The Pharma Innovation Journal 2016; 5(1): 114-120

www.ThePharmaJournal.com

The Pharma Innovation

ISSN: 2277- 7695
TPI 2016; 5(1): 114-120

www.thepharmajournal.com
Received: 22-11-2015
Accepted: 24-12-2015

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Formulation and *in vitro* evaluation of Selegiline floating tablets

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Abstract
A multiple unit oral floating drug delivery system of Selegiline was developed to prolong gastric residence time, target stomach mucosa and increase drug bioavailability. Floating tablets of Selegiline were developed using a HPMC K 250 PH PRM, HPMC K750 PH PRM, and HPMC K1500 PH PRM. The prepared tablets were evaluated in terms of their pre compression parameters, physical characteristics, *in vitro* buoyancy, *in vitro* drug release and release order kinetics. The results of *in vitro* release studies showed that optimized formulation (F19) could sustain drug release (98.65±1.29%) for 24 h and remain buoyant for 24 h. The optimized formulation was subjected to various release kinetic investigations and it was found that the mechanism of drug release was predominantly diffusion with a minor contribution from polymeric relaxation. Floating tablets of Selegiline were successfully formulated with the ability of providing controlled release and non-Fickian transport of the drug from tablets was confirmed.

Keywords: Selegiline, Floating tablets, HPMC

Introduction
Oral delivery of the drug is the most preferable route of drug delivery due to the ease of administration, patient compliance, and flexibility in the formulations [1] To prolong the residence time of dosage forms within gastrointestinal tract until all drug is released at desired rate is one of the real challenges for oral controlled release drug delivery system [2] In the present era, gastro-retentive dosage forms (GRDF) receive great attention because they can improve the performance of controlled release systems. An optimum GRDF system can be defined as a system which remains in the stomach for a sufficient time interval against all the physiological barriers, releases active moiety in a controlled manner, and finally is easily metabolized in the body. Physiological barriers like gastric motility and gastric retention time (GRT) act as obstacles in developing an efficient GRDF [3]. Several technical approaches are currently utilized in the prolongation of gastric residence time, including high density, swelling and expanding, polymeric mucoadhesive, ion-exchange, raft forming, magnetic and floating drug delivery systems (FDDS), as well as other delayed gastric emptying devices [4]. Since decade or two, the development of floating drug delivery systems becomes a significant and novel tool as having low density than gastric content [5].
Selegiline is a selective inhibitor of MAO-B in the nigrostriatal pathway of the brain, irreversibly inhibiting it by binding to it covalently. It exerts effects by blocking the breakdown of dopamine, thus increasing its activity. Its possible neuroprotective properties may be due to protecting nearby neurons from the free oxygen radicals that are released by MAO-B activity. At higher doses, Selegiline loses its selectivity for MAO-B and inhibits MAO-A as well.
Selegiline also inhibits CYP2A6 and can increase the effects of nicotine as a result. Selegiline also appears to activate $\sigma_1$receptors, having a relatively high affinity of approximately 400nM.

Materials and Methods
Materials
Selegiline pure drug was generous gift from Aurobindo Pharma Limited, Hyderabad, India. HPMC K 250 PH PRM, Carnauba wax, Sodium Bicarbonate, MCC, HPMC K 750 PH PRM, HPMC K 1500 PH PRM, was obtained from Rubicon labs, Mumbai. Xanthan gum and Polyox WSR 303 ere gifted from MSN Labs Ltd. Hyderabad. All other chemicals used were of analytical grade.

Methods

Micromeretic Studies of Selegiline Mesylate

Angle of repose

A funnel was fixed at a height approximately 2-4 cm over the platform. The loose powder was slowly passed along the wall of funnel, till the tip of powder cone so formed just touched the tip of funnel stem**.** Angle of repose was then determined by measuring the height of the cone of powder and radius of the circular base of powder heap.

Density analysis

The volume of powder packing was determined on an apparatus consisting of a graduated cylinder mounted on a mechanical tapping device that has a specially cut rotating cam. An accurately weighed sample of powder was carefully added to the cylinder with the aid of a funnel [6] Initial volume of powder was noted and the sample subjected to tapping (500, 750 or 1250 tappings) until no further reduction in volume was noted or the percentage of difference in volume was not more than 2%. A sufficient number of taps should be employed to assure reproducibility for the material in question. The tapping should not produce particle attrition or a change in the particle size distribution of the material being tested.

