INTERNATIONAL JOURNAL
OF
PHARMACEUTICAL SCIENCES
AND
RESEARCH

FORMULATION AND *IN-VITRO* EVALUATION OF FAST DISSOLVING TABLETS OF LACOSAMIDE USING NATURAL SUPER DISINTEGRANTS

C. Haranath [*], C. Suryaprakash Reddy, B. Pradeep Kumar and K. Arshad Ahmed Khan

Raghavendra Institute of Pharmaceutical Education and Research (RIPER), KR Palli Cross, Chiyyedu, Anantapur - 515721, Andhra Pradesh, India.

ABSTRACT: Fast dissolving tablets are those which disintegrates rapidly within the mouth and taken without consumption of water. The present work is concerned with the formulation and *in-vitro* evaluation of Lacosamide fast dissolving tablets. Lacosamide is a novel anti-epileptic drug used in the treatment of partial onset of seizures. The objective of this study was to improve the rapid onset of action of the drug. The fast dissolving tablets of Lacosamide were prepared using direct compression method by employing natural super-disintegrating agents like dehydrated banana powder (DBP) and *Ocimum sanctum* powder. Different concentrations of superdisintegrants were used in the formulations as 2%, 4%, 6%, and 8%. The prepared tablets were evaluated for pre-compression parameters like bulk density, tapped density, angle of repose, Hausner ratio, Carr's index, and were in the acceptable range. Post-compression parameters like hardness, friability, drug content, wetting time, water absorption ratio, disintegration time, and dissolution study were also evaluated. From the results obtained, it was found that tablet formulation with 8% concentration of *Ocimum sanctum* seed powder (F8) showed 98% of drug release at the end of 30 min and disintegration time was found to be 25 sec. Also, the hardness, friability, weight variation, and drug content of prepared tablets were found to be in the acceptable limits. The *in-vitro* release kinetics reveals that formulation (F8) follows first order kinetics.

INTRODUCTION: Oral drug delivery remains the preferred route for administration of various drugs. Recent developments in technology have prompted scientists to develop FDTs with improved patient compliance and convenience. Many elderly patients have difficulty in swallowing tablets, capsules, or powders. To alleviate this problem, these tablets are expected to dissolve or disintegrate in the oral cavity without drinking water [1].

Addition of disintegrates in fast dissolving tablets leads to quick disintegration of tablets and hence improve dissolution. As disintegration plays an important role in a tablet's dissolution before the active drug substance is finally released from the tablet's structure into the body, therefore, type, concentration and efficiency of disintegrants to a large extent affects the disintegrate properties [2].

Epidemiologic studies have shown that approximately 0.5% to 1% of the general population suffer from epilepsy, with annual incidence rates of approximately 30 to 50 percent per year. Epilepsy is not a distinct disease entity, but a common final pathway of a large variety of different etiologies. It can be described as the repetitive occurrence of abnormal bioelectrical synchronization of a large number of neurons

leading to temporary dysfunction of one or more brain areas [3]. Lacosamide (R)-2-acetamido-N-benzyl-3-methoxypropionamide, is a functionalized amino acid with a novel anticonvulsant activity. Complex partial seizures impair consciousness or can cause some people to lose consciousness entirely. Simple partial seizures can be even more delicate while the person cannot control the seizure itself. Lacosamide has low plasma protein binding (≤15%), and the volume of distribution is approximately 0.6 L/kg, which is similar to body water. Lacosamide is primarily eliminated really as unchanged drug.

Lacosamide selectively enhances slow inactivation of voltage-dependent sodium channels without affecting fast inactivation, which may normalize neuronal firing thresholds [4]. To improve the rapid onset of action of the drug and to provide immediate therapy to the patients, fast dissolving tablets of Lacosamide was developed. In the present study, an attempt was made to develop fast dissolving tablets of Lacosamide using natural super- disintegrating agents like dehydrated banana powder and *Ocimum sanctum* powder. The usage of above natural superdisintegrating agents in the formulation of Lacosamide tablets gives the novel approach to the present work.

