EUROPEAN JOURNAL OF BIOMEDICAL AND PHARMACEUTICAL SCIENCES
http://www.ejbps.com

ISSN 2349-8870
Volume: 8
Issue: 9
737-746
Year: 2021

FORMULATION AND EVALUATION OF FAST DISSOLVING TABLET OF LURASIDONE HYDROCHLORIDE BY USING SOLID DISPERSION TECHNIQUE

Yelve Shivaji*[1], Dr. Deeliprao Derle[2], Sandeep Khatale[3] and Dilip Satwadhar[4]

[1]Student, Department of Pharmaceutics, MVP Samaj's College of Pharmacy, Nashik, MH, India.
[2]Principal, Department of Pharmaceutics, MVP Samaj's College of Pharmacy, Nashik, MH, India.
[3]Professor, Department of Pharmaceutics, MVP Samaj's College of Pharmacy, Nashik, MH, India.
[4]Student, Department of Pharmaceutics, School of Pharmacy, SRTMU Nanded, MH, India.

***Corresponding Author: Yelve Shivaji**
Student, Department of Pharmaceutics, MVP Samaj's College of Pharmacy, Nashik, MH, India.

Article Received on 21/07/2021 **Article Revised on 11/08/2021** **Article Accepted on 01/09/2021**

ABSTRACT
In present work, an attempt was made to formulate fast dissolving tablets of Lurasidone hydrochloride by solid dispersion technique for improving solubility of Lurasidone hydrochloride using PEG 6000. The Lurasidone hydrochloride tablets were prepared by direct compression method using sodium starch glycolate as superdisintegrant polymer.in Solvent evaporation method drug: polymer 1:3 ratio was showed maximum solubility and drug content. The excipient- drug substance compatibility was assessed and there associative behavior was comprehensively studied by FT-IR, Differential Scanning calorimetry (DSC).Pre-compression parameters of the blend and Post-compression parameters of the prepared batches were evaluated and found to be satisfactory. The prepared tablets were evaluated for various physical parameters, In- vitro drug release study was carried out in phosphate buffer (pH 6.8) for 30 min following USP type-II paddle apparatus. Increase in Sodium starch glycolate concentration resulted in a significant decrease in disintegration time. F6 was optimized formulation released 97.01% of drug release within 30 min. and disintegration time 26 second. Hence, F6 were considered as the best formulation. It was concluded that fast dissolving tablets lurasidone hydrochloride formulated and increase solubility and dissolution rate.

KEYWORDS: Lurasidone hydrochloride, solid dispersion, PEG 6000, solubility, dissolution rate, FDT.

1. INTRODUCTION
For the past two decades, there has been enhanced demand for more patient compliant dosage form. As a result, the demand for the technologies has been increasing 3-fold annually. Since the development cost of a new chemical entity is very high, the pharmaceutical companies are focusing on the development of new drug delivery systems for existing drug with an improved efficacy and bioavailability together with reducing dosing frequency to minimize side effect.[1]

Many elderly persons will have difficulties in taking conventional solid dosage form (tablets and capsules) because of their hand tremors and dysphasia. Swallowing problems are also common in young individuals because of their underdeveloped muscular system. Other groups, who may experience problems in swallowing solid dosage form, are the mentally ill, the developmentally disabled, uncooperative patients and reduced liquid intake plans or nausea. In some cases, such as motion sickness, sudden episode of allergic attack or coughing and an unavailability of water, swallowing of tablets may become difficult.[2]

To fulfil these medical needs, the pharmaceutical technologist has devoted considerable efforts to develop a novel type of dosage form for oral administration, the Fast Dissolving Tablet (FDT), tablet that disintegrates and dissolves rapidly in saliva without need of water. The fast dissolving tablets usually dissolve in oral cavity within 15 second to 1 minute. The faster the drug goes into solution, the quicker the absorption and onset of clinical effects. The development of fast dissolving tablets also provides line extension in the market place.[3]

Lurasidone hydrochloride (LH) is a psychotropic agent reported to antagonize dopamine D2 receptors, also serotonin 5-HT2A and 5-HT7 receptors.[4] It is a partial agonist at 5-HT1A receptors. Also, it antagonizes adrenergic alpha2A andalpha2C receptors but exhibits minimal affinity for histaminic (H1)and acetylcholinergic muscarinic (M1) receptors It is approved in October 2010 by the FDA in the treatment of schizophrenia and bipolar disorders.[5]

It is a lipophilic drug with a log P value of 5.6. It is a poorly water-soluble drug belonging to BCS Class II.[6] It

possesses a lower bioavailability of 9-19%, leading from its lower gastrointestinal absorption.[7] Its dose varies according to the condition i.e. 20-80 mg/day. It possesses a longer half-life of 18 h.[8]

1.1 Definition

USFDA defines FDT as 'A solid dosage form containing medicinal substance or active ingredient which disintegrates and dissolves rapidly usually within a matter of seconds when placed upon the tongue' the disintegration time ranging from several seconds to about a minute.[3]

2. MATERIALS AND METHOD

Following are the Chemicals used

Table 1: List of Chemicals Used.