Compressibility index and Hausner ratio

In recent years compressibility index and the closely related Hausner ratio have become the simple, fast and popular methods of predicting powder flow characteristics. Compressibility index has been proposed as an indirect measure of bulk density, size and shape, surface area, moisture content, and cohesiveness of materials because all of these can influence the observed compressibility index. The compressibility index and Hausner ratio are determined by measuring both bulk density and the tapped density of a powder.

Sieve analysis

The procedure involves the electromagnetic sieve shaking of the sample through the series of successively arranged sieves (sieve no. 20, 30, 60, 80 and 100 and receiver), and weighing of the portion of the sample retained on each sieve and calculating percentage retained on each sieve.

Evaluation of Final Blend

The Final blend of all formulations was evaluated for Bulk density, Tapped density, Compressibility Index (CI), Hausner ratio and Angle of repose [7].

Formulation Method

Accurately weighed quantities of polymers and MCC were taken in a mortar and mixed geometrically, to this required quantity of Selegiline was added and mixed slightly with pestle. Accurately weighed quantity of Sodium bicarbonate was taken separately in a mortar and powdered with pestle. The powder is passed through sieve no 40 and mixed with the drug blend which is also passed through sieve no 40. The whole mixture was collected in a plastic bag and mixed for 3 minutes. To this Magnesium stearate was added and mixed for 5 minutes, later Talc was added and mixed for 2 minutes [7]. The mixture equivalent to 150mg was compressed into tablets with 10mm round concave punches at a hardness of 6 kg/cm^2.

Table 1: Composition of floating matrix tablets of Selegiline by using HPMC K 250 PH PRM

Ingredients	Formulations						
	F1	F2	F3	F4	F5	F6	F7
Selegiline	5	5	5	5	5	5	5
HPMC K250 PH PRM	40	45	50	55	60	65	70
WSR 301 (mg)	10	10	10	10	10	10	10
Sodium bicarbonate	10	12	14	16	18	20	22
Avicel pH 102	71	64	57	50	43	36	29
PVP K 30	10	10	10	10	10	10	10
Talc	2	2	2	2	2	2	2
Magnesium Stearate	2	2	2	2	2	2	2
Total Weight (mg)	150	150	150	150	150	150	150

Table 2: Composition of floating matrix tablets of Selegiline with HPMC K 750 PH PRM

Ingredients (weight in mg)	Formulations						
	F8	F9	F10	F11	F12	F13	F14
Selegiline	5	5	5	5	5	5	5
HPMC K 750 PH PRM	40	45	50	55	60	65	70
WSR 301	10	10	10	10	10	10	10
Sodium Bicarbonate	10	12	14	16	18	20	22
Avicel pH 102	71	64	57	50	43	36	29
PVP K 30	10	10	10	10	10	10	10
Talc	2	2	2	2	2	2	2
Magnesium Stearate	2	2	2	2	2	2	2
Total Weight (mg)	150	150	150	150	150	150	150

Table 3: Composition of floating matrix tablets of Selegiline by using HPMC K 1500 PH PRM

Ingredients	Formulations						
	F15	F16	F17	F18	F19	F20	F21
SELEGILINE*	5	5	5	5	5	5	5
HPMC K1500 PH PRM	40	45	50	55	60	65	70
WSR 301	10	10	10	10	10	10	10
Sodium bicarbonate	10	12	14	16	18	20	22
Avicel pH 102	71	64	57	50	43	36	29
PVP K 30	10	10	10	10	10	10	10
Talc	2	2	2	2	2	2	2
Magnesium Stearate	2	2	2	2	2	2	2
Total Weight (mg)	150	150	150	150	150	150	150

Evaluation of Floating Tablets of Selegiline

Weight Variation

Twenty (20) tablets from each batch were individually weighed in grams on an analytical balance. The average weight and standard deviation were calculated, individual weight of each tablet was also calculated using the same and compared with average weight.

