Research Article

Solubility Enhancement of Lamotrigine by Liquisolid Technique

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ABSTRACT

Introduction: The term 'liquisolid system' describes a pharmaceutical formulation approach where a liquid drug is transformed into a dry, powdered form. **Aim:** The study's goal was to utilize LS technology to convert Lamotrigine (LTG) into a more soluble and bioavailable form, which could have significant implications for the treatment of conditions that require this medication, such as epilepsy and bipolar disorder. FTIR analyses were used to determine the drug and excipients' compatibility. **Materials and Methods:** Following preliminary screening, Transcutol was selected as the non-volatile solvent and Avicel pH 102 and MCC as carrier materials in formulation of LS tablets. The coating substance chosen was Aerosil 200. Prior to pounding the liquid-solid powder into tablets, a precompression study was conducted. The pills' physical and chemical properties as well as results of dissolution tests were examined. The pharmacopoeial tolerances were met by all formulations. A comparison of the dissolution rates of LTG and conventional tablet demonstrates that the formulation of liquisolid tablets is beneficial and useful in contrast to regular traditional tablets. **Results:** Transcutol and Prosolv SMCC 50 were chosen as the optimized components in the LS formulation. These choices led to a significant enhancement in the dissolution rate of LTG, addressing its low water solubility, and potentially improving its bioavailability. The LS formulation passed stability tests and demonstrated stability for at least a month. This is essential for ensuring that the formulation maintains its quality and performance over time, which is a critical factor in pharmaceutical product development. **Conclusion:** The study suggests that the liquisolid approach in a viable alternative for improving the dissolution properties of medications that are not water-soluble.

Keywords: Lamotrigine, Liquisolid tablets, Transcutol, Prosolv SMCC 50.

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INTRODUCTION

The most suitable, non-volatile solvent systems, liquid lipophilic pharmaceuticals, drug suspensions, and solutions of solid, water-insoluble medications are all included in the definition of "liquid medication". Through blending with selected carrier and coating materials, liquid lipophilic drugs, drug suspensions, or solutions of water-insoluble solid drugs in appropriate non-volatile solvent systems are transformed into dry, non-adherent, freely flowing, and easily compressible powder admixtures. These are called "liqui-solid systems." Liqui-solid compacts are prepared tablets or capsules with either instant or delayed release. They also include the appropriate adjuvants, such as lubricants, for tabletting or encapsulation, and binders or disintegrants, for rapid or sustained release action. A material having appropriate absorption characteristics is called a carrier material because it aids in liquid absorption. Amorphous and microcrystalline cellulose are two examples. Coating materials, which include various types of silica, are substances with small, highly-adsorptive particles that assist cover the wet carrier particles and give the appearance of powder by adsorbing any excess moisture.[1]

The Liqui-Solid (LS) technique has several applications. It can be used to create controlled release tablets and

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achieve sustained release of water-soluble medications like propranolol hydrochloride. It can also be used to enhance solubility and dissolution, produce rapid release rates, and be effectively used for liquid lipophilic medicines or solid medications that are insoluble in water.[1,2] Liquisolid systems are categorized into two types, one based on the type of liquid medication and the other on the formulation process used. Liquisolid systems are classified into three types based on the type of liquid medication: powdered drug solutions, powdered drug suspensions, and powdered liquid pharmaceuticals. Liquisolid systems are classified into two types based on the formulation process used: liquisolid compacts and liquisolid microsystems.[3] The objective of the study was to enhance the solubility of Lamotrigine using Liquisolid technology.

MATERIALS AND METHODS

Materials

Lamotrigine is obtained from AET Laboratories Pvt. Ltd.,; propylene glycol, tween 80, tween 20, PVP K30, magnesium stearate, talc, PEG-600 all are obtained from S.D Fine chemicals, India; PEG-400, Microcrystalline cellulose are obtained from N R Chemicals; glycerol is obtained from Molychem; Olive oil, Arachis oil are obtained from Finar Ltd.,; Liquid paraffin is obtained from Finar Ltd., Ahmedabad; Prosolv SMCC 50, Aerosil 200 are obtained from Dr. Reddy's Laboratories; Castor oil, span-80 are obtained from Oxford Laboratory, Mumbai; Transcutol is obtained from Alfa Aesar; Avicel pH 102 is obtained from Research-lab fine chem. Industries. All the chemicals and reagents were of the analytical grade from Fine Chemical Research Lab Industries. Each and every chemical and reagent was of analytical grade.