MATERIALS AND METHODS: Lacosamide was obtained as a gift sample from Finoso Pharma Pvt. Ltd., Hyderabad, Telangana. Microcrystalline cellulose, talc, magnesium stearate, and other chemicals were purchased from SD Fine Chemicals, Mumbai. All the chemicals used were of analytical grade.

Pre-formulation Studies:
Compatibility Studies: Infrared spectra of pure drug and mixture of drug and excipients were recorded by Fourier Transform Infrared Spectrophotometer [5]. In the present study, drug and excipients were taken in 1:1 ratio in a mortar and mixed. Samples were analyzed in the scanning range of 4000-400 cm^{-1}.

Analytical Method Development:
Preparation of Standard Stock Solution: 100 mg of Lacosamide pure drug was dissolved in 100 ml of 0.1N HCl (stock solution - 1000 µg/mL), from this 10 ml of solution was taken, and the volume was adjusted to 100 ml with 0.1N HCl and suitable dilutions were made to get the concentrations of 5 to 30 µg/mL. The absorbance of the above dilutions was measured at 215 nm by using UV-spectro-photometer [6].

Formulation of Lacosamide Fast Dissolving Tablets: Fast dissolving tablets containing Lacosamide were prepared by direct compression method using varying concentrations of natural super-disintegrants like dehydrated banana powder and *Ocimum sanctum* seed powder with micro-crystalline cellulose as diluent. Sodium saccharin was used as a sweetening agent. All the ingredients were weighed as per the batch formula mentioned in **Table 1**.

TABLE 1: COMPOSITION OF LACOSAMIDE FAST DISSOLVING TABLETS

Ingredients (mg)	F1	F2	F3	F4	F5	F6	F7	F8
Lacosamide	100	100	100	100	100	100	100	100
Dehydrated banana powder (DBP)	6	12	18	24	-	-	-	-
Ocimum sanctum seed powder	-	-	-	-	6	12	18	24
Avicel PH 102 (MCC)	185	179	173	167	185	179	173	167
Magnesium stearate	3	3	3	3	3	3	3	3
Sodium saccharin	3	3	3	3	3	3	3	3
Talc	3	3	3	3	3	3	3	3

The drug and excipients were initially passed through sieve no. 40. Super- disintegrants, Lacosamide, and other ingredients were mixed homogeneously using motor and pestle. The above mixture was lubricated with magnesium stearate and talc before the compression. The tablets were compressed by using Rimek tablet compression machine [7].

Preparation of Dehydrated Banana Powder (DBP): The bananas were purchased from the local market of Anantapur. Peels were removed, and the fruits were sliced. The sliced pulp was washed with distilled water to remove water-soluble contents. 0.2% w/w methylparaben was added as a preservative. Sliced pulp was grounded in a domestic mixer and the obtained wet mass was

dried in an oven at 45 ºC for 24 h to get constant weight. The resultant was passed through mesh size 80 and stored in polythene bags [8].

Preparation of *Ocimum Sanctum* Seed Powder:
Ocimum sanctum seeds were blended and kept in contact with Petroleum ether in conical for 12 h. The flask was kept on the electrical shaker for continuous shaking. The material was then filtered out and dried at room temperature for complete removal of petroleum ether. The seed powder was then soaked in distilled water. The swollen wet mass then spread on the glass tray and dried at 60°C. The dried material was passed through sieve #30. The material was again passed through mesh #60. [9]

Evaluation of Pre-compression Parameters:
Bulk Density: It is the ratio of the total mass of powder to the bulk volume of powder. It was measured by pouring the weighed powder into a measuring cylinder, and the initial volume was noted. This initial volume is called bulk volume. The bulk density is calculated according to the formula mentioned below [10].

$$\text{Bulk density (p)} = \text{mass of powder (w)} / \text{Bulk volume}$$

Tapped Density: Weighed quantity of powder blend was taken into a graduated cylinder. The volume occupied by the drug was noted down. Then the cylinder was subjected to 100 taps in density tester (Electro lab), and the volume was measured [11]. It is expressed in g/mL.

$$\text{Tapped density} = \frac{\text{Mass of powder}}{\text{The tapped volume of the powder}}$$

The angle of Repose (θ): A glass funnel is held in place with a clamp on ring support over a tile. Approximately 100 g of powder is transferred into funnel through a mesh size no. 20# keeping the orifice of the funnel blocked by the thumb. When the powder is emptied from the funnel, the angle of the heap to the horizontal plane is measured with a scale. The height of the pile (h), and the radius of the base is measured with a ruler [12].

$$\Theta = \tan^{-1} h / r$$

Where, θ = Angle of repose, h = Height of pile, r = Radius of base if pile.