Thickness

The thickness in millimeters (mm) was measured individually for 10 pre weighed tablets by using Vernier Calipers. The average thickness and standard deviation were reported.

Hardness

Tablet hardness was measured using a Monsanto hardness tester. The crushing strength of the 10 tablets with known weight and thickness of each was recorded in kg/cm^2 and the average hardness, and the standard deviation was reported.

Friability

Twenty (20) tablets were selected from each batch and weighed. Each group of tablets was rotated at 25 rpm for 4 minutes (100 rotations) in the Roche Friabilator. The tablets

were then dusted and re-weighed to determine the loss in weight. Friability was then calculated as per weight loss from the original tablets [8].

***In vitro* buoyancy studies**

The *in vitro* buoyancy was determined by floating lag time. The tablets were placed in a 100ml beaker containing 0.1N hydrochloric acid. The time required for the tablet to rise to the surface and float was determined as floating lag time [9]. The duration of time for which the dosage form constantly remained on the surface of medium was determined as the total floating time.

Drug Content

Twenty tablets were taken, powdered. The powder equivalent to one dose each was transferred to a 100 ml volumetric flask and 0.1N HCl was added. The volume was then made up to the mark with 0.1N HCl. The solution was filtered and diluted suitably and drug content in the samples was estimated using UV-spectrophotometer at 265nm [10].

***In vitro* Drug Release Studies**

The *in vitro* drug release study was performed for the single- & multiple-unit tablets using USP Type II dissolution apparatus using 900ml of 0.1N HCl at a temperature of 37±0.5ºC at 50 rpm. 5 ml of sample was collected at 0, 2, 4, 6, 8, 12, 16, 20, 24 hours and the same volume of fresh media was replenished [11]. The drug content in the samples was estimated using UV visible spectrophotometer at 265 nm.

Analysis of *in vitro* drug release kinetics and mechanism

The *in vitro* release data from several microspheres formulations containing Selegiline was determined kinetically using different mathematical models like Zero order, First order, Higuchi, and Korsmeyer–Peppas model**.**

Drug-excipient compatibility studies

Fourier transform infrared spectroscopy (FTIR)

The spectral analysis can be used to identify the functional groups in the pure drug and drug-excipient compatibility. Pure Selegiline FTIR spectra, physical mixtures and optimized formulation were recorded by using FTIR (SHIMADZU). Weighed quantity of KBr and drug-excipients were taken in the ratio 100:1 and mixed by mortar. The samples were made into pellet by the application of pressure [12]. Then the FTIR spectra were recorded in the wavelength region between 4000 and 400cm^{-1}.

Stability studies

Stability testing was conducted at 40˚C ± 2˚C/75% RH ± 5% RH for 3 months using stability chamber (Thermo Lab, Mumbai). Samples were withdrawn at predetermined intervals 0, 30, 60 and 90 days period according to ICH guidelines [13]. Various *in vitro* parameters like % yield, entrapment efficiency and *in vitro* release studies were evaluated.