Preparation of standard solution of lamotrigine in 0.1 N HCl

Standard curve of LTG was performed in 0.1 N HCl as per I.P.

Determination of λ_{max} in 0.1 N HCl

A double beam UV-visible spectrophotometer was used to scan a 10 µg/mL concentration of standard solution between 200 and 400 nm, with 0.1 N HCl serving as a blank. For 0.1 N HCl, an absorption peak of 280 nm was obtained, and this was chosen to create the standard curve.

Preparation of working standard solutions

Aliquots of the stock II solution of 2, 4, 6, 8 and 10 mL were pipetted into separate tubes separately for each media to obtain concentrations of 2, 4, 6, 8 and 10 g/mL, respectively. Their absorbances were measured at 280 nm against 0.1 N HCl as blank. Three times the experiment was run, and the average of the results was used for plotting.[4,5]

Solubility studies

Studies on the solubility of several non-volatile solvents were conducted in order to select the best non-volatile solvent for dissolving LTG. In 5 mL of non-volatile solvents individually, excess drug was added in order to create saturated solutions. For 48 hr, the mixtures were continuously shaken in an orbital shaker bath at 25ºC. The supernatants were then diluted accordingly with distilled water after being filtered using a Whatman filter paper (0.2 µm). The medication levels were examined using a UV spectrophotometer at 280 nm. The common equation was used to calculate the concentration of the medication that had been dissolved.[6]

Drug-excipient compatibility studies

FTIR studies

To make sure the polymer and medication were compatible, FTIR spectroscopy was used. On an FTIR instrument (FTIR 8400S, Shimadzu, Japan), FTIR spectra for LTG, a physical mixture of the drugs Avicel pH 102, Aerosil 200, and Prosolv SMCC 50, as well as a formulation blend, were obtained. Samples were examined using KBr pellet method in 4000-400 cm^{-1} range of an IR spectrophotometer. The dry samples were compressed at a 10 tons/$inch^2$ pressure for 10 min to form pellets. The resulting spectrum was checked for any additional or extra peak. They were scrutinized for peaks associated with functional groups of chemicals.

Angle of slide

Test powder was placed at one end of a smooth metallic plate and gradually lifted until the plate became angular to the horizontal plane, at which point the powder just slid.[7]

Holding capacity of the carrier material

It's the carrier material's ability to hold onto liquid while yet acting as dry powder. A predetermined amount of carrier material is added along with various weights of non-volatile solvents, and the mixture is then triturated until the content starts resembling a non-adherent, free-flowing, dry powder.

Liquid load factor (Lf)

It is the weight ratio of the liq. medicine in the system (W) to the substance that serves as its carrier (Q), while maintaining sufficient flow and compression properties.

Flowable liquid retention potential (Φ value)

The powder's capacity to hold a specific volume of liquid while retaining smooth flow behaviour is known as liquid retention potential. The flowability of the resulting mixes was calculated by measuring the angle of repose after the carrier materials' holding capacity was established.

Selection of carrier material

The LS tablets were produced with calculated weights of solvent and carrier materials and a carrier to coating ratio of 5:1. Tablets' physicochemical characteristics and flow characteristics of powder were assessed.

Preparation of Liquisolid tablets

The drug solution was prepared by dissolving 5 mg of the medication in Transcutol. The liquid medication was combined with the coating and carrier materials, Aerosil 200 and Avicel pH 102, respectively in a mortar. Table 1 displays the various formulations with Lf factor. Three steps were involved in the mixing process:

1. The medication was slowly mixed to ensure uniform distribution of the liquid treatment.
2. The coating material was added in approximate proportions after the liquid powder had been left to absorb the drug solution into the powder particles for about 5 min, during which time the carrier material was added and mixed for 2 min.
3. The powder was compacted into tablets after being combined in that sequence with PVP K30, talc, and magnesium stearate as a binder, glider, and lubricant, respectively. (Traditional LTG pills were manufactured without a vehicle by mixing solid ingredients and compressing them directly).[7]

(Note: All the tablets contain 2% talc and Mg. stearate).

