the less compressible a material the more flowable it is [5].

$$CI = (TD\text{-}BD) \times 100/TD$$

where, TD is the tapped density and BD is the bulk density.

d) Hausner's Ratio:

It is the ratio of tapped density and bulk density. Hausner found that this ratio was related to interparticle friction and, as such, could be used to predict powder flow properties [5]. Generally a value less than 1.25 indicates good flow properties, which is equivalent to 20% of Carr's index.

Evaluation of Matrix Tablets

a. Thickness

Twenty tablets from the representative sample were randomly taken and individual tablet thickness was measured by using digital vernier caliper. Average thickness and standard deviation values were calculated.

b. Hardness

Tablet hardness was measured by using Monsanto hardness tester. From each batch six tablets were measured for the hardness and average of six values was noted along with standard deviations.

c. Friability Test

From each batch, ten tablets were accurately weighed and placed in the friability test apparatus (Roche friabilator). Apparatus was operated at 25 rpm for 4 minutes and tablets were observed while rotating. The tablets were then taken after 100 rotations, dedusted and reweighed. The friability was calculated as the percentage weight loss.

Note: No tablet should stick to the walls of the apparatus. If so, brush the walls with talcum powder. There should be no capping also.

% friability was calculated as follows

$$\%\ \text{Friability} = (W_1 - W_2) \times 100/W_1$$

Where,W_1= Initial weight of the 20 tablets.

W_2 = Final weight of the 20 tablets after testing.

Friability values below 1.0 % are generally acceptable.

d. Weight Variation Test

To study weight variation individual weights (W_I) of 20 tablets from each formulation were noted using electronic balance. Their average weight (W_A) was calculated. Percent weight variation was calculated as follows. Average weights of the tablets along with standard deviation values were calculated.

$$\%\ \text{weight variation} = (W_A - W_I) \times 100/\ W_A$$

As the total tablet weight was 120 mg, according to IP 1996, out of twenty tablets ±7.5 % variation can be allowed for not more than two tablets.

According to USP 2004, ±10% weight variation can be allowed for not more than two tablets out of twenty tablets.

Drug Content (Assay): The drug content of the matrix tablets was determined according to in-house standards and it meets the requirements if the amount of the active ingredient in each of the 10 tested tablets lies within the range of 90% to 110% of the standard amount

Ten tablets were weighed and taken into a mortar and crushed into fine powder. An accurately weighed portion of the powder equivalent to about 100 mg of TM was transferred to a 100 ml volumetric flask containing 70 ml of 0.1N HCl. It was shaken by mechanical means for 1h.Then it was filtered through a Whatman filter paper (No. 1) and diluted to 100 ml with 0.1N HCl. From this resulted solution 1 ml was taken, diluted to 50 ml with 0.1N HCl and absorbance was measured against blank at 295 nm.

***In -Vitro* Drug Release Characteristics**

Drug release was assessed by dissolution test under the following conditions: n = 3, USP type II dissolution apparatus (paddle method) at 50 rpm in 900 ml of 0.1N HCl for first 4 hours and the phosphate buffer pH 6.8 from 6 to 24 hours, maintained at 37°C ± 0.5°C. An aliquot (5ml) was withdrawn at specific time intervals and replaced with the same volume of prewarmed (37°C ± 0.5°C) fresh dissolution medium. The samples withdrawn were filtered through Whatman filter paper (No.1) and drug content in each sample was analyzed by UV-visible spectrophotometer at 260 nm.

Kinetic Analysis of Dissolution Data

To analyze the *in vitro* release data various kinetic models were used to describe the release kinetics. The zero order rate Eq. (1) describes the systems where the drug release rate is independent of its concentration [4-5]. The first order Eq. (2) describes the release from system where release rate is concentration dependent [1-2] described the release of drugs from insoluble matrix as a square root of time dependent process based on Fickian diffusion Eq. (3). The Hixson-Crowell cube root law Eq. (4) describes the release from systems where there is a change in surface area and diameter of particles or tablets [6].

$$\mathbf{C = K_0 t}$$

where, K_0 is zero-order rate constant expressed in units of concentration/time and t is the time.

$$\mathbf{LogC = LogC_0 - K_1 t / 2.303}$$

where, C_0 is the initial concentration of drug and
K_1 is first order constant.

$$\mathbf{Q = K_H t^{1/2}}$$

where, K_H is the constant reflecting the design variables of the system.

$$\mathbf{Q_0^{1/3} - Q_t^{1/3} = K_{HC} t}$$

where, $Q_t$is the amount of drug remained in time t,
Q_0 is the initial amount of the drug in tablet and
K_{HC} is the rate constant for Hixson-Crowell rate equation.