Carr's Index: The compressibility index of the powder blend was determined by Carr's compressibility index. It depends upon the bulk density and tapped density of powder and evaluates the rate at which it packed down [13]. The following formula was used for the determination of carr's index:

$$\text{Carr's Index (\%)} = \frac{\text{Tapped density} - \text{Bulk density}}{\text{Tapped density}} \times 100$$

Hausner's Ratio: It is defined as the ratio of the tapped density to bulk density. It can be calculated by using the formula:

$$\text{Hausner ratio} = \text{Trapped density} / \text{Bulk density}$$

Evaluation of Post-compression Parameters:
Thickness: The thickness of tablets was measured using Vernier calipers. Tablets are taken and are placed between the two upper jaws and thickness is measured as a replicate of three sets. After adjusting the calipers to zero reading the negative or positive correction values is noted, and the values are estimated [14].

Hardness: Tablet hardness (tablet crushing strength), the force required for breaking a tablet in a diametric compression of five tablets was measured using Monsanto hardness tester [15].

Friability: Friability test from each batch were examined using Roche fribilator (Electrolab) and the equipment was run for 4 min at 25 revolutions per min. The tablets were taken out, dedusted and reweighted, and % friability was calculated [16].

$$\text{Percent friability} = \frac{\text{Initial weight} - \text{Final weight}}{\text{Initial weight}} \times 100$$

Weight Variation: Weigh individually 20 units selected at random and calculate the average weight. Not more than two the individual weight deviates from the average weight by more than percentage, and none deviates by more than twice that percentage [17].

Wetting Time: A piece of tissue paper (10.75 × 12 mm) folded twice was placed in a culture dish (d = 6.5 c) containing 6 ml of simulated saliva (phosphate buffer pH 6.8). A tablet was carefully placed on the surface of tissue paper and the time required for simulated saliva to reach the upper surface of the tablet was noted as the wetting time [18].

Water Absorption Ratio: A piece of tissue paper (10.75 × 12 mm) folded twice was placed in a culture dish (d = 6.5 c) containing 6 ml of simulated saliva (phosphate buffer pH 6.8). A tablet was placed on the surface of tissue paper. Initially, the tablet weight was noted before placing in a petri dish. After complete wetting, the wetted tablet was then weighed. The water absorption ratio, r, was determined using equation [19].

$$r = 100 \, (W_a - W_b) / W_b$$

Where W_a is the weight of the tablet after water absorption. W_b is the weight of the tablet before absorption.

In-vitro **Disintegration Studies:** The test was carried out on 6 tablets using digital tablet disintegration tester (Electrolab). Distilled water at 37 °C ± 2 °C was used as a disintegration media and the time taken for complete disintegration of the tablet with no palpable mass remaining in the apparatus was measured in seconds [20].

Drug Content: Tablets were selected randomly, and the average weight was calculated. Tablets were crushed in a motor and accurately weighed the amount of tablet powder was taken from the crushed blend. Then the samples were transferred to 100 ml volumetric flask and diluted with 0.1N HCl. The contents were shaken periodically and kept for 2 h for solvation of drug completely. The mixture was filtered in Whatmann filter paper and absorbance was measured at 215 nm using 0.1N HCl as blank [21].

In-vitro **Release Study**: *In-vitro* dissolution of Lacosamide fast dissolving tablets was determined in apparatus II as per USP employing a rotating paddle at 50 rpm using 900 ml of 0.1N HCl, at 37 ± 0.5 ℃. Aliquots of dissolution solution (5 ml) were withdrawn at specific intervals of time and analyzed for drug content by measuring the absorbance at 215 nm. The volume withdrawn at each time interval was replaced with a fresh volume of dissolution medium. Cumulative percent of Lacosamide released was calculated and plotted against time [22].