Evaluation of flow properties

Angle of repose: The formula used to calculate it is:

$$\text{Tan } \theta = \frac{h}{r\,\theta} = \tan^{-1}\frac{h}{r}$$

Bulk density (ρ b): The formula used to calculate it is:

$$\rho\ b = \frac{\text{Wt. in g}}{V\ b}$$

Tapped density (ρ t): The formula used to calculate it is:

$$\rho\ t = \frac{\text{Wt. in g}}{V\ t}$$

Compressibility index: The formula used to calculate it is:

$$CI = \left(\frac{\rho\ t - \rho\ b}{\rho\ t}\right) \times 100$$

Hausner's ratio: It's an indirect measurement of powder flow easiness. The formula used to calculate it is:

$$\text{Hausner's ratio} = \frac{\rho\ t}{\rho\ b.}$$ [7-10]

Evaluation of LS Tablets

Hardness

It was measured using a tablet-based hardness meter and three tablets from every batch were chosen randomly, and average reading was noted.[8]

Weight variation

A total of twenty tablets were chosen randomly and weighed at once then the average weight was determined from the total weight.[11]

Table 1: Formulation of LS compacts of lamotrigine.

Formulation	DRUG (mg)	Solvent (mL)	Carrier material (Q)	Aerosil 200 (q)	Prosolv SMCC 50	Ratio R/r	Lf	Total weight
LS 1	25	99.9	252	50.4	-	5	0.39	450
LS 2	25	99.9	252	25.2	-	10	0.39	450
LS 3	25	99.9	252	16.8	-	15	0.39	450
LS 4	25	99.9	252	12.6	-	20	0.39	450
LS 5	25	99.9	252	10.08	-	25	0.39	450
LS 6	25	99.9	251	50.2	-	5	0.39	450
LS 7	25	99.9	251	25.1	-	10	0.39	450
LS 8	25	99.9	251	16.73	-	15	0.39	450
LS 9	25	99.9	251	12.55	-	20	0.39	450
LS 10	25	99.9	251	10.04	-	25	0.39	450
LSP	25	99.9	-	-	200	-	0.49	400
DCTM	25	-	251	50.4	-	-	-	350
DCTA	25	-	252	50.2	-	-	-	350

(Note: All the tablets contain 2% talc and Mg. stearate).

Thickness

Thickness of tablet was measured using a screw gauge and the average thickness and standard deviation were noted.[12]

Disintegration time

It was calculated using 0.1 N HCl as the disintegration medium at 37±0.5ºC in a tablet disintegration test device and the disintegration time was noted when the tablets were said to have totally broken down.[5,13]

Friability

The Roche Friabilator was used to evaluate it and the friabilator was loaded with 20 pre-weighed tablets and rotated 100 times and the formula below yields the F% value.[5,7,11]

$$F\ \% = \left(\frac{1\text{-}W_0}{W}\right) \times 100$$

Drug content

Twenty tablets were crushed to a fine powder and weighed powder containing 5 mg of LTG was dissolved in 10 mL of methanol, which was transferred to 100 mL volumetric flask and made upto 100 mL using 0.1 N HCl and from the filtrated supernatant 1 mL of the sample was obtained and made to 10 mL which has a concentration of 10 g/mL and at 280 nm, the absorbance was compared with blank and drug content was calculated using standard graph.[4]

Content uniformity

Ten tablets were selected at random from each batch of LS tablets. Each tablet was crushed into a powder, and 10 mL of methanol was put along with it to a 100 mL volumetric flask. By shaking the flask, it was thoroughly blended. The volume was adjusted to the necessary level using 0.1 N HCl. The final product was filtered using a Whatman filter, the filtrate properly diluted, and content uniformity was determined.[7]

Dissolution study

The *in vitro* dissolution investigations were performed on USP type-II apparatus. 25mg of LTG, LS tablets, and DCT were added to 900 mL of 0.1N HCl at 37±0.5ºC and mixed at 50 rpm. To maintain sink conditions, an aliquot of 5 mL was removed at regular intervals of 5, 10, 15, 20, 25, 30, and 45 min and replaced with 5 mL of 0.1 N HCl, filtered right away, and then the samples were examined spectrophotometrically at 280 nm. Three trials were carried out for every formulation.[5,13]

Accelerated stability testing

For a month, the stability tests on the improved formulation were carried out at 40ºC±2ºC, and 75%±2% RH. Individually wrapped with aluminium foil, tablets were kept in a humidity room for a month under the aforementioned conditions. After each week for a month, tablets were tested for any significant changes in certain parameters.[11]

RESULTS

LTG Analysis

Determination of lamotrigine λmax in 0.1N HCl

The UV-visible spectrophotometer was used to scan the λ_{max} of LTG in 0.1N HCl. A measured λ_{max} of 280 nm was found.