Results and Discussion

Table 4: Physical properties of prepared powder blends of selegiline

Formulation	Bulk density (g/cc)	Tapped density (g/cc)	Angle of repose	Carr's index (%)	Hausner ratio
F1	0.56±0.02	0.59±0.01	24.34±0.4	11.23±0.8	1.13±0.02
F2	0.58±0.12	0.60±0.04	21.67±0.3	10.23±1.0	1.12±0.07
F3	0.59±0.04	0.64±0.05	26.54±0.1	10.12±0.7	1.13±0.09
F4	0.51±0.06	0.54±0.03	21.56±0.2	09.14±1.0	1.11±0.06
F5	0.65±0.02	0.65±0.02	22.56±0.1	11.23±0.8	1.13±0.05
F6	0.57±0.21	0.66±0.12	23.30±0.1	10.23±0.5	1.12±0.06
F7	0.54±0.04	0.63±0.04	23.89±0.2	11.34±0.6	1.16±0.03
F8	0.53±0.01	0.68±0.03	24.67±0.3	10.11±0.8	1.12±0.03
F9	0.57±0.01	0.61±0.01	23.56±0.3	11.45±0.7	1.13±0.02
F10	0.58±0.13	0.67±0.06	21.66±0.2	11.45±0.5	1.15±0.01
F11	0.53±0.09	0.68±0.12	25.34±0.2	10.23±0.5	1.13±0.01
F12	0.51±0.04	0.56±0.07	21.09±0.2	09.28±0.4	1.11±0.03
F13	0.54±0.01	0.67±0.04	25.14±0.3	10.67±0.4	1.13±0.02
F14	0.57±0.06	0.64±0.21	22.99±0.5	11.34±0.5	1.12±0.01
F15	0.53±0.01	0.63±0.04	22.78±0.4	10.45±0.3	1.13±0.02
F16	0.54±0.02	0.61±0.07	22.45±0.4	10.68±0.2	1.13±0.02
F17	0.59±0.21	0.68±0.03	25.09±0.3	11.47±0.8	1.12±0.02
F18	0.58±0.03	0.67±0.08	23.05±0.2	11.99±0.3	1.14±0.02
F19	0.50±0.07	0.55±0.03	20.04±0.4	09.09±0.4	1.11±0.02
F20	0.59±0.06	0.64±0.1	24.78±0.1	12.12±0.5	1.14±0.01
F21	0.56±0.02	0.61±0.12	25.06±0.2	11.45±0.6	1.13±0.01

Above parameters are communicated as Average ± Standard Deviation; (n=3)

The results of bulk densities formulations bearing F1 to F21 reported being in the range of 0.50g/cc to 0.59g/cc.

The findings of tapped density formulations F1 to F21 reported being in the range of 0.54g/cc to 0.68g/cc.

The angle of repose of all the formulations was found a satisfactory result. The formulation F19 was found to be 20.04 having good flow property.

The compressibility index values were found to be in the range of 9 to 12 %. These findings indicated that the all the batches of formulations exhibited good flow properties.

The Hausner's ratio values in the space of 1.10 to 1.16 %. These findings designated that the all the batches of formulations advertised good flow criterions.

Table 5: Physicochemical parameters of Selegiline floating tablets

F. No	Weight variation (mg)	Thickness (mm)	Hardness (Kg/Cm^2)	Friability (%)	Content uniformity (%)	Floating Lag time (sec)	Total floating time (hrs)
F1	150.65±1.2	6.4±0.12	6.3±0.12	0.57±0.01	95.23±0.63	47	>24
F2	151.69±0.8	6.3±0.06	6.1±0.06	0.55±0.02	97.04±0.06	45	>24
F3	152.04±0.5	6.3±0.06	6.1±0.06	0.63±0.03	95.56±0.14	43	>24
F4	151.05±0.0	6.2±0.12	6.2±0.12	0.72±0.01	98.11±1.01	40	>24
F5	151.54±0.4	6.3±0.00	6.3±0.00	0.62±0.02	94.23±1.08	38	>24
F6	150.78±0.4	6.3±0.10	7.1±0.06	0.66±0.01	95.45±0.31	36	>24
F7	150.65±0.3	6.1±0.10	6.3±0.10	0.53±0.02	98.91±0.49	34	>24
F8	151.57±0.2	6.3±0.25	6.3±0.40	0.69±0.01	97.23±0.51	46	>24
F9	152.76±0.35	6.3±0.06	6.3±0.06	0.58±0.00	96.13±0.56	44	>24
F10	150.49±0.2	6.2±0.20	6.2±0.42	0.79±0.02	95.23±0.24	41	>24
F11	151.53±0.4	6.2±0.06	6.3±0.06	0.76±0.01	97.97±0.21	39	>24
F12	150.58±0.3	6.2±0.00	6.4±0.06	0.73±0.02	98.45±0.76	37	>24
F13	151.34±0.2	6.3±0.26	6.8±0.35	0.72±0.02	97.45±0.48	35	>24
F14	150.67±0.3	6.1±0.21	6.4±0.21	0.54±0.03	98.98±0.23	34	>24
F15	152.65±0.2	6.4±0.06	7.0±0.23	0.75±0.02	96.45±0.36	48	>24
F16	150.65±0.3	6.2±0.25	6.4±0.23	0.78±0.01	96.45±0.69	46	>24
F17	151.79±0.4	6.5±0.15	6.8±0.32	0.79±0.01	96.34±0.35	43	>24
F18	151.87±0.1	6.4±0.25	6.7±0.35	0.82±0.01	97.56±0.23	41	>24
F19	150.16±0.8	6.0±0.10	6.2±0.21	0.52±0.89	99.78±0.23	31	>24
F20	151.32±0.2	6.2±0.12	6.5±0.2	0.63±0.03	97.18±0.81	33	>24
F21	150.65±0.2	6.4±0.06	7.0±0.23	0.75±0.02	96.45±0.36	34	>24