FTIR Studies

FTIR studies were performed on drug and the optimized formulation using Shimadzu FTIR (Shimadzu Corp., India). The samples were analyzed between wavenumbers 4000 and 400 cm^{-1}.

Stability Studies

The optimized matrix tablets were subjected to stability studies at 25°C ± 2°C / 60% ± 5% RH and 40°C ± 2°C / 75% ± 5% RH The products were evaluated for their physical characteristics, drug content, and in-vitro drug release profiles over a period of 3 months[7].

RESULTS AND DISCUSSION

Drug-Excipient interaction study

Fourier Transform Infra-Red (FTIR) spectroscopy

From Preformulation study there is no physical change is observed mixture drug and excipients.

The results of the uniformity of weight, hardness, thickness, friability, and drug content of the tablets are given in Table 4 . All the tablets of different batches complied with the official requirements of uniformity of weight as their weights varied between 200.4 and 202.5 mg. The hardness of the tablets ranged from 5.08 to 6.16 kg/cm^2 and the friability values were less than 0.8% indicating that the matrix tablets were compact and hard. The thickness of the tablets ranged from 2.88 to 3.40 mm. All the formulations satisfied the content of the drug as they contained 90 to 103 % of Ropinirole hydrochloride and good uniformity in drug content was observed. Thus all the physical attributes of the prepared tablets were found be practically within control.

In-Vitro Drug Release Studies

Drug Release from HPMC K15M and HPMC K100M Matrices:

The results of release studies of formulations F1 to F6 are shown in Table 5 and Figure 3. The release of drug depends not only on the nature of matrix but also upon the drug polymer ratio. As the percentage of polymer increased, the kinetics of release decreased. Formulation F1 composed of drug polymer ratio of 0.25:1, failed to sustain release beyond 24h. This formulation underwent erosion before complete swelling could take place. Formulations with drug polymer ratios 0.16:1 (F2), have extended the drug release for 16h. Further increasing the ratio to 0.125:1 (F3), the release was sustained for 18h. All these formulations have shown more than 25% release in the first 2 hour indicating burst release. This phenomenon may be attributed to surface erosion or initial disaggregation of the matrix tablet prior to gel layer formation around the tablet core. It is reported in the literature that more than 25% release of drug in the first hour of dissolution indicates the chance of dose dumping. Based on the dissolution data, F5 was chosen as the optimized formula as cumulative % drug release is similar to that of the marketed Ropinirole Hydrochloride formulation, i.e, REQUIP XL.

Drug Release from Natural polymers (Sodium alginate and Guar gum)

Three batches were manufactured with sodium alginate and three batches with natural polymers with a drug to polymer concentration of 0.25:1; 0.16:1; 0.125:1. From the dissolution profiles it was observed that the drug release faster in the batches prepared with sodium alginate compared with the batches manufactured with guar gum. More than 30% of the drug was released in the batches of sodium alginate (F7, F8&F9) within 2Hr time period only. As the percentage of polymer increased, the kinetics of release decreased. Finally it can be concluded that slower release rates can be obtained from the matrices containing Guar gum compared to Sodium alginate. Based on the dissolution data, F12 was chosen as the optimized formula as cumulative % drug release is similar to that of the marketed Ropinirole Hydrochloride formulation, i.e, REQUIP XL.

Kinetic

a. Kinetic analysis of dissolution data:

The release rate kinetic data for the F5 i As shown in Figures 5, drug release data was best explained by zero order equation, as the plots showed the highest linearity (r^2 = 0.9805), followed by Higuchi's equation (r^2 = 0.9197). As the drug release was best fitted in zero order kinetics, indicating that the rate of drug release is concentration independent. Higuchi's kinetics explains why the drug diffuses at a comparatively slower rate as the distance for diffusion increases.

b. Mechanism of drug release

As shown in Figure 6. The mechanism of release for the optimized formulations was determined by finding the R^2 value for each kinetic model viz. Zero-order, First-order, Higuchi, and Korsmeyer-Peppas corresponding to the release data of formulations.