Preparation of standard graph in 0.1 N HCl

The absorption values were measured at 280 nm using standard solutions ranging from 2 to 10 µg/mL in 0.1 N HCl as blank.

From the Table 2, the lamotrigine's standard curve was developed with equation of line y=0.0311x+0.007 and R^2=0.9974 as depicted in Figure 1.

Table 2: Standard graph of lamotrigine in 0.1N HCl.

Sl. No.	Concentration (µg/mL)	Absorbance (280 nm)
1.	2	0.073±0.011
2.	4	0.137±0.009
3.	6	0.198±0.013
4.	8	0.248±0.015
5.	10	0.318±0.006

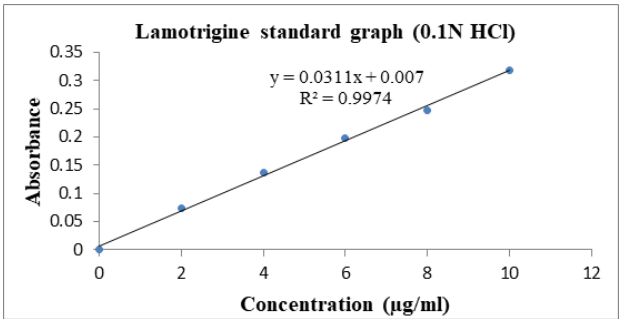


Figure 1: Standard curve of lamotrigine in 0.1N HCl.

Solubility studies

Before making LS tablets, the solubility of drug was tested in a variety of non-volatile solvents. The maximal solubility of LTG was seen in Transcutol, 27.62 mg/mL.

Drug excipient compatibility studies

Interaction studies by FTIR

The compatibility of LTG with the excipient was examined using FTIR. The absence of any chemical