Sr. No.	Material	Suppliers
1	Lurasidone Hydrochloride	Macleods Pharmaceuticals Ltd Mumbai
2	PEG 6000	SD fine chemicals Ltd. Mumbai
3	Sodium Sacharine	SD fine chemicals Ltd. Mumbai
4	Microcrystalline cellulose	SD fine chemicals Ltd. Mumbai
5	Sodium starch glycolate	Hi-Media Chemicals Ltd. Mumbai
6	Magnesium stearate	SD Fine Chemicals Ltd. Mumbai
7	Mannitol	SD Fine Chemicals Ltd. Mumbai
8	Methanol	SD Fine Chemicals Ltd. Mumbai
9	Aerosil	SD Fine Chemicals Ltd. Mumbai

3. Experimental Works

3.1 Preformulation Studies

Preformulation Studies is the first step in the rationale development of the dosage forms of the drug substance. It can be defined as the investigation of the physical and chemical properties of the drug substance alone and when combined with the excipients. It gives the extensive information needed to define the nature of the drug substance and provide a framework for the drug combination with pharmaceutical excipients in the dosage form. Hence, preformulation studies on the obtained sample of drug are required.

3.1.1 Description: The received sample of Lurasidonne Hydrochloride was checked for its appearance and colour.

3.1.2 Solubility: Solubility of Lurasidone Hydrochloride was determined using different solvents like Water, Methanol, pH 6.8 Phosphate Buffer. The amount of solvent required to dissolve 0.5g of drug was noted and compared with standards.

3.1.3 Melting Point Determination: Melting point determination is prime requirement for the confirmation of drug. Melting point was determined by capillary method.

- *Capillary Method*- In this method, drug (Lurasidone Hydrochloride) was filled into capillary tube and tied to the thermometer in such a way that it remains dipped in liquid paraffin bath. The temperature range at which the drug starts melting and complete melting was noted.

3.1.4 Preparation of Standard Calibration of Lurasidone Hydrochloride in Methanol

- **Preparation of Standard Solution**

100mg of pure Lurasidone hydrochloride was accurately weighed and dissolved into sufficient amount of Methanol in 100 ml volumetric flask and volume was made up to 100 ml to get 1000 µg/ml solution. Further, 10 ml of above solution was diluted to 100 ml with Methanol to get 100 µg/ml solution (SS-I).

Preparation of working Standard Solutions

From SS-I aliquots of 0.2ml, 0.4ml, 0.6ml, 0.8ml,1ml were pipetted out into 10ml volumetric flasks. The volume was made up with Methanol to get the final concentrations of 2,4, 6, 8, 10,µg/ml respectively. The absorbance of each concentration was measured at 223 nm wavelength against Methanol as blank.

- **Calibration curve in water**

By taking water as a desired solvent, stock solution in Methanol and then further dilution as 2,4,6,8,10 ug/ml is prepared and filtered after which higher concentration dilution(10PPM) was scanned for λ max in the range of 200- 400 nm. Then, absorbance of further dilutions were taken at obtained λ max only. These absorbance are then plotted on a graph of Absorbance v/s Concentration.

- **Calibration curve in Phosphate buffer pH 6.8**

By taking phosphate buffer pH 6.8 as a desired solvent, stock solution in Methanol and then further dilution as 2,4,6,8,10,ug/ml is prepared and filtered after which higher concentration dilution(10PPM) was scanned for λ max in the range of 200- 400 nm. Then, absorbance of further dilutions were taken at obtained λ max only. These absorbances were then plotted on a graph of Absorbance v/s Concentration.

3.1.5 Preparation of Solid Dispersion

3.1.5.1 Solvent Evaporation Techniques

- **Preparation of solid dispersions**

The physical solid dispersions were prepared by solvent evaporation technique in different ratios (1:1),(1:2), (1:3) by using drug Lurasidone hydrochloride and polymer

PEG 6000. The following combination of drug and carrier were used.

➢ **Procedure**

The drugdissolved in 10 ml of methanol solvent and the resulting clear solution was kept for evaporation the solvent and get the glassy solid mass. the obtain solid mass was left to dry in open air for 24 hrs. after complete removal of the solvent the solid dispersion were collected and stored.

Table 2: Formulation of Solid Dispersion.

Solid dispersion code	Composition	Ratio
SD1	Lurasidone Hydrochloride:PEG 6000	1:1
SD2	Lurasidone Hydrochloride:PEG 6000	1:2
SD3	Lurasidone Hydrochloride:PEG 6000	1:3

3.1.5.2 Total Drug Content

Solid dispersion (10 mg) was accurately weighed and transferred into a 100 ml volumetric flask. Initially, 10 ml of methanol was added and shaken for 15 min, then volume was made up to 100 ml with same solution and kept it for 24 hours. The resulting solution was filtered, diluted suitably and analyzed by UV-visible spectrophotometer at 223 nm using methanol as a blank.

3.1.6 Fourier-Transform Infrared (FT-IR) Spectroscopic Analysis

Shimadzu FT-IR spectrophotometer was used for infrared analysis of samples. About 1-2 mg of samples were mixed with dry potassium bromide of IR grade in the ratio of 1:100 and examined at transmission mode over wave number range of 4000 to 400 cm^{-1} with a resolution of 4 cm^{-1}. FT-IR studies were carried out on pure Lurasidone hydrochloride, PEG6000, complex formulation of drug: polymer ratio of (1:3).

3.1.7 Differential Scanning Calorimetry (DSC)

The DSC studies of pure drug (Lurasidone hydrochloride) and optimized solid dispersion formulation was performed to access what changes had actually made when complex was formed. DSC thermogram was obtained using DSC at heating rate of 10ºC/min over a temperature range of 40-340°C in nitrogen atmosphere. The onset peak and end set peaks are recorded for pure drug and complex formulation.

3.2 Precompression parameters Studies

3.2.1 Angle of repose

Angle of repose has been used as indirect methods of quantifying powder flow ability, because of their relationship with inter particle cohesion. A static heap will slide when the angle of inclination is large enough to overcome frictional forces and stop when gravitational forces balance the forces. The sides of heap will make an angle with horizontal which is called angle of repose.