Drug Release Kinetics: To investigate the mechanism of drug release from the prepared tablets, the release data were fitted into first-order, zero-order models [23].

RESULTS AND DISCUSSION:
Pre-formulation Studies: Pre-formulation studies were performed for pure drug and when combined with excipients. The results were shown in **Fig. 1**, **2**, **3**, and **4**.
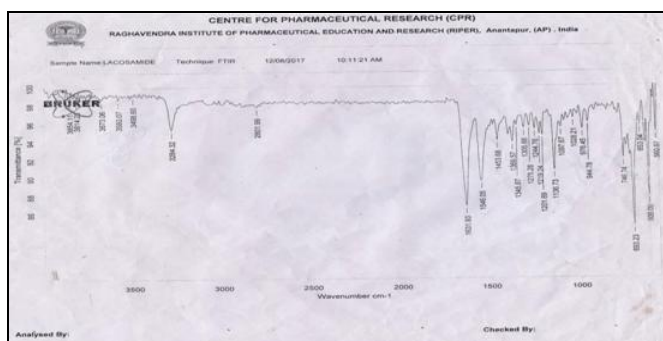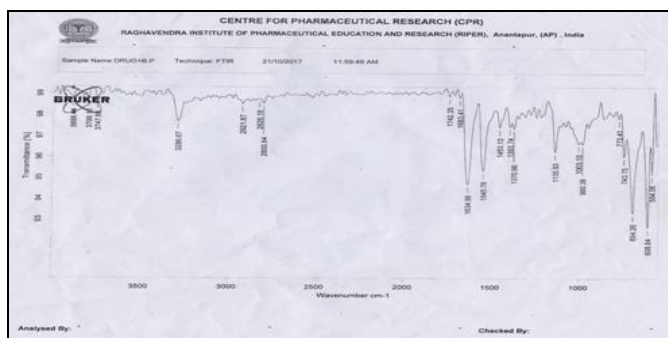

FIG. 1: FT-IR SPECTRUM OF LACOSAMIDE

**FIG. 2: FT-IR SPECTRUM OF LACOSAMIDE +
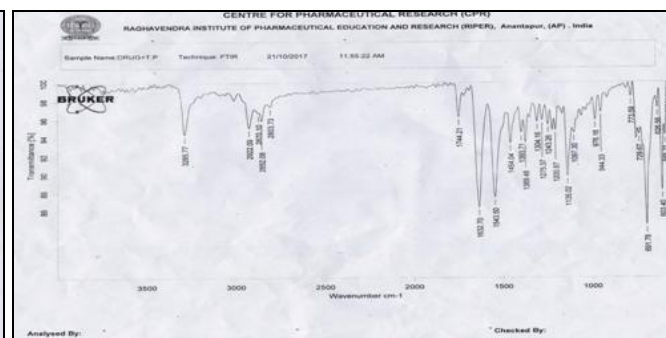DEHYDARATED BANANA POWDER**

**FIG. 3: FT-IR SPECTRUM OF LACOSAMIDE +
OCIMUM SANCTUM POWDER**

FT-IR studies revealed that there is no change in nature of the position of a characteristic band of drug and excipients used in formulations; hence it can be concluded that there is no interaction between drug and excipients.

Evaluation of Pre-compression Parameters: Pre-compression parameters like bulk density, tapped density, Hausner ratio, Carr's index and angle of repose were performed for all formulations, and the results were reported in **Table 2**.