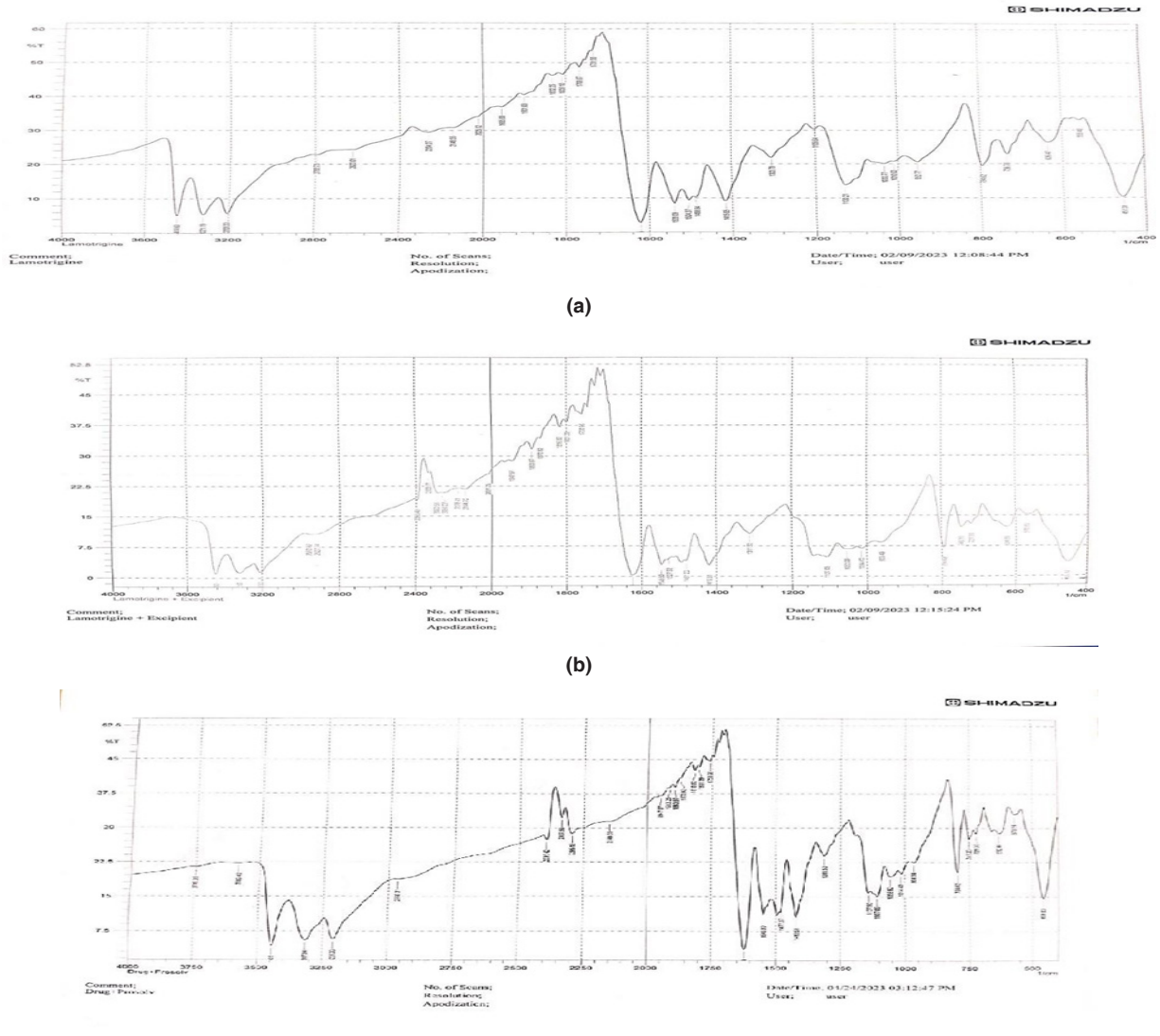


Figure 2: FTIR spectra of (a) LTG, (b) LTG with Avicel 102, (c) LTG with Prosolv SMCC 50.

interactions between the excipients and medication was established by FTIR analyses from the spectra as shown in Figure 2.

Angle of slide

All the powders (Starch, MCC, Avicel 102, Prosolv SMCC 50 and Aerosil 200) possess the ideal flow properties, which makes them appropriate to be used as carriers and coating materials for the manufacturing of LS tablets.

Holding capacity of carrier material and determination of Lf

The flowability, and Lf of all the materials were calculated by maintaining a constant dosage of 1000 mg. Different doses of transcutol were added, including 99.9 mg, 199.8 mg, 299.7 mg, 399.6 mg and 499.5 mg. By the addition of non-volatile solvent, the carrier material's flow properties were revealed to be in the 22-35 range, suggesting fair to passable flowability. It was observed that the holding capacity of a particular carrier material decreased as the solvent level increased, leading to poor flowability.

The medication was dissolved in Transcutol and varying amounts of carrier material were added until the desired flowability was obtained. When combined with Prosolv SMCC 50 at a weight of 300 mg, MCC and Avicel pH 102 showed flowability of 34 and 32 at carrier weights of 252 mg and 251 mg, respectively, showing good flow properties and outstanding flow were optimized.

Evaluation of flow properties for LS formulations

The LS powder's flow characteristics were assessed as shown in (Table 3). The flowability of the powder may reduce as the fluid content increases. As a result, Aerosil 200 was chosen as the coating substance.

Table 3: Precompression parameters of LS powder.

Formulation Code	Angle of Repose	Bulk Density (gm./cm³)	Tapped Density (gm./cm³)	Hausner Ratio	Carr's Index (%)
LS 1	37.97±0.39	0.31±0.34	0.38±0.12	1.22±31	18.42±0.30
LS 2	35.76±0.23	0.32±0.12	0.39±0.36	1.21±30	17.94±0.25
LS 3	31.27±0.31	0.46±0.48	0.54±0.26	1.17±23	14.81±0.32
LS 4	30.21 ±0.25	0.48±0.29	0.56±0.19	1.16±22	14.28±0.36
LS 5	29.77 ±0.32	0.35±0.29	0.40±0.33	1.14±26	12.5±0.34
LS 6	35.96±0.28	0.35±0.17	0.42±0.18	1.2±12	16.66±0.21
LS 7	32.29±0.10	0.35±0.14	0.41±0.37	1.17±21	14.63±0.26
LS 8	31.48±0.53	0.37±0.13	0.43±0.44	1.16±23	13.95±0.31
LS 9	28.66 ±0.36	0.49±0.67	0.56±0.25	1.14±15	12.5±0.15
LS 10	27.98±0.19	0.34±0.25	0.39±0.20	1.14±17	12.82±0.39
LSP	26.10 ±0.13	0.30±0.25	0.34±0.47	1.13±33	11.76±0.13
DCTM	27.69 ±0.14	0.40±0.11	0.45±0.23	1.12±34	11.11±0.17
DCTA	26.81 ±0.67	0.44±0.30	0.49±0.30	1.11±36	10.2±0.29

All the formulations (LS1-DCTA) had their flow characteristics investigated. The flowability of LSP, which uses Prosolv SMCC 50 as both a carrier and coating material, is sufficient at 26.10±0.38, indicating satisfactory flowability. All the formulations complied with I.P. pharmacopoeial limits. These mixtures were compacted into tablets using an 11.9 mm punch, and their physicochemical properties were assessed.