Method: Angle of repose is determined by using funnel method. The accurately weighed blend was taken in a funnel. The height of the funnel was adjusted in such a way that the tip of the funnel just touches the apex of the heap of blend. The drug-excipient blend was allowed to flow through the funnel freely on to the surface. Finally, the diameter and height of the powder cone was measured, and angle of repose is calculated using the following equation.

$$\theta = \tan^{-1}(H/R) \quad (1)$$

where,

θ = Angle of repose

H = Height of powder cone

R = Radius of the powder pile

3.2.2 Bulk density

It is the volume in the graduated cylinder including both the particulate volume and the pore volume. It is defined as the mass of a powder divided by the bulk volume. It depends primarily on particle size distribution, particle shape and the tendency of the particles to adhere to one another.

Method: It was determined by taking a sample of about of powder, previously been passed through a standard sieve no.20, was carefully introduced into a 100ml graduated cylinder The bulk density of each formulation was calculated using following equation

$$Df = M/V_p \quad (2)$$

Where,

Df= Bulk density

M= Weight of sample in grams

V_p= Final volume of powder in cm^3

3.2.3 Tapped density

Tapped density of a powder is the ratio of the mass of the powder to the volume occupied by the powder after it has been tapped for a defined period of time.

Method: It was determined by taking a sample of about of powder, previously been passed through a standard sieve no.20, was carefully introduced into a 100ml graduated cylinder and the cylinder was dropped at 2second intervals on a hard wood surface three times from a height of 1inch. The tapped density of each formulation was calculated using following equation.

$$Do = M/V_p \quad (3)$$

Where,

Do= Tapped density

M = Weight of sample in grams

V_p= Final volume of powder in cm^3

3.2.4 Carr's Index

Carr's index is an indication of compressibility of the powder. The percentage compressibility of a powder was a direct measure of the potential powder arch or bridge strength and stability. Carr's index of each formulation was calculated using following equation.

Compressibility Index (%) = (Do-Df/Do) x 100 (4)

Where,

Df = Bulk density

Do = Taped or consolidated density

3.2.5 Hausner's ratio

Hausner's ratio is the measure of the propensity of a powder to be compressed. As such, it is a measure of the relative importance of inters particulate interactions. The Hausner's ratio of the powder can be determined by the following equation.

Hausner's ratio = Do / Df (5)

Where,

Df = Bulk density

Do = Taped or consolidated density

3.3 Formulation of tablets by the Direct Compression Technique

The steps followed in the formulation of FDTs by direct compression technique includes Dry screening, weighing, mixing, mixing of Super Disintegrants, lubricant and glidant then compressing.Development of the formulation in the present study was mainly based on the type and concentration of polymers and properties of the drug. Various polymers in different concentrations were used to get tablets with good physical properties. In the following formulations cross povidone, sodium starch glycolate and croscarmellose sodium were used in different concentrations.

Procedure: All the required ingredients were passed through 40 mesh size to get uniform size particles and weighed accurately. Measured amount of drug, super disintegrants and sweetener except glidant and lubricant were mixed in increasing order of their weights in a mortar. To this mixture talc and magnesium stearate were added. The final mixture is manually shaken for 10mins in plastic bag. Final blend was compressed into tablets using 8mm s/c round, flat punches using Rimek Compression Tablet Punching Machine.

Table 3: Composition of Lurasidone Hydrochloride FDTs.

Sr. no.	Materials (mg)	F1	F2	F3	F4	F5	F6	F7	F8	F9
01	Lurasidone hydrochloride	40	40	40	40	40	40	40	40	40
02	PEG 6000	131.37	131.37	131.37	131.37	131.37	131.37	131.37	131.37	131.37
03	Sodium Starch Glycolate	10	10	10	7.5	7.5	7.5	5	5	5
04	Micro crystalline cellulose	25	18.75	12.5	25	18.75	12.5	25	18.75	12.5
05	Mannitol	32.63	38.88	43.13	35.13	41.38	47.63	37.63	43.88	50.13
06	Sodium Sacharine	5	5	5	5	5	5	5	5	5
07	Magnesium Stearate	3	3	3	3	3	3	3	3	3
08	Aerosil	3	3	3	3	3	3	3	3	3

3.4 Evaluation of Lurasidone HCL Fast dissolving Tablets

3.4.1 General appearance: The general appearance of a tablet, its visual identity and over all "elegance" is essential for consumer acceptance and tablet's size, shape, colour, presence or absence of an odour, surface texture, physical flaws and consistency and legibility of any identifying marking.

3.4.2 Thickness Measurement: Randomly 10 tablets were taken from each formulation and their thickness was measured using a vernier caliper scale. The reading displayed was noted.

3.4.3 Hardness: The tablet hardness of different formulations was measured using a Monsanto hardness tester. The tester consists of a barrel containing a compressible spring held between two plungers. The lower plunger was placed in contact with the tablet and a zero was taken.The upper plunger was then forced against the spring by turning a threaded bolt until the tablet fractures. As the spring is compressed, a pointer rides along a gauge in the barrel to indicate the force. The force of fracture is recorded, and the zero-force reading is deducted from it. Generally, a minimum hardness of 4 kg is considered acceptable for uncoated tablets. The hardness for FDTs should be preferably 1-3 kg.