For most of the formulations, the R^2 value of zero-order model is very near to 1 than the R^2 values of other kinetic models. Thus, it can be said that the drug release follows Zero-order model mechanism. Plots of percent release Vs square root of time (Higuchi's plots) were found to be linear indicating that the dug release from the Higuchi diffusion mechanism.

c. Kinetic analysis of dissolution data

The release rate kinetic data for the F12 is . As shown in Figures 7, drug release data was best explained by zero order equation, as the plots showed the highest linearity (r^2 = 0.9809), followed by Higuchi's equation (r^2 = 0.9164). As the drug release was best fitted in zero order kinetics, indicating that the rate of drug release is concentration independent. Higuchi's kinetics explains why the drug diffuses at a comparatively slower rate as the distance for diffusion increases.

d. Mechanism of drug release

As shown in Figure 8**,** The mechanism of release for the optimized formulations was determined by finding the R^2 value for each kinetic model viz. Zero-order, First-order, Higuchi, and Korsmeyer-Peppas corresponding to the release data of formulations.

For most of the formulations, the R^2 value of zero-order model is very near to 1 than the R^2 values of other kinetic models. Thus, it can be said that the drug release follows **Zero-order model mechanism**. Plots of percent release Vs square root of time (Higuchi's plots) were found to be linear indicating that the dug release from the **Higuchi diffusion mechanism**

Stability studies

Stability studies of the optimized formulation did not reveal any degradation of the drug and there was no significant change in the physical properties, drug content, and in vitro release profiles of the optimized formulation after storage for 3 months.