Liquisolid tablets evaluation

The tablets were made in accordance with the formulation table specified in the experimental approach, and their physicochemical characteristics were assessed (Table 4). All formulations passed the uniformity of weight test in accordance with official requirements, the values were within the allowable. The thickness varied from 3.01 to 3.80 mm. The hardness of all formulations ranged from 3.0 to 4.7 kg/cm^3. Disintegration time for all formulations ranged from 2 to 9 min, which was within acceptable ranges for breaking down tablets in media. LS tablets were evaluated and it was found that the drug content ranged from 95% to 99%, the content uniformity ranged from 91% to 98%, and the friability for all formulations were in permissible limits. As a result, all of the formulations complied with official standards (Indian Pharmacopoeia, 2007).

Dissolution studies

Dissolution data of LS tablets in 0.1N HCl

The drug release patterns of LS formulations from LS1 to LS5 that contain carrier material as MCC and varied amounts of coating material shown in Table 5 and Figure 3(a). The LS5 formulation showed a better drug release than previous formulations. The drug release

Table 4: Evaluation parameters of LS tablets.

Formulation code	Weight variation (mg)	Hardness (kg/cm^2)	Thickness (mm)	Disintegration time (min.)	Friability (%)	Drug content (%)	Content uniformity (%)
LS1	449.3±0.62	4.6±0.05	3.62±0.04	5.0±0.06	0.26±0.22	97.7±0.17	92.5±0.35
LS2	448.7±0.76	4.5±0.08	3.43±0.06	6.02±0.24	0.16±0.10	98.9±0.13	95.3±0.29
LS3	449.10±1.23	4.7±0.04	3.80±0.09	4.10±0.23	0.19±0.09	96.4±0.14	91.9±0.22
LS4	447.89±0.79	3.8±0.10	3.62±0.08	5.45±0.29	0.12±0.03	98.3±0.19	97.5±0.16
LS5	449.44±1.08	3.2±0.02	3.55±0.05	7.3±0.18	0.18±0.07	96.8±0.23	94±0.45
LS6	448.63±0.67	3.9±0.10	3.52±0.07	8.5±0.27	0.50±0.01	97.3±0.21	93.6±0.19
LS7	448.35±0.43	3.6±0.04	3.53±0.03	9.2±0.19	0.53±0.12	95.4±0.24	93.2±0.24
LS8	448.27±0.55	3.7±0.12	3.41±0.04	8.0±0.20	0.53±0.20	98.7±0.22	97.4±0.13
LS9	448.24±0.82	3.8±0.03	3.50±0.08	3.4±0.09	0.57±0.02	95.1±0.34	92.5±0.32
LS10	447.59±0.90	3.0±0.02	3.51±0.09	3.4±0.18	0.19±0.16	99.0±0.29	98.1±0.11
LSP	399.94±0.55	3.7±0.03	3.42±0.03	2.54±0.17	0.55±0.06	97.3±0.31	96.3±0.15
DTCM	348.19±0.43	3.5±0.15	3.01±0.06	2.16±0.19	0.46±0.04	97.6±0.14	94.5±0.10
DTCA	349.24±0.68	3.6±0.11	3.03±0.06	2.40±0.16	0.48±0.03	98.2±0.21	93.6±0.14

Table 5: Percentage of medicine release for LS1 to LS10.