3.4.4 Friability test: This test is performed using a laboratory friability tester known as Roche Friabilator.

Method

Ten tablets were weighed and placed in a Roche Friabilator and the equipment was rotated at 25 rpm for 4 min. The tablets were taken out, dedusted and reweighed. The percentage friability of the tablets was measured as per the following formula; the percentage friability was measured using formula-

Friability (%) = (Initial weight-Final weight)/(Initial weight) ×100 (6)

3.4.5 weight Variation Test : Weigh individually 20 units selected at random or, for single dose preparations in individual containers, the contents of 20 units, and calculate the average weight. Not more than two of the

individual weights deviate from the average weight by more than the percentage shown in the table and none deviates by more than twice that percentage.

3.4.6 Disintegration Time: Disintegration time is one of the important criteria in selecting the best formulation. To achieve correlation between disintegration time In vitro and In vivo (in oral cavity) several methods were proposed, developed, and followed at their convenience. One of the simple methods followed is described below.

Method: Disintegration time was also measured using a modified disintegration method. For this purpose, a Petri dish (10 cm diameter) was filled with 10ml of water. Tablet was carefully put in the center of the Petri dish and the time for the tablet to completely disintegrate into find particles was noted using a stopwatch. Oro dispersible tablets should disintegrate in less than 3 min. Food and Drug Administration in Guidance for Industry recommends that this time should not exceeded 30sec.

3.4.7 In vitro Dissolution studies: In vitro dissolution studies were carried out by USP II (paddle type) dissolution test apparatus at 50 rpm. The dissolution medium consisted of 900 ml of phosphate buffer pH6.8. This is maintained at 37±0.5 0C. Aliquots of 5 ml were withdrawn as prescribe in table and equivalent amount of fresh dissolution medium is added. Aliquots withdrawn were filtered and analysed at 224 nm spectrophotometrically. And the drug concentration was calculated from the standard graph and expressed as % of drug released.

4. RESULT AND DISCISSION

4.1 Preformulation study

4.1.1 Description: Lurasidone Hydrochloride was a white to off-white coloured Powder.

4.1.2 Solubility: Lurasidone Hydrochloride was freely soluble in methanol and very slightly soluble in water.

4.1.3 Melting Point: The melting point of drug Lurasidone Hydrochloride was measured by using glass capillary method indicated the melting point at 250ºC. It was confirmed with the reported melting point of Lurasidone Hydrochloride, it complies with the purity of drug sample

4.1.5 Spectrophotometric Analysis

4.1.5.1 Preparation of Standard Calibration Curve of Lurasidone hydrochloride in Methanol

Table 4: Preparation of Standard Curve of LH in Methanol.

Sr. No.	Concentration (µg/ml)	Absorbance
1	0	0
2	2	0.08
3	4	0.155
4	6	0.223
5	8	0.301
6	10	0.352

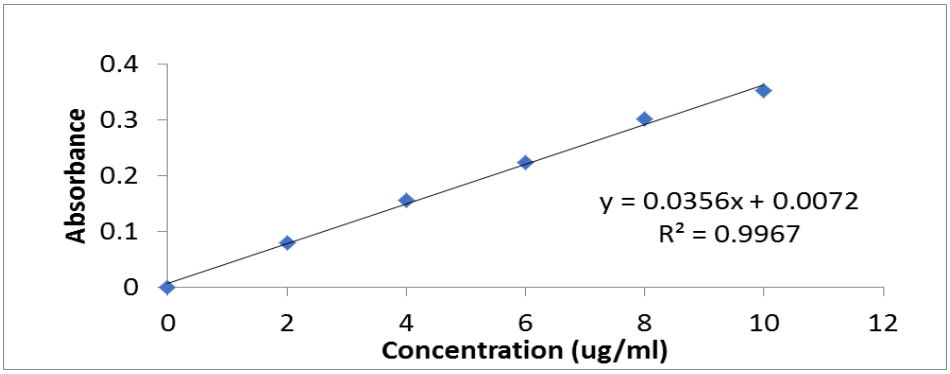

Figure 1: Standard Calibration Curve of LH in Methanol.

4.1.5.2 Standard Calibration in water

Table 5: Preparation of standard curve LH in water.

Sr. No.	Concentration (µg/ml)	Absorbance
1	0	0
2	2	0.08
3	4	0.155
4	6	0.223
5	8	0.301
6	10	0.352

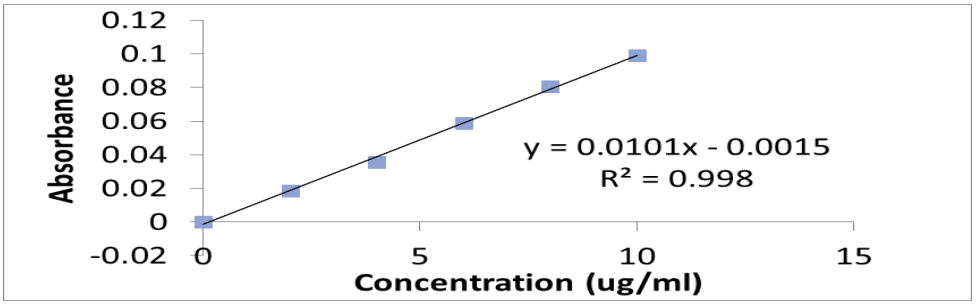

Figure 2: Standard calibration curve of LH in water.

4.1.5.3: Calibration curve in pH phosphate 6.8 buffer

Table 6: Calibration curve in pH phosphate 6.8 buffer.