*Values are expressed in mean± SD: (n=20)
#Values are expressed in mean± SD: (n=3)

The Weight variation of all formulations witnessed to be in the limit allowed that is ± 5% of total tablet weight.
The suitable hardness for compressed tablets is considered as a vital function for the end user. The deliberated crushing strength of fabricated tablets of formulations F1-F21 trended between 6.0-7.0kg/cm^2 and magnitudes of crushing strength tabulated in Table 5. The thickness of all the formulations between the ranges 6-6.5 mm. The friability of all prepared formulation between 0.52-0.84.the friability properties limits are in between 0-1%.
The drug content of all formulation is in between 94.11-99.78%, drug content depends on the angle of repose since the angle of repose indicates uniform flow nature of powder blend which makes the drug to evenly distribute in all the formulation and to maintain content uniformity in all batches.
Tablets of all batches had floating lag time below 3 minutes regardless of viscosity and content of HPMC because of evolution of CO_2 resulting from the interaction between sodium bi carbonate and dissolution medium; entrapment of gas inside the hydrated polymeric matrices enables the dosage form to float by lowering the density of the matrices. Total Floating time for the HPMC formulations were between 12 to 24 hrs.

At time 0 **After 31 sec**

Fig 1: *In vitro* buoyancy lag time of the optimized formulation F19

Fig 2: Selegiline floating tablets after 24 hours

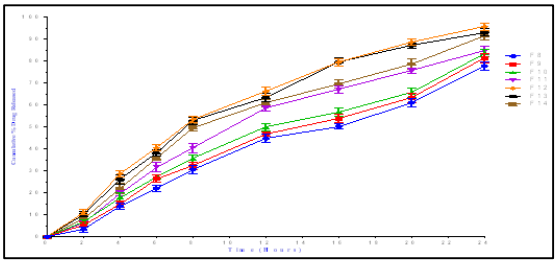

Fig 3: *In vitro* Drug Release Profile of Selegiline floating tablets F1-F7

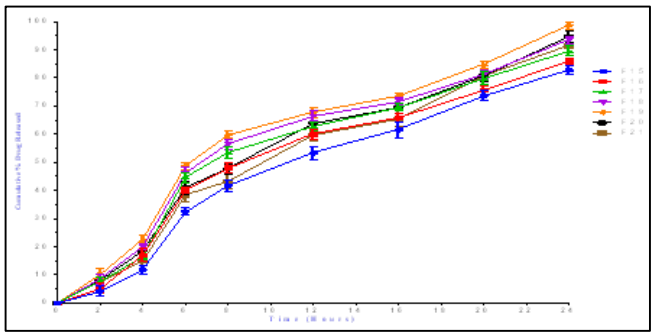

Fig 4: *In vitro* Drug Release Profile of Selegiline floating tablets F8-F14

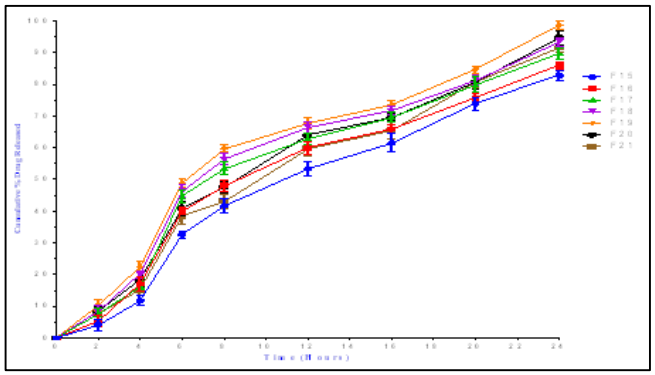

Fig 5: *In vitro* Drug Release Profile of Selegiline floating tablets F15-F21

From the above figure it can be observed that the polymer HPMC K 1000 PH PRM has controlling effect on the release of drug from the floating matrix tablet. The percent of drug release from formulations F15, F16, F17, F18, F19, F20 and F21 was 82.78, 85.87, 89.65, 93.43, 98.65, 94.78 and 91.45 in 24 h respectively. The difference in the drug release profiles of various formulations was due to the presence of different concentrations of polymer. The concentrations of polymers was added as increase order to check its drug retarding and release ability up to F19 the release was increased beyond that it shown decrease release so formulation F19 was considered as best formulation among all the seven formulations as it showed good buoyancy properties (floating lag time: 31 sec & floating time >24 hrs and controlled the drug release for desired period of time (24 hrs). The release profiles from all these formulations were followed diffusion controlled release complying with higher correlation coefficient values of Higuchi and Peppas equations.

In vitro drug release studies for optimized formulation (F19) and marketed product *In vitro* drug release studies