Stability compilation for optimized formulations

Fig 1. IR spectrum of Ropinirole hydrochloride

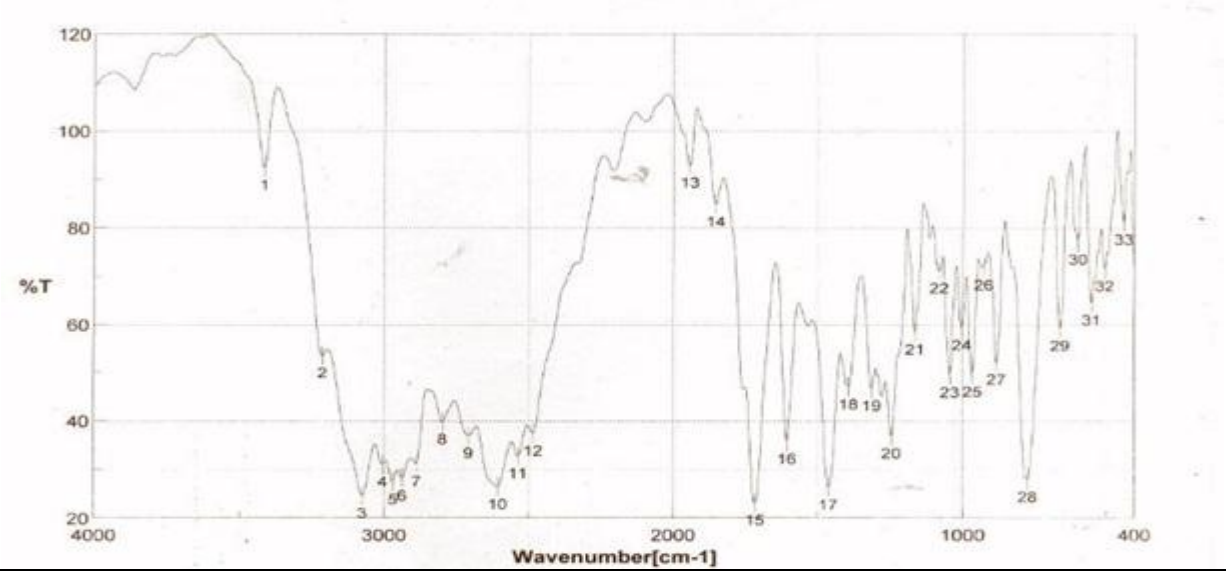

Fig 2. IR spectrum of Ropinirole hydrochloride with physical mixture

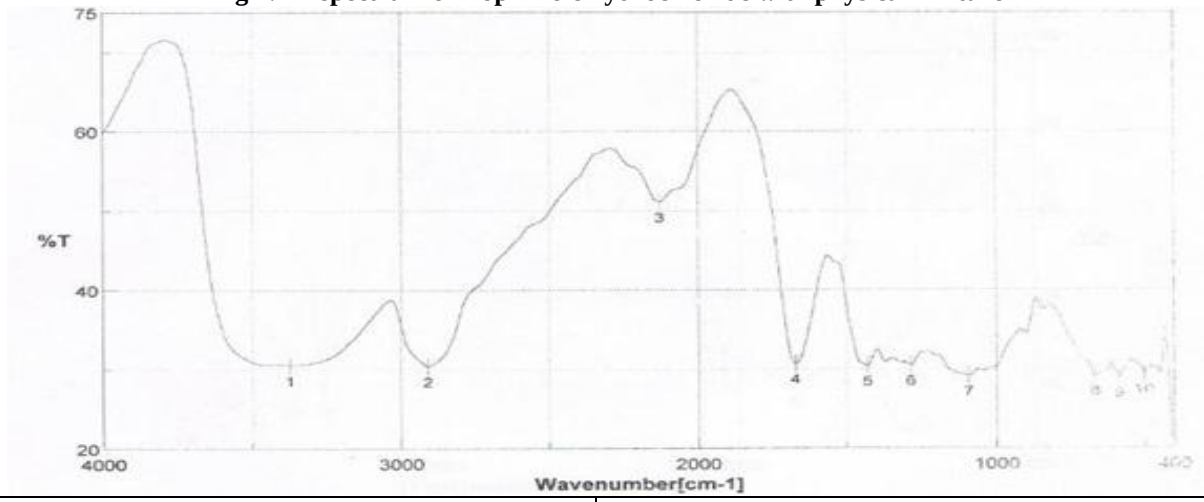

Fig 3. Release Profiles of Ropinirole hydrochloride from HPMC K15M and HPMC K100M Matrice

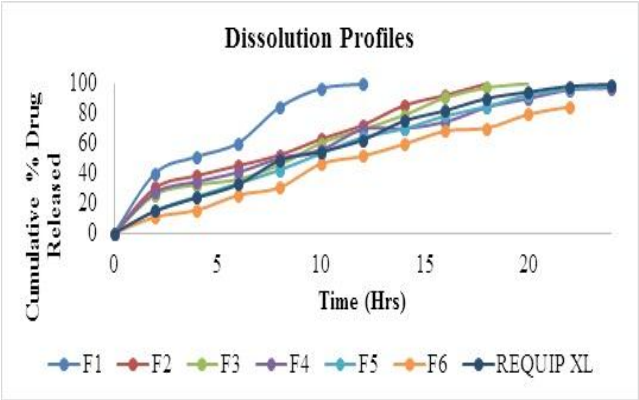

Fig 4. Release Profiles Ropinirole hydrochloride from Na^+ and Guar gum Matrices.

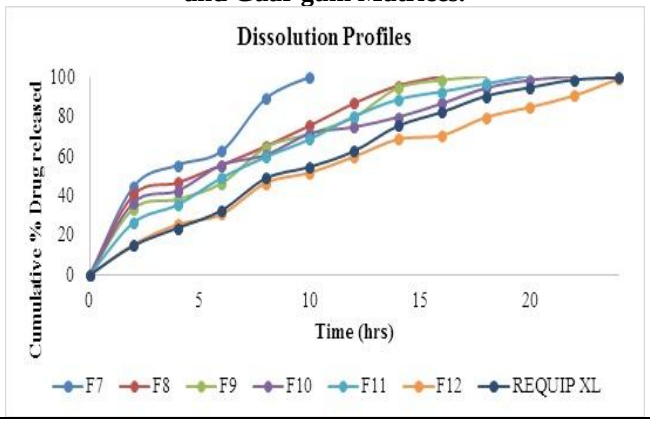

Fig 5. Zero order graph F5.

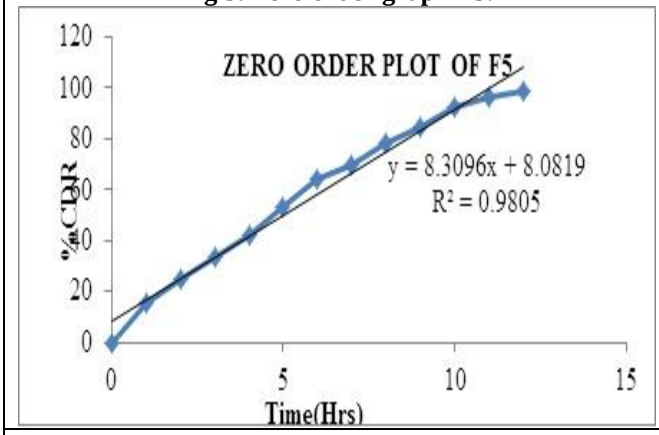

Fig 6. Higuchi order graph F5.