Sr. No	Concentration (ug/ml)	Absorbance
1	0	0
2	2	0.0267
3	4	0.0497
4	6	0.0813
5	8	0.113
6	10	0.137

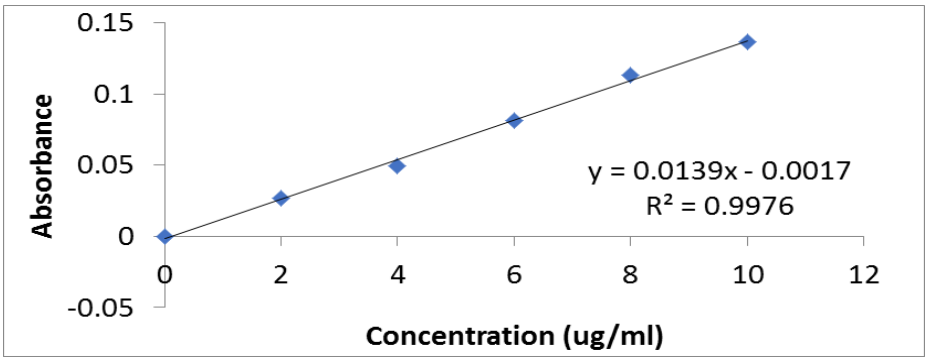

Figure 3: Standard calibration curve of LH in phosphate (pH6.8) buffer.

4.1.6 Saturation Solubility of Drug

Table 7: Solubility of Drug in Different solvent.

Sr. No	Solvent	Observed Solubility(mg/ml)
1	Water	0.213 mg/ml
2	pH 6.8 Phosphate buffer	3.27 mg/ml
3	Methanol	14.42 mg/ml

4.1.7: FT-IR Spectroscopy: Infrared spectrum of drug (prepared mixture of potassium bromide and add about 1 mg of drug and triturated mixture properly) was recorded on spectrophotometer

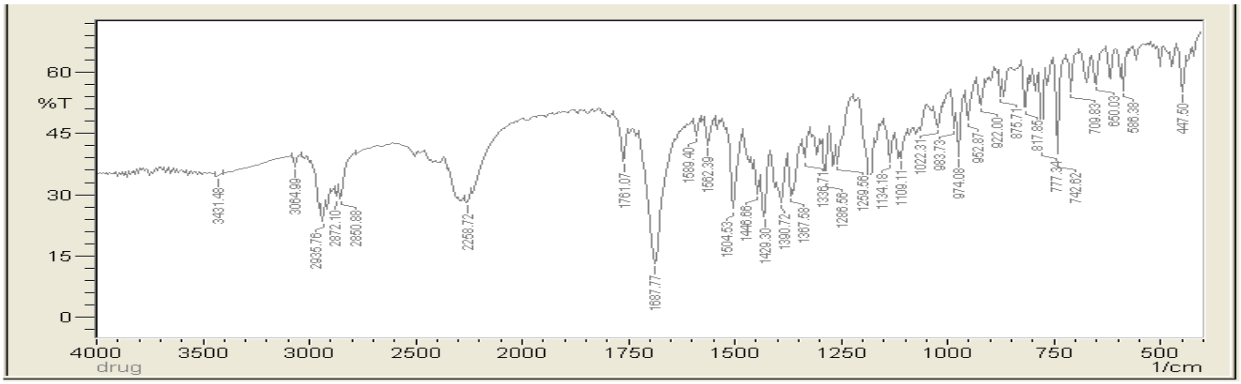

Figure 4: FT-IRSpectra of Lurasidone hydrochloride Drug.

Table 8: Reported and observed IR frequencies of Model drug.

Functional Grou	Range (cm^{-1})	Peak Observed (cm-1)
Aromatic C-H	3150-3000	3064
Aliphatic C-H	2850-2950	2935,2872
Amide C=O	1760-1630	1761,1687
Aliphatic C-N	1342-1266	1336,1286
Aromatic C=N	1690-1640	1687
Aromatic C=C	1650-1500	1589,1562

FT-IR Spectra of PEG 6000

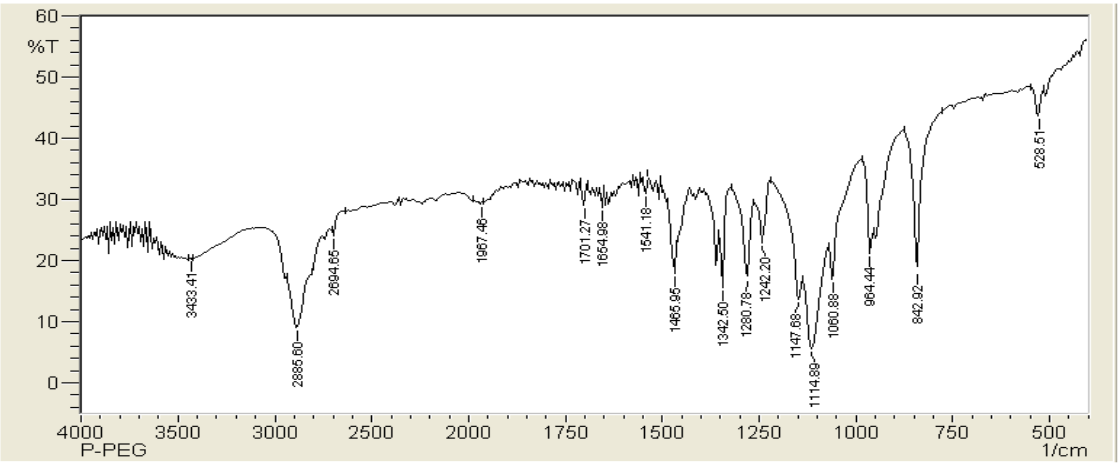

Figure 5: FT-IRSpectra of PEG 6000.