An *in vitro* release profile of Selegiline was sequentially determined in gastric fluid of P^H 1.2.

The formulation with drug polymer ratio F19 was selected as optimized formulation because it showed a maximize release in stomach region.

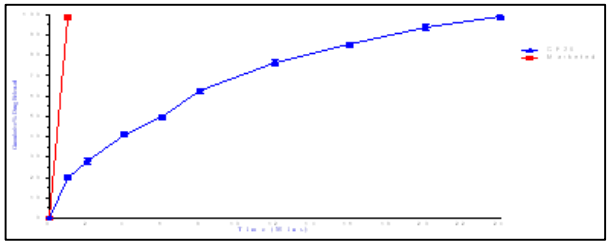

Fig 6: Comparison of marketed product of Selegiline with optimized formulation (F19)

Mathematical modelling of optimized formula (F19) of Selegiline floating tablets

In vitro dissolution has been recognised as an important element in drug development. Under certain conditions it can be used as a surrogate for the assessment of bioequivalence. There are several models to represent the drug dissoluton profiles where ft is a function of time releated to the amount of drug dissolved from the pharmaceutical dosage systems. The quantitative interpretation of the values obtained in the dissolution assay is facilitated by the usage of a generic eqation that mathematically translates the dissolution curve in the function of some parameters releated with the pharmaceutical dosage forms.

A water soluble drug incorporated in a matrix is mainly released by diffusion, while for a low water- soluble drug the self-erosion of the matrix will be the principal relese mechanism. To accomplish these studies the cumulative profiles of dissolved drug are more commonly used in opposition to their differential profiles. Mathematical modeling of the relese kinetics of specific classes of controlled-relese systems may be used to predict solute release rates from and solute diffusion behavior through polymers and elucidate the physical mechanisms of solute transport by simply comparing the relese data to mathematical models.

In the view of establishment of release mechanism and quatitatively interpreting and translate mathematically the dissolution date being plotted.

Table 6: Release kinetics of optimized formulation of Selegiline floating tablets (F19)

Formulation Code	Zero Order		First Order		Higuchi		Korsmeyer-Peppas	
	R^2	n	R^2	n	R^2	n	R^2	n
F19	0.999	8.741	0.748	0.151	0.937	29.62	0.959	0.825

From the above results it is apparent that the regression coefficient value closer to unity in case of zero order plot i.e.0.999 indicates that the drug release follows a zero order mechanism (Table 6). This data indicates a lesser amount of linearity when plotted by the first order equation. Hence it can be concluded that the major mechanism of drug release follows zero order kinetics.

Further, the translation of the data from the dissolution studies suggested possibility of understanding the mechanism of drug release by configuring the data in to various mathematical modelling such as Higuchi and Korsmeyer-Peppas plots. Further the n value obtained from the Korsmeyer-Peppas plots i.e. 0.825 indicating non Fickian (anomalous) transport thus it projected that delivered its active ingredient by coupled diffusion and erosion.