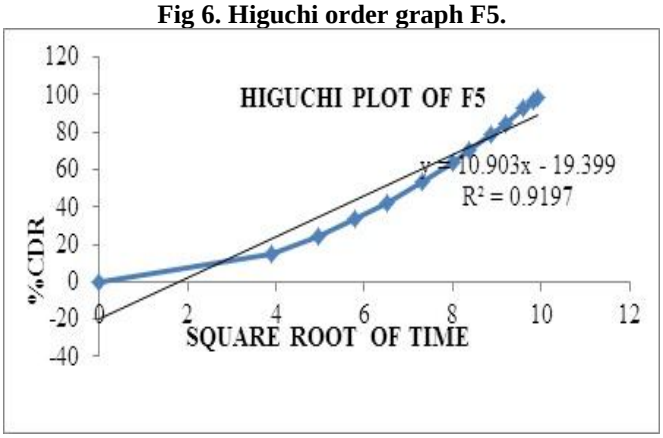

Fig 7. Zero order graph F12.

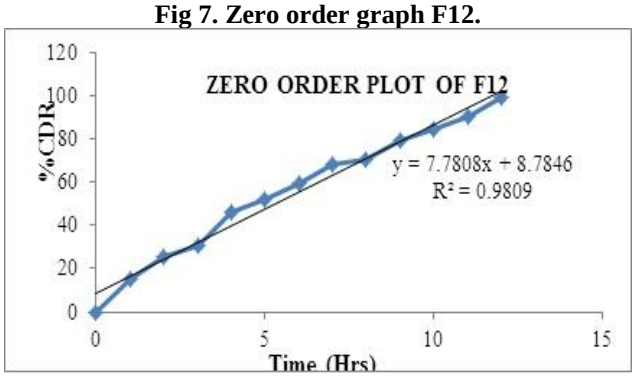

Fig 8. Higuchi order graph F12.

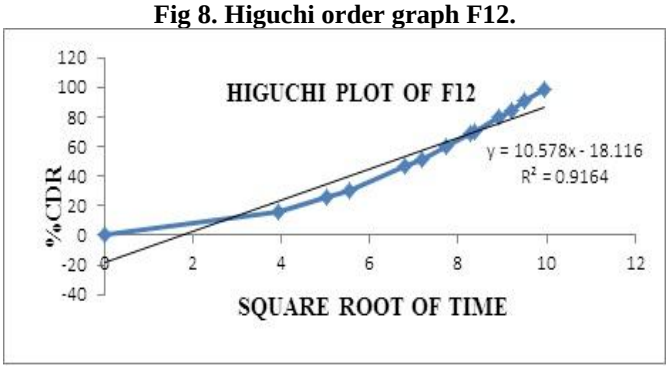

Table 1. Composition of Matrix Tablets Containing HPMC K15M & HPMC100M

Composition	F1	F2	F3	F4	F5	F6
Ropinirole	5 mg	5 mg	5 mg	5 mg	5 mg	5 mg
HPMCK15M	20 mg	30 mg	40 mg	-	-	-
HPMCK100M	-	-	-	20 mg	30 mg	40 mg
Microcrystalline Cellulose pH 101	169 mg	159 mg	149 mg	169 mg	159 mg	149 mg
Talc	2 mg	2 mg	2 mg	2 mg	2 mg	2 mg
Magnesium stearate	4 mg	4 mg	4 mg	4 mg	4 mg	4 mg
Total weight	200 mg	200 mg	200 mg	200 mg	200 mg	200 mg

Table 2. Composition of Matrix Tablets Containing Sodium alginate & Guar gum

Composition	F7	F8	F9	F10	F11	F12
Ropinirole	5 mg	5 mg	5 mg	5 mg	5 mg	5 mg
Sodium Alginate	20 mg	30 mg	40 mg	-	-	-
Guar gum	-	-	-	20 mg	30 mg	40 mg
Microcrystalline Cellulose pH101	169 mg	159 mg	149 mg	169 mg	159 mg	149 mg
Talc	2 mg	2 mg	2 mg	2 mg	2 mg	2 mg
Magnesium stearate	4 mg	4 mg	4 mg	4 mg	4 mg	4 mg
Total weight	200 mg	200 mg	200 mg	200 mg	200 mg	200 mg