Time (min.)	LS 1(%)	LS 2(%)	LS 3(%)	LS 4(%)	LS 5(%)
0	0	0	0	0	0
5	14.86±0.12	40.5±0.82	29.44±0.52	35.11±0.41	55.18±0.42
10	26.98±0.23	43.27±0.62	36.84±0.63	36.97±0.52	59.31±0.08
15	28.80±0.14	43.56±0.43	43.03±0.51	41.76±0.74	59.70±0.56
20	33.83±0.85	44.08±0.41	45.64±0.52	47.84±0.32	62.37±0.12
25	33.86±0.42	44.89±0.85	50.92±0.45	50.5±0.41	63.41±0.07
30	36.79±0.36	51.73±0.42	57.45±0.63	56.23±0.52	72.74±0.26
45	42.72±0.58	58.08±0.96	61.16±0.52	78.64±0.63	93.06±0.12
Time (min)	**LS 6(%)**	**LS 7(%)**	**LS 8(%)**	**LS 9(%)**	**LS 10(%)**
0	0	0	0	0	0
5	28.92±0.51	45.13±0.14	44.83±0.42	45.59±0.17	45.41±0.47
10	35.35±0.82	47.74±0.85	46.8±0.71	46.33±0.91	50.79±0.24
15	35.46±0.36	52.12±0.56	47.32±0.45	47.26±0.52	54.21±0.51
20	35.98±0.42	53.74±0.41	50.27±0.56	49.51±0.36	57.97±0.85
25	36.45±0.58	55.14±0.82	53.40±0.42	55.18±0.42	60.87±0.41
30	39.63±0.63	56.18±0.57	65.32±0.81	64.74±0.28	72.45±0.29
45	55.78±0.41	69.03±0.81	72.21±0.47	78.74±0.45	95.99±0.41

characteristics for the LS formulations from LS6 to LS10 that use Avicel pH 102 as a carrier material is shown in Table 5 and Figure 3(b). The formulation LS10 gave the best drug release compared to other formulations.

Comparative dissolution studies of LTG, DCT and LSP

% medication studies of LTG, LSP and traditional tablets were performed and analysed as shown in Table 6 and Figure 4.

In 30 min, LSP demonstrated the highest drug release (99.18±0.54%). After 45 min, normal conventional tablets released 50.0±81.65% of their contents. The optimized LS pills were proven to have the greatest drug release when compared to pure drug and DCT.

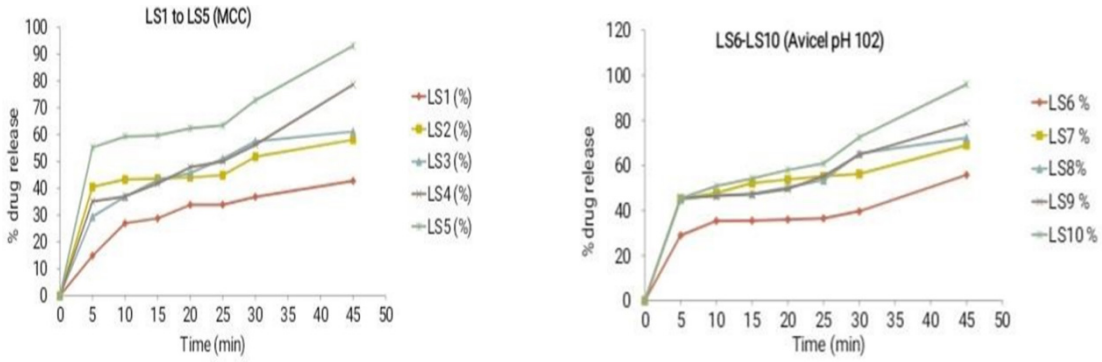
Accelerated stability studies

The appearance, hardness, drug content, percent drug release and disintegration time were all found to be satisfactory at the end of a month with no discernible alterations, demonstrating the stability of the optimized formulation.

DISCUSSION

The goal of current study is to improve the dissolution rate of lamotrigine by employing LS compacts technology along with various carriers.

Transcutol was found to have the highest solubility of approximately 27.62 mg/mL among the tested non-volatile solvents, thereby suggesting that Transcutol is an



(a) (b)

Figure 3: % of medicine release for (a) LS1 to LS5 and (b) LS6 to LS10.