Table 7: Release kinetics of Marketed Product

Formulation Code	Zero Order		First Order		Higuchi		Korsmeyer-Peppas	
	R^2	n	R^2	n	R^2	n	R^2	n
Marketed	0.927	8.642	0.994	0.061	0.954	24.76	0.971	0.833

From the above results it is apparent that the regression coefficient value closer to unity in case of First order plot i.e.0.994 indicates that the drug release follows a first order mechanism (Table 7). This data indicates a lesser amount of linearity when plotted by the zero order equation. Hence it can be concluded that the major mechanism of drug release

follows first order kinetics.

Further, the translation of the data from the dissolution studies suggested possibility of understanding the mechanism of drug release by configuring the data in to various mathematical modelling such as Higuchi and Korsmeyer-Peppas plots.

Further the n value obtained from the Korsmeyer-Peppas plots i.e. 0.833 indicating non Fickian (anomalous) transport thus it projected that delivered its active ingredient by coupled diffusion and erosion.

Correlation Coefficient Values For Optimized

Table 8: Regression coefficient (R^2) values, n

S. No	Formulation	Zero order R^2	First order R^2	Higuchi Model R^2	Korsmeyer-Peppas model R^2	n
1	F19	0.999	0.748	0.937	0.959	0.835
2	Marketed	0.927	0.983	0.943	0.968	0.833

The *in vitro* drug release profiles were fitted to several kinetic models and release data followed by their R^2 and n values shown in the Table 8. The optimized formulation was best fitted in Zero Order and Korsmeyer-Peppas. The optimized formulation n value was 0.835 indicating non Fickian (anomalous) transport thus it projected that delivered its active ingredient by coupled diffusion and erosion. The marketed conventional formulation followed the first order kinetics indicating drug release is directly proportional to the concentration of drug.