TABLE 2: EVALUATION OF FLOW PROPERTIES OF FORMULATIONS F1-F8

Formulations	Bulk density (g / ml) ± SD*	Tapped density (g/ ml) ± SD*	Angle of repose (θ) ± SD*	Carr's index (%) ± SD*	Hausner's ratio ± SD*
F1	0.36 ± 0.02	0.42 ± 0.02	28.40 ± 0.23	15.66 ± 0.24	1.16 ± 0.01
F2	0.34 ± 0.01	0.41 ± 0.01	24.53 ± 0.21	12.56 ± 0.01	1.12 ± 0.05
F3	0.39 ± 0.14	0.45 ± 0.04	26.51 ± 0.25	13.35 ± 0.18	1.16 ± 0.04
F4	0.37 ± 0.17	0.46 ± 0.03	25.7 ± 0.17	15.58 ± 0.12	1.17 ± 0.06
F5	0.35 ± 0.13	0.38 ± 0.03	28.26 ± 0.19	14.89 ± 0.21	1.15 ± 0.01
F6	0.36 ± 0..15	0.43 ± 0.05	26.24 ± 0.21	13.52 ± 0.01	1.13 ± 0.03
F7	0.37 ± 0.17	0.41 ± 0.01	24.53 ± 0.21	13.35 ± 0.18	1.15 ± 0.01
F8	0.34 ± 0.01	0.41 ± 0.01	24.33 ± 0.21	12.56 ± 0.01	1.12 ± 0.05

*n=3

The angle of Repose: The angle of repose of all formulations was found to be in the range of 24.330-30.220. The optimized formulation F8 shown an angle of repose 24.330, which indicates that flow property was good.

Carr's Index: Carr's index of all formulations was found to be in the range of 12.56-15.66%. The optimized formulation F8 shown 12.56%, which ensures that the flow property is good.

Hausner Ratio: Hausner ratio of all formulations was found to be in the range of 1.12-1.17. The optimized formulation F8 showed 1.12; it indicates that flow property was good.

Evaluation of Post-compression Parameters: The results of post-compression parameters such as disintegration time, wetting time, water absorption ratio %, hardness, average weight, friability, drug content were shown in **Table 3** and **4**.

TABLE 3: POST COMPRESSION PARAMETERS OF FORMULATIONS F1-F8

Formulation	Hardness (kg/cm^2) ± SD*(*n=5)	Friability (%) ± SD*(*n=10)	Average weight ± SD*(mg) (*n=20)	Drug content ± SD* (*n=10)
F1	3.3 ± 0.02	0.52 ± 0.04	300 ± 0.83	97 ± 0.08
F2	3.3 ± 0.10	0.65 ± 0.01	300 ± 0.99	98 ± 0.03
F3	3.3 ± 0.02	0.54 ± 0.01	300 ± 0.13	98 ± 0.68
F4	3.5 ± 0.02	0.52 ± 0.03	300 ± 0.16	99 ± 0.75
F5	3.3 ± 004	0.51 ± 0.01	299 ± 0.74	97 ± 0.05
F6	3.3 ± 0.06	0.51 ± 0.02	299 ± 0.33	98 ± 0.88
F7	3.5 ± 0.10	0.56 ± 0.05	300 ± 0.14	97 ± 0.94
F8	3.5 ± 0.03	0.66 ± 0.03	300 ± 0.28	99 ± 0.03

TABLE 4: DISINTEGRATION, WETTING TIME AND WATER ABSORPTION OF FORMULATIONS F1-F8

Formulation	Disintegration time (sec)	Wetting time (sec)	Water absorption ratio %
F1	98	87	52.12 ± 0.66
F2	85	78	59.10 ± 0.28
F3	73	66	63.29 ± 0.45
F4	57	50	70.53 ± 0.10
F5	62	56	56.15 ± 0.35
F6	54	49	63.52 ± 0.10
F7	46	39	66.66 ± 0.24
F8	25	19	80.76 ± 0.20

***In-vitro* Disintegration Studies:** Disintegration ability to prepared the formulations were evaluated in normal purified water. The time taken for formulations to disintegrate were evaluated. F1, F2, F3, F4 formulations containing DBP as 2%, 4%, 6% and 8% concentration disintegrated within 98 sec, 85 sec, 73 sec and 57 sec and F5, F6, F7, F8 formulations containing *Ocimum sanctum* powder disintegrated with in 62 sec, 54 sec, 46 sec, 25 sec respectively. *Ocimum sanctum* powder containing formulations, *i.e.*, F5-F8 disintegrates faster than formulations F1-F4 containing banana powder. This may be suggested that an increase in the concentration of super disintegrating agent, faster the disintegration. The reason for the decrease in

disintegration time is the ability of *Ocimum sanctum* seeds to increase water penetration due to a wicking action which increases tablet porosity and thus lowers disintegration time.