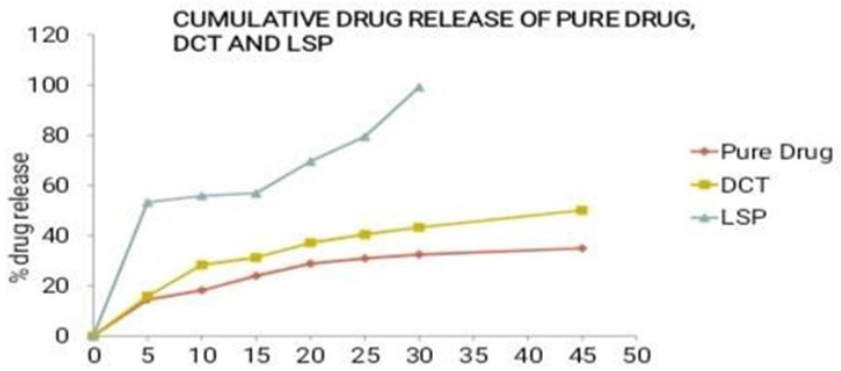


Figure 4: Comparative % medicine released from LTG, DCT and LSP.

effective solvent for dissolving the target compound.[6] By selecting the carrier material with the highest solvent-holding capacity, the aim was to optimize the LS formulation to achieve the desired drug dissolution rate and enhance the bioavailability of LTG. The coating substance Aerosil 200 was added in the Ratios (R) of 5, 10, 15, 20 and 25. The pre- and post-compression evaluations of the LS tablets were performed Tables 3 and 4. Every parameter was within the range as per the specification. The results obtained were very promising and suggest that this study successfully achieved its goal of enhancing the solubility of LTG using LS technology with Prosolv SMCC 50 as a carrier. Key findings are summarized below:

The solubility profiles of the formulation with Prosolv SMCC 50 were significantly higher (99.18±0.54% in 30 min) compared to the solubility of pure drug (34.92% in 45 min) as shown in Table 6 and Figure 4.[5,13] This substantial increase in solubility is a crucial achievement as it can lead to improved bioavailability and potentially more effective therapeutic outcomes for LTG. FTIR studies were conducted to characterize the optimized formulation (Figure 2a, 2b, 2c). The absence of any interaction observed in the FTIR spectra indicates that the liquisolid formulation did not lead to any chemical or molecular interactions that could compromise the drug's stability or efficacy. Stability studies showed that the formulations remained reliable over time.[11] The strengths of Liquisolid systems are they are cheaper to produce than soft gelatin capsules, improved accessibility of an oral water-insoluble medication, the formulation allows for molecular dispersion of the drug, they may be used to create greasy liquid medicines and other liquid drugs.[1-3] The limitations are when high levels of carrier and coating materials are added to the liquisolid powder formulations to obtain acceptable flow properties and compatibility the weight of the tablet is increased above 1 g making it challenging to take the medication and low concentrations of hydrophilic carrier or carrier material do not significantly improve the dissolving profile.

Table 6: Percentage of medicine release from Pure drug, DCT and LSP.

Time (min)	% Cumulative drug release		
	Pure drug	DCT	LSP
5	14.47±0.84	15.81±0.69	53.25±0.27
10	18.18±0.27	28.33±0.27	55.83±0.42
15	23.98±0.05	31.27±0.74	56.88±0.12
20	28.79±0.74	37.10±0.29	69.55±0.54
25	30.88±0.54	40.43±1.08	79.39±0.96
30	32.45±0.25	43.28±1.42	99.18±0.54
45	34.92±0.22	50.08±1.65	-

CONCLUSION

The study successfully accomplished its primary goal of enhancing lamotrigine's solubility using LS technology with Prosolv SMCC 50 as a carrier.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

ABBREVIATIONS

LS: Liquisolid system; **LTG:** Lamotrigine; **FTIR:** Fourier Transform Infrared Spectroscopy; **MCC:** Microcrystalline cellulose; **Mg:** Milligram; **mL:** Millilitre; **µg/mL:** Microgram per milliliter; **nm:** Nanometer; **HCl:** Hydrochloric acid; **G/cm³:** Grams per cubic centimetre; **%:** Percentage; **Kg/cm²:** Kilogram per square centimetre; **mm:** Millimeter.

SUMMARY

The study improved the solubility and dissolution rates of LTG utilising the Liqui-solid technique, in which Transcutol was used as a non-volatile solvent, Avicel pH 102, and MCC as carrier materials in the formulation of LS tablets. Aerosil 200 was used as a coating material. All formulations underwent a pre-compression research for powder, as well as a physical and chemical property analysis for tablets. All the formulations were within the pharmacopoeial norms. The dissolution rates of LTG, conventional tablets, and liquisolid tablets were examined, and the results showed that liquisolid tablets released more medication in 30 min than conventional tablets. The optimised components for the LS formulation were Transcutol and Prosolv SMCC 50. The LS formulation passed stability tests and indicated stability for at least