Table 9: Reported and observed IR frequencies of PEG 6000.

Functional Group	Range (cm^{-1})	Peak Observed (cm^{-1})
Alcoholic O-H	3550-3200	3423
Aliphatic C-H	2850-2950	2885
Sec.Alcohol C-O	1125-1000	1114,1060

FT-IR Spectra of Drug and PEG 6000

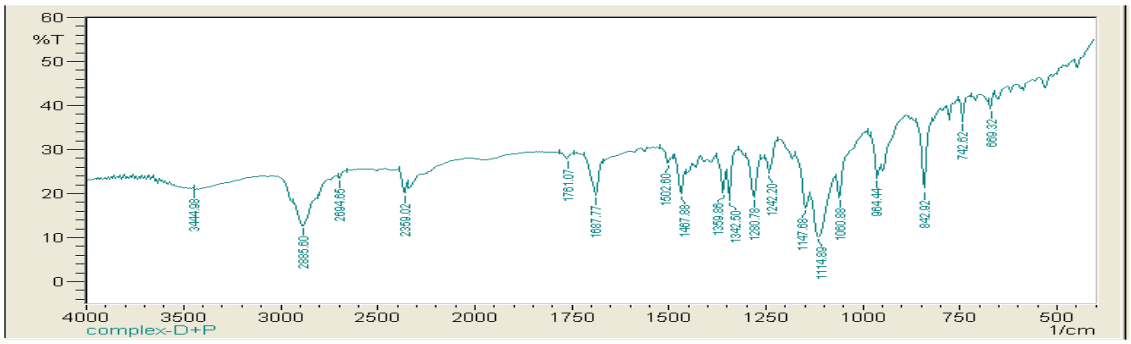

Figure 6: FT-IRSpectra of Drug and PEG 6000.

Table 10: Reported and observed IR frequencies of Drug and PEG 6000.

Functional Group	Range (cm^{-1})	Peak Observed (cm^{-1})
Alcoholic O-H	3550-3200	3344
Aliphatic C-H	2850-1950	2885
Amide C=O	1760-1630	1761,1681
Aliphatic C-N	1342-1266	1342,1280
Aromatic C=C	1650-1500	1502

From theresults it indicated that there was no interaction between drug and excipient. the frequencies of functional groups of drug remained intact in physical mixture containing different excipients.

4.1.8 DSC Spectra of Lurasidone Hydrochloride

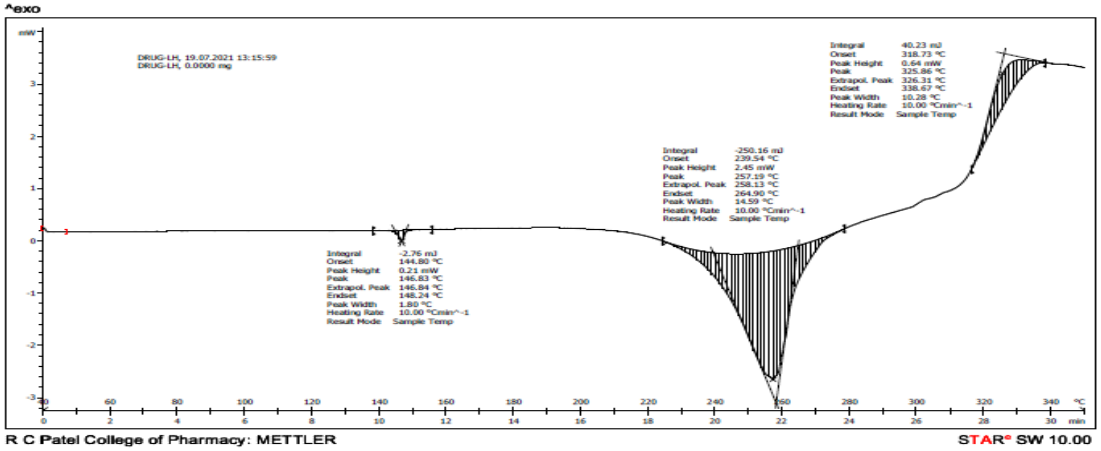

Figure 7: DSCSpectra of Lurasidone hydrochloride Drug.

DSC Spectra of Drug And PEG 6000

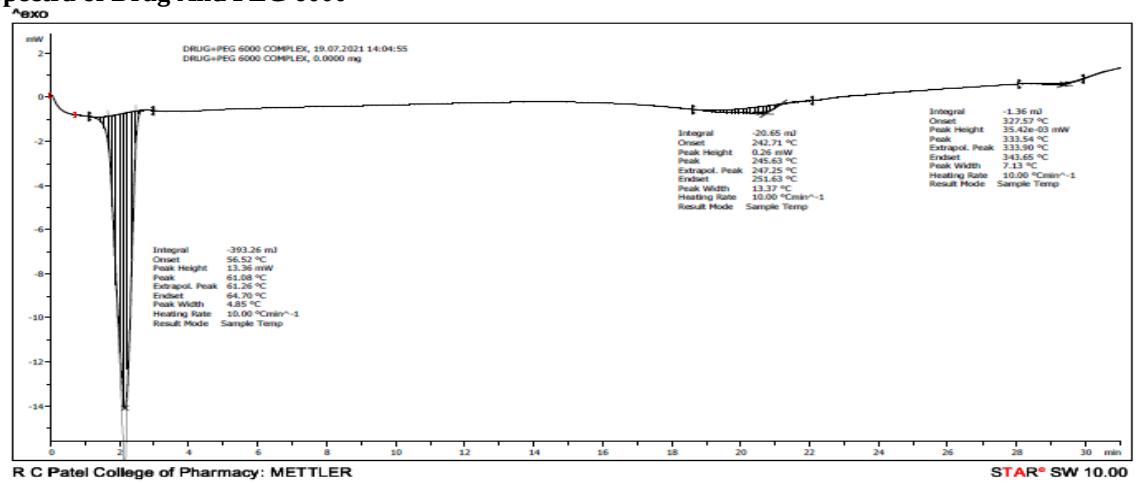

Figure 8: DSCSpectra of Drug and PEG 6000.