Table 3. Physical Properties of Precompression Blend

Formulations	Angle of repose (°)	Bulk Density (g/ml)	Tapped Density (g/ml)	Carr's Index (%)	Hausner's ratio
F1	25.49	0.214	0.251	14.74	1.17
F2	26.24	0.308	0.364	15.38	1.18
F3	29.05	0.276	0.322	14.28	1.16
F4	26.97	0.341	0.388	12.11	1.13
F5	29.25	0.324	0.376	13.82	1.16
F6	32.27	0.320	0.397	19.39	1.24
F7	33.65	0.521	0.629	17.17	1.20
F8	33.21	0.518	0.627	17.38	1.21
F9	26.56	0.422	0.506	16.60	1.19
F10	28.75	0.481	0.572	15.90	1.18
F11	27.33	0.475	0.566	16.07	1.19
F12	25.38	0.524	0.599	12.52	1.14

Table 4. Physical Evaluation of matrix tablets

F.Code	Hardness (kg/cm^2) †	Thickness (mm) ‡	Weight (mg) ‡	Friability (%)	Drug content * (%)
F1	5.50 ±0.44	3.22±0.17	202.4±1.48	0.36	98.25±1.37
F2	5.50±0.31	3.37±0.25	201.6±0.54	0.39	95.28±0.80
F3	5.58±0.40	3.14±0.80	200.5±0.41	0.43	99.12±2.47
F4	5.66±0.55	3.20±0.20	200.4±1.64	0.12	101.22±0.88
F5	4.25±0.57	3.08±0.66	201.2±1.14	0.54	100.24±1.25
F6	4.08±0.30	3.33±0.25	202.5±0.83	0.58	99.53±1.87
F7	4.25±0.57	3.24±0.71	200.4±0.67	0.64	93.28±1.99
F8	4.41±0.60	3.32±0.89	202.4±0.43	0.37	95.35±1.14
F9	5.00±0.44	3.38±0.73	201.6±0.80	0.77	96.34±2.18
F10	5.00±0.31	3.00±0.68	201.2±0.83	0.42	91.29±0.98
F11	5.08±0.37	2.98±0.88	200.1±0.93	0.48	97.35±0.43
F12	5.41±0.70	3.11±0.36	202.2±0.97	0.15	98.88±0.88

***** All values represent mean ± Standard Deviation (SD), n=3; † All values represent mean ± Standard Deviation (SD), n=6
‡ All values represent mean ± Standard Deviation (SD), n=20.

Table 5. In-*Vitro* Release Data of Ropinirole hydrochloride from HPMC K15M and HPMC K100M Matrices

Time (Hrs)	F1	F2	F3	F4	F5	F6	REQUIP XL
0	0	0	0	0	0	0	0
2	40.25	30.4	25.8	27.28	15.1	10.8	14.8
4	51.23	38.45	32.4	34.49	24.5	15.4	23.7
6	60.45	45.24	36.1	40.8	33.32	25.4	32.6
8	84.32	52.3	45.8	50.2	42.32	30.6	48.7
10	96.9	63.05	60.4	55.8	53.4	46.4	54.5
12	99.8	72.29	69.4	69.5	64.12	51.6	62.4

14		85.4	78.9	70.01	69.9	59.6	75.1
16		92.4	90.8	74.47	78.5	68.4	82.1
18		100.2	97.4	84.32	84.72	70.4	90.2
20			100.1	90.1	92.4	79.5	94.5
22				95.9	96.4	84.6	98.4
24				97.23	98.53		99.50

Table 6. In-*Vitro* Release Data of Ropinirole hydrochloride from Sodium alginate and Guar gum Matrices

Time (Hrs)	F7	F8	F9	F10	F11	F12	REQUIP XL
0	0	0	0	0	0	0	0
2	44.6	40.4	33.46	36.48	26.4	15.4	14.8
4	55.46	46.54	38.24	42.46	35.4	25.4	23.7
6	62.46	55.46	46.25	55.46	48.97	30.6	32.6
8	88.96	64.84	64.25	60.48	59.46	46.4	48.7
10	99.8	75.24	71.25	71.25	68.48	51.6	54.5
12		86.48	79.54	74.56	79.84	59.6	62.4
14		95.42	94.25	79.54	88.46	68.4	75.1
16		100.2	98.25	86.45	92.46	70.4	82.1
18			100.1	94.25	96.46	79.5	90.2
20				98.25	100.5	84.6	94.5
22				100.1		90.4	98.4
24						98.8	99.50