Wetting Time: Formulations F1-F4 containing banana powder shown the wetting time of 87, 78, 66, 50 sec and formulations F5-F8 containing *Ocimum sanctum* powder showed 56, 49, 39, 19 sec respectively. Increase in concentration of disintegrating agent decreases wetting time.

Water Absorption Ratio: Water absorption capacity was found to increase with an increase in the concentration of both banana powder and *Ocimum sanctum* powder from batches F1-F8 which could be due to higher water uptake by the natural polymer.

Hardness: The hardness of each batch of tablets was found to be in the range of 3.3-3.5 kg/cm^2, which ensures good handling characteristics for all formulations.

Friability: The percentage friability was less than 0.5% for all formulations ensuring that all tablets were mechanically stable and the ranges were found between 0.1-0.6%.

Weight Variation: All the formulation passed weight variation test as the % weight variation was within the Standard Pharmacopoeial limits. The weights of all the tablets were found to be uniform with low standard deviation values.

Drug Content: The prepared tablets were evaluated for drug content, and the drug content was found to be in the range of 97-99.7%. The results indicated that reproducible with minimum batch to batch variability.

In-vitro Dissolution Study: Formulation F1 containing banana powder (DBP) as super-disintegrating agent containing 2% concentration shows 80% drug release at the end of 30 min. The gradual increase in concentration of DBP, the formulation F4 containing 8% concentration of DBP shows 93% drug release. When compared with formulations F1-F4, formulation F5 containing 2% concentration of *Ocimum sanctum* powder shown 89% of drug release and gradual increase in the concentration of *Ocimum sanctum* powder F8 formulation shown 98% of drug release and the results were shown in **Fig. 4**.
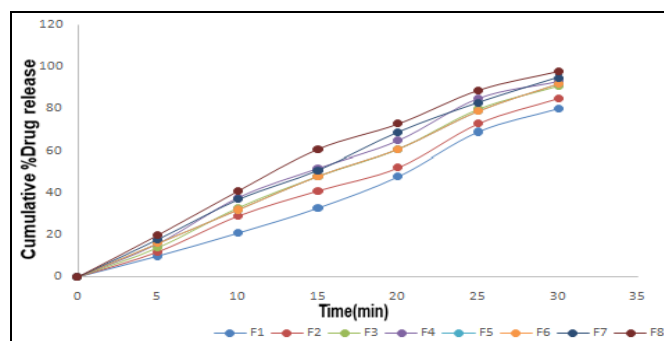

FIG. 4: *IN-VITRO* **DRUG RELEASE PROFILES OF FORMULATIONS F1-F8**

In-vitro Drug Release Kinetics: The drug release data of all formulations were fitted to kinetic models. The results were shown in **Table 5** and **Fig. 5**, **6**, **7,** and **8**.

TABLE 5: DRUG RELEASE KINETIC STUDIES FOR ALL FORMULATIONS F1-F8

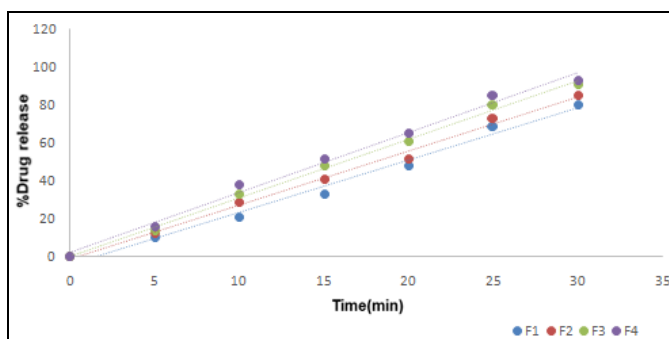| Formulation	Zero-order R^2 values	First order R^2 values
F1	0.9148	0.9871
F2	0.9163	0.9949
F3	0.9142	0.9971
F4	0.9210	0.9912
F5	0.8779	0.9926
F6	0.8957	0.9921