The DSC thermogram of pure Lurasidone hydrochloride showed a single sharp peak, endothermic peak at 258.13ºC corresponding to its melting point indicating the crystalline nature of drug in figure 10.8. In DSC thermogram of drug and PEG 6000 showed endothermic sharp peak at 61.26ºC and 247.25 ºC in figure 10.9.this indicates that there is no interaction between drug and excipient in the solid dispersion complex.

4.2 Evaluation of Solid Dispersion

4.2.1 Practical yield (%) & Drug content (%)

Table 11: Drug content & practical yield of solid dispersion.

Sr. No.	Batch	Drug Content (%)	Practical Yield (%)
1	SD1(1:1)	92.40%	92.50%
2	SD2(1:2)	89.54%	93.33%
3	SD3(1:3)	93.37%	95.00%

As shown in result the practical yield and drug content of SD3 (1:3) is better than the SD1 and SD2 which indicates that the solvent used methanol shows better result than other solvent.

4.2.3 Solubility Determination

Table 12: Results of Solubility analysis.

Sr.No	Batches	Solubility in water (mg/ml)	Solubility in pH 6.8Phospate buffer (mg/ml)
1	SD1(1:1)	0.976	10.6
2	SD2(1:2)	1.143	8.271
3	SD3(1:3)	1.43	10.48

The results of solubility study shows that the solubility of SD1, SD2 and SD3 had increased than the pure drug. Among all SD3 shows maximum solubility at the concentration PEG6000.

4.3 Evaluation of Lurasidone hydrochlorideFast Dissolving Tablets

4.3.1 Pre-Compression Evaluations

Table 13: Pre-Compression Parameter of Batches F1-F9.

Batch No	Bulkdensity g/cm^3	Tap density g/cm^3	Angle of Repose Θ	Carr's index%	Hausner's ratio
F1	0.38±0.0044	0.43±0.0032	27.15±0.0011	11.6±0.0084	1.14±0.0023
F2	0.37±0.0048	0.42±0.0034	32.73±0.0023	17.1±0.0021	1.19±0.0030
F3	0.40±0.0052	0.47±0.0041	22.31±0.0015	12.8±0.0011	1.12±0.0026
F4	0.37±0.0055	0.45±0.0042	28.44±0.0024	18.7±0.0089	1.16±0.0029
F5	0.40±0.0045	0.47±0.0044	24.03±0.0018	14.8±0.0075	1.21±0.0020
F6	0.35±0.0043	0.40±0.0048	21.41±0.0020	11.3±0.0067	1.13±0.0024
F7	0.32±0.0033	0.38±0.0040	26.15±0.0017	18.1±0.0031	1.23±0.0028
F8	0.45±0.0044	0.42±0.0045	22.15±0.0014	13.1±0.0041	1.15±0.0040
F9	0.38±0.0041	0.43±0.0038	29.15±0.0010	16.1±0.0028	1.25±0.0029

(n*=3)

4.3.2 Post Compression Evaluation

Table 14: Post-Compression Parameter of Batches F1-F9.

Batch No	Thickness (mm)	Hardness (kg/cm2	Friability (%)	Weight variation (mg)	Disintegration time (sec)
F1	4.20±0.015	4.45±0.005	0.92	249.05± 18.67	55±1
F2	4.32±0.11	3.66±0.021	0.85	241.35± 12.51	38±3
F3	4.39±0.032	3.52±0.131	0.74	249.35± 18.70	26±2
F4	4.41±0.06	3.54±0.033	0.80	248.55± 18.56	49±1
F5	4.43±0.023	3.20±0.045	0.85	246.65± 18.49	34±1
F6	4.38±0.02	3.67±0.050	0.96	245.65± 13.42	32±2
F7	4.31±0.16	3.58±0.036	0.82	243.55± 38.52	42±2
F8	4.48±0.26	3.44±0.33	0.78	247.75± 14.16	38±2
F9	4.23±0.35	3.24±0.025	0.82	246.15± 68.80	34±2

(n*=3)

4.3.3: *In vitro* dissolution study of LH fast dissolving tablets

Prepared tablet of lurasidone hydrochloride was subjected to dissolution study in pH 6.8 phosphate buffer solution. By using USP type II (paddle) apparatus, rotation speed 50 rpm, temperature is 37±0.5ºC and time 30 min.

Table 15: Dissolution data of Lurasidone hydrochloride formulation in 6.8 pH phosphate buffer.