Table 7. Drug Release Kinetics of Batch (F5) Matrix Tablets*

Zero order	First order	Higuchi	Korsmeyer-Peppas	
R^2	R^2	R^2	R2	N
0.9805	**0.7849**	**0.9197**	**0.8963**	**0.3486**

* r^2 = Correlation coefficient; K = Kinetic constant; n= Diffusional exponent

Table 8. Drug Release Kinetics of Batch (F12) Matrix Tablets*

Zero order	First order	Higuchi	Korsmeyer-Peppas	
R^2	R^2	R^2	R2	n
0.9809	**0.7178**	**0.9164**	**0.8913**	**0.3414**

* r^2 = Correlation coefficient; K = Kinetic constant; n= Diffusional exponent

Table 9. Stability studies F5

Formulation - F5	Initial	25°C/60%RH			25°C/60%RH			40°C/75%RH		
		1 Month	2 Month	3 Month	1 Month	2 Month	3 Month	1 Month	2 Month	3 Month
Hardness (kg/cm2)	4.25± 0.57	4.22± 0.58	4.28± 0.59	4.20± 0.60	4.20± 0.58	4.24± 0.62	4.22± 0.64	4.26± 0.54	4.27± 0.65	4.20±0. 66
Thickness (mm)	3.08± 0.66	3.12± 0.67	3.10± 0.68	3.09± 0.69	3.10± 0.52	3.11± 0.71	3.07± 0.68	3.12± 0.73	3.14± 0.64	3.16±0. 72
Weight (mg)	201.2± 1.14	200.2± 1.15	201.2± 1.12	202.2± 1.34	200± 1.18	201.2± 1.19	203.2± 1.20	200.2± 1.21	200.1± 1.22	200.2±1 .52
Friability (%)	0.54	0.53	0.52	0.54	0.54	0.52	0.53	0.53	0.52	0.54
Drug content (%)	100.24±1 .25	101.24± 1.24	100.48± 1.36	100.28± 1.25	100.48± 1.42	101.24± 1.35	100.48± 1.25	100.68± 1.24	100.21 ±1.39	100.47± 1.36

Table 10. Stability studies F12

Formulation - F12	Initial	25°C/60%RH			25°C/60%RH			40°C/75%RH		
		1 Month	2 Month	3 Month	1 Month	2 Month	3 Month	1 Month	2 Month	3 Month
Hardness (kg/cm2)	5.41± 0.70	5.41± 0.71	5.39± 0.72	5.26± 0.56	5.40± 0.48	5.43± 0.75	5.37± 0.48	5.42± 0.57	5.38± 0.78	5.35± 0.79
Thickness (mm)	3.11± 0.36	3.15± 0.58	3.13± 0.59	3.11± 0.71	3.15± 0.49	3.12± 0.56	3.16±0. 68	3.16± 0.52	3.15± 0.69	3.14± 0.56
Weight (mg)	202.2±0 .97	201.2± 1.25	201.2± 1.12	200.2± 1.24	201± 1.16	200.2± 1.24	203.2±1 .20	201.58± 1.21	201.1± 1.23	200.2± 1.62
Friability (%)	0.15	0.14	0.16	0.12	0.14	0.15	0.16	0.15	0.14	0.15
Drug content (%)	98.88± 0.88	100.24± 1.68	101.48± 1.25	100.29± 1.32	99.48± 1.56	101.24± 1.28	98.48± 1.25	99.28± 1.24	101.21± 1.39	99.48± 1.24

CONCLUSION

The formulation and evaluation of sustained released matrix tablets of Ropinirole using different Synthetic and Natural polymer was successfully developed for prolonged period of time. The polymers HPMCK100 and Gurgam successfully sustained the drug release for 24hr and drug release pattern was similar to market formulation. The HPMCK100 and Guargum followed zero order kinetics and Higuchi diffusion mechanism was followed.

The oral sustained released tablets of Ropinirole were formulated and evaluated to help in reducing dosing frequency and improve the patient compliance. The formulated SR tablets were better when compared to the conventional tablets. These tablets were prepared using a simple technique which could be adapted to large scale production.

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