Drug - Excipient compatibility studies

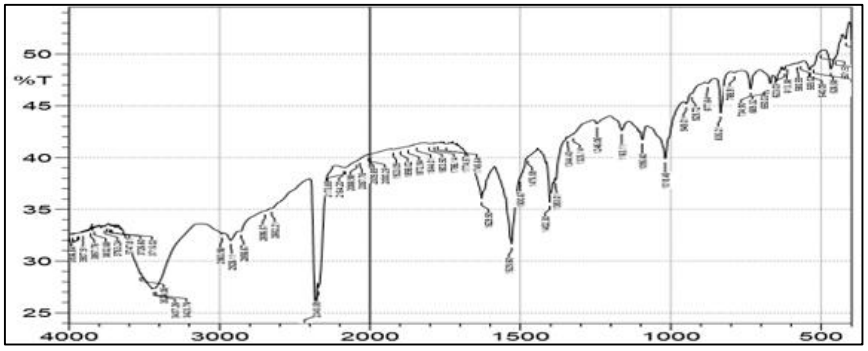

Fig 7: FTIR spectrum Selegiline pure drug

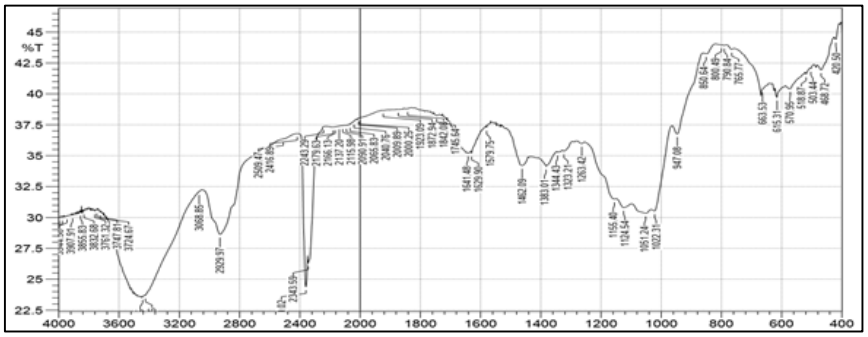

Fig 8: FTIR spectrum of HPMC K1500 PH PRM

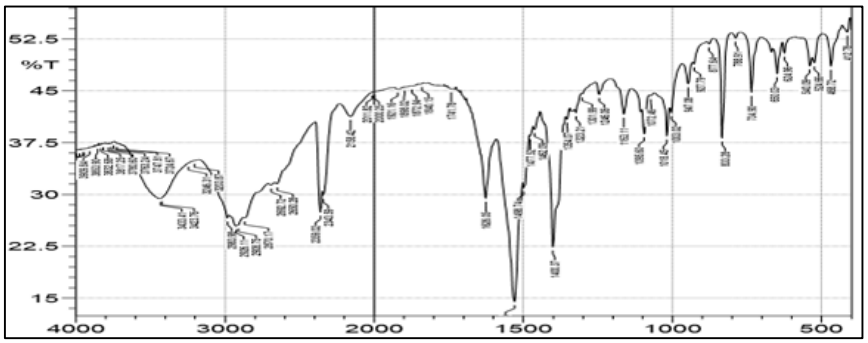

Fig 9: FTIR spectrum of Selegiline optimized formulation (F19)

FTIR spectra of Selegiline showed peaks of 3410, 2941, 1629, 1530, 1400 and 1060 cm^{-1}due to –OH stretching, C-H stretching, C=O stretching, N-H bending, C-H bend in plane and C-C stretching respectively. FTIR Spectra of HPMC K 1500 PH PRM showed peaks of 2929, 1462, 1163, 1022, 947 and 850 cm^{-1} due to C-H stretching, O-H stretching and C-C stretching respectively. FTIR spectra of optimized formulation showed both characteristics peaks of drug and polymer indicating no drug-polymer interaction.

Stability Studies

Table 9: Parameters after Accelerated Stability Study of optimized Formulation F19

Parameters	Temperature Maintained at 40±2 ^{0}C; Relative Humidity (RH) Maintained at 75%±5%RH			
	Initial	After 1 month	After 3 months	After 6 months
Drug Content (%)	99.78±0.14	99.26±0.68	98.73±0.37	99.12±0.22
In Vitro Drug Release (%)	98.65±1.15	98.10±1.53	97.82±1.42	97.50±1.35
Floating lag time	31	32	33	33

There were no changes observed in % drug content, *In vitro* drug release studies and floating lag time during storage of the optimized formulation and the results are tabulated in Table 9. Hence the optimized formulation was found to be stable.

Summary and Conclusion

In present work attempt was made to formulate and evaluate Selegiline floating tablets. Attempts were made to achieve controlled drug release from the dosage form.

Twenty one formulations (F1-F21) were prepared by direct compression method using different polymers such as HPMC K 250 PH PRM, HPMC K 750 PH PRM and HPMC K 1500 PH PRM. Seven formulations were made using various concentrations of each polymer.

All the above polymers are innovative and effective in retarding the drug release.

The effervescent agents i.e. sodium bicarbonate and citric acid were used in increase order of their concentrations but floating lag time is not directly proportional to its concentrations.

In the Preformulation properties was carried out and the values obtained were within the range. Solubility studies showed pH dependent solubility of Selegiline, highly soluble in acidic pH but poorly soluble in alkaline pH and FTIR studies results revealed that there was no incompatibility between drug and excipients.

Thus, gastric floating tablets were formulated by varying proportions of polymers by direct compression method and they were evaluated. All the physicochemical properties of the formulations were within the limit.

The difference in the drug release profiles of various formulations was due to the presence of different concentrations of polymer. The concentrations of polymers was added as increase order to check its drug retarding and release ability up to a certain concentration the release was increased beyond that it shown decrease release. In present work we identified optimum concentration levels of each polymer.

The formulations from each polymer F4, F12 and F19 gave better controlled drug release and floating properties in comparison to the other formulations. Among all the formulation F19 was selected as optimized formulation because it showed maximum release in stomach.

In vitro drug release studies were carried out to know the drug release with respective of the time. Maximum drug was released from the formulation F19 within 24 Hrs. Based on the physicochemical properties and, *in vitro* drug release, floating lag time and total floating time, the formulation F19 was concluded as the best formulation.

No prominent changes in physicochemical properties of formulation after its exposure to accelerated conditions of temperature (40±2 ^{0}C) and humidity conditions (75 ± 5%RH) were seen. Hence the developed formulation was found to be stable even after subjecting to accelerated stability conditions.

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