Time (Min)	F1(%)	F2(%)	F3(%)	F4(%)	F5(%)	F6(%)	F7(%)	F8(%)	F9(%)
0	0	0	0	0	0	0	0	0	0
5	24.36	22.72	29.47	32.43	27.71	31.08	24.08	30.08	31.08
10	38.71	35.66	36.28	44.66	42.17	41.96	34.96	41.96	41.96
15	46.01	44.83	45.46	61.24	56.68	58.49	58.49	52.49	48.49
20	49.42	62.59	62.43	75.09	66.41	65.56	65.56	61.56	55.56
25	53.24	74.33	83.60	83.54	72.04	78.31	78.31	69.31	68.31
30	63.71	87.41	97.01	90.12	79.19	87.01	77.01	91.01	92.01

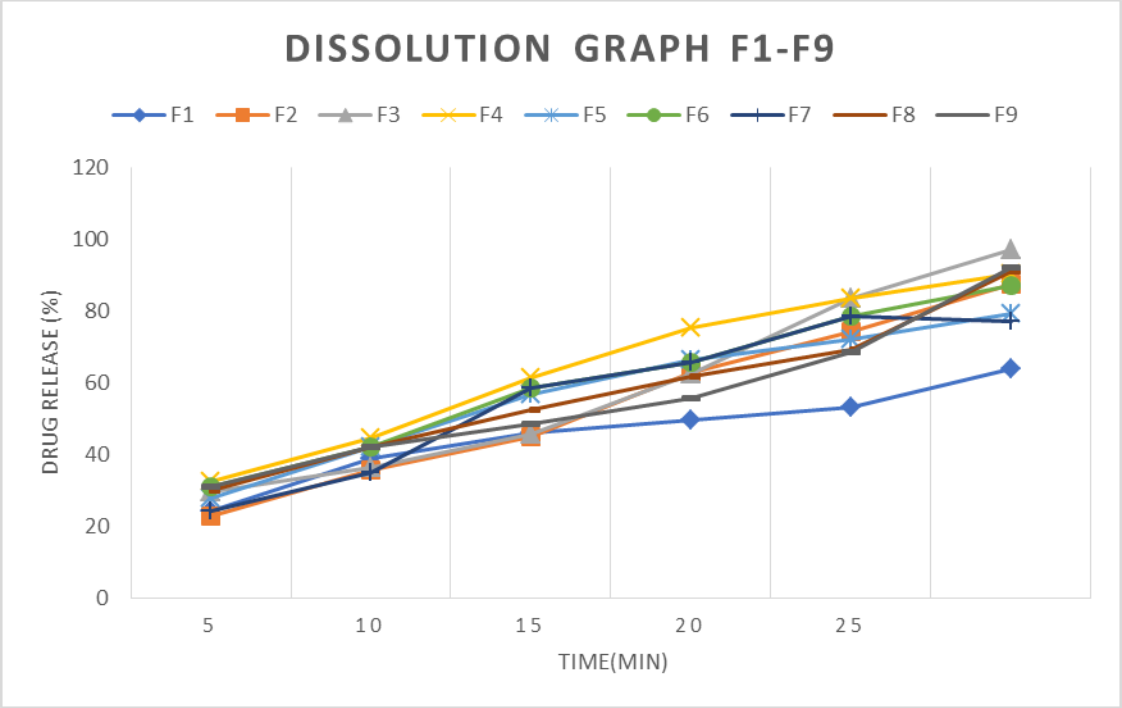

Figure 9: *In-Vitro*Dissolution studies of Batches F1-F9.

CONCLUSION

For this study BCS classII drug Lurasidone HCl was selected as a model drug. Drug Lurasidone HCl has solubility problem, so to improve its solubility by solvent evaporation method and solid dispersion was prepared. In this work lurasidone HCL was formulated to Fast dissolving tablet with choice of suitable excipients by direct compression method.

- Pre-formulation study of drug with various excipients was performed and compatible with each other. No change was observed after completing physical appearance, FT-IR and DSC study.
- Formulation F1 to F9 was studied for various pre-compression and post-compression parameter studies.
- From pre-compression and post-compression data batch F3was found to be better than othe reight batches.
- *In-vitro* Drug release study was performed for all nine batches. From all nine batches batch F3 was show significant result. Batch F3 showed higher dissolution rate as compared to another batch.

Batches prepared with various concentration of SSG as superdisintegrant show release from **22.72 to 97.01%.** The optimized batch F3 was shows maximum % drug release than other. And also disintegration timeless than other batches.so Batch F3 was selected as optimized batch.

5. REFERENCES

1. Kuchekar BS, Bhise SB, Arumugam V. Design of fast dissolving tablets. Indian J Pharm. Edu., 2001; 35: 150.
2. Kuchekar BS, Atul, Badhan C, Mahajan HS. Mouth dissolving tablets: A novel drug delivery system. Pharma Times, 2003; 35: 7-9.
3. Bogner R and Meghan F. Fast dissolving tablets. US Pharmacist, 2005; 27: 03.
4. Meyer J, Loebel AD,Schweizer E. Lurasidone: a new drug in development for schizophrenia. ExprtOpin Invest Drugs, 2009; 18: 1715-26.
5. Franklin R, Zorowitz S, Corse AK, Widge AS, Deckersbach T. Lurasidone for the treatment of bipolar depression: an evidence-based review. NeuropsychiatrDisTreat, 2015; 11: 2143-52.
6. Cruz MP. LurasidoneHCl (Latuda), an oralonce-daily atypical antipsychotic agent for the treatment of patients with schizophrenia. Pharm Ther, 2011; 36: 489-92.
7. Bawa R, Scarff JR. Lurasidone: a new treatment option for bipolar depressiona review. InnovClinNeurosci, 2015; 12: 21-3.
8. Shah S, Parmar B, Soniwala M, Chavda J. Design, optimization, and evaluation of lurasidone hydrochloride nanocrystals. AAPS PharmSciTech, 2016; 17: 1150-8.
9. Tripathi KD (6th edition) Essential of Medical Pharmacology, 2010.
10. Indian Pharmacopoeia. 7thed. Ghaziabad: The Indian Pharmacopoeial Commission, 2014.