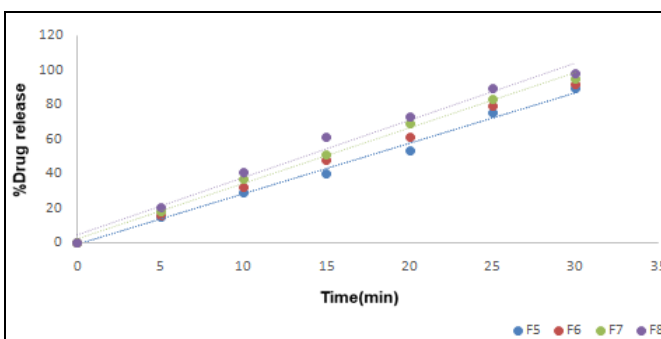**FIG. 5: ZERO ORDER PLOTS OF FORMULATIONS F1-F4**

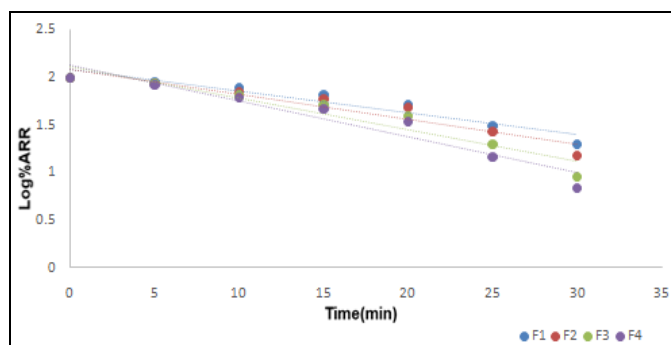**FIG. 6: ZERO ORDER PLOTS OF FORMULATIONS F5-F8**

FIG. 7: FIRST ORDER PLOTS OF FORMULATION F1-F4
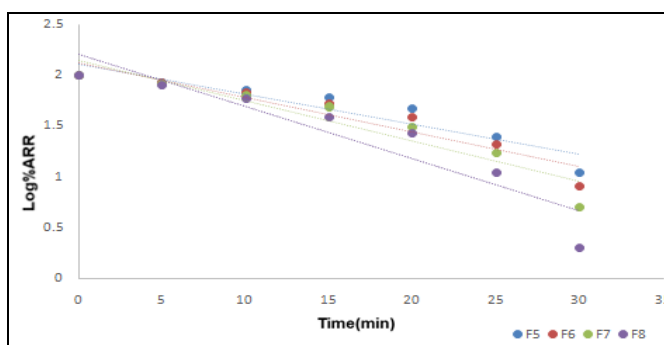

FIG. 8: FIRST ORDER PLOTS OF FORMULATIONS F5-F8

R^2 values of First order (0.9846) for formulation (F8) was greater than R^2 values of Zero order (0.8651). Hence, drug release follows First order kinetics.

CONCLUSION: The fast dissolving tablets of Lacosamide were prepared successfully by using a direct compression method. The *in-vitro* drug release studies showed that the formulation F8 containing 8% w/w of *Ocimum sanctum* powder showed 98% of drug release at the end of 30 min, and formulation F4 which containing 8% w/w of dehydrated banana powder (DBP) powder showed 93% of drug release at the end of 30 min. Hence, formulation F8 can be considered as a promising formulation.

CONFLICT OF INTEREST: Nil

REFERENCES:

1. Hardenia SS and Darwhekar GN: Development and optimization of fast dissolving tablets of promethazine theoclate using 3^2 full factorial design. Int J Pharm Sci Res 2016; 7(6): 5115-24.
2. Mahesh S, Jayachandra Reddy P, Umasankar K, Alagasundaram M and Ramesh Reddy K: Design development & evaluation of fast dissolving tablet of lacosamide. International Journal of Innovative Drug Discovery 2014; 4(3): 148-58.
3. Manford M: Recent advances in epilepsy. J Neurol 2017; 2(8): 1811-1824.
4. Herbert B and Newton: Epilepsy and brain tumors. Academic Press, Edition 1st, 2015.
5. Wasfy M, Ali O, Nokhodchi K and Alkhatib H: Evaluation of matrix tablets based on Eudragit®E100/Carbopol®971P combinations for controlled release and improved compaction properties of water-soluble model drug paracetamol. AAPS Pharm Sci Tech 2015; 16(5): 34-39.
6. Rao ABN N, Reddy G R, Kumar S and Khan A: UV-Visible spectrophotometric method for the determination of lacosamide in its pure and tablet dosage form. Der Pharmacia Lettre 2012; 4(6): 1737-41.
7. Bhusnure OG, Faisal Ekbal S and Jyoti M: Formulation and evaluation of fast mouth dissolving chewable tablets of albendazole. Indo American Journal of Pharmaceutical Research 2016; 6(08): 6457-64.
8. Singh MC, Eknath PS and Hiraram CN: Preparation and evaluation of powder of unripe fruits of various varieties of *Musa paradisiacal* (banana and plantain) as a tablet disintegrant. Int J Life Sci Bt & Pharm Res 2014; 3(3): 35-43.
9. Kamble Meghan S, Mendake D, Satish P, Pravin D and Chaudhari P: Studies on Isolation and evaluation of Ocimum tenuiflorum linn seed mucilage. Journal of Drug Delivery & Therapeutics 2012; 2(6): 25-28.
10. Khar KR and Vyas SP : Lachman/Lieberman's The theory and practice of industrial Pharmacy. CBS Publishers & Distributors, Edition 4th, 2015.
11. Navjot K, Rakesh Kumar B, Amita S and Sinha VR: Preparation and evaluation of floating tablets of pregabalin. Drug Dev Ind Pharm Informa Healthcare USA 2015; 1-7.
12. Abdulahad H, Pradeepkumar B, Haranath C and Reddy KS: Fabrication and evaluation of glimepiride *Cordia dichotoma* G. Forst fruit mucilage sustained release matrix tablets. International Journal of Chemical Sciences 2009; 7(4): 2555-60.
13. Preeti P, Ganarajan G and Preeti K: Formulation and evaluation of mouth dissolving tablets of telmisartan using natural superdisintegrants. Indo Am J P Sci 2016; 3(7): 713-27.
14. Khan KAA: Development and characterization of zolpidem tartrate oro-dispersible tablets. J Pharm Res 2015; 4(6): 226-23.
15. Rasoul SA and Gamal A: Propafenone HCl fast dissolving tablets containing subliming agent prepared by direct compression method. Saudi Pharmaceutical Journal 2017; 25(7): 1086-92.
16. Ranganathan V and Yoong J: Development and evaluation of mouth dissolving tablets using natural super disintegrants. J Young Pharm 2017; 9(3): 332-35.
17. Kumar SP, Ratna JV, Aditya P and Revathi S: Formulation and evaluation of fast dissolving tablets of paracetamol using oats powder. International Journal of Pharmaceutical Science Invention 2016; 5 (3): 7-12.
18. Swati S, Nirmala G and Jyothi N: Formulation and evaluation of fast dissolving tablets of olanzapine. Indo American Journal of Pharmaceutical Research 2016; 6(3): 4617-27.

19. Sharad KK and Sunita SS: Design and development of fast dissolving tablets of gliclazide. J Develop Drugs 2017; 6(3): 1-13.

20. Deepak S: Formulation development and evaluation of fast disintegrating tablets of Salbutamol sulphate for respiratory disorders. ISRN Pharmaceutics 2013; 1(1): 1-8.

21. Malik K, Gurpreet A and Singh I: *Ocimum sanctum* seeds, a natural superdisintegrant: Formulation and evaluation of fast melt tablets of nimesulide. Polim Med 2012; 42(1): 49-59.

22. http://www.accessdata.fda.gov/scripts/cder/dissolution/. Accessed on 2nd August 2018.

23. Hiremath SP and Chidambar P: Formulation and evaluation of orodispersible tablets of a model antihypertensive drug. International Journal of Pharmacy and Pharmaceutical Sciences 2017; 9(11): 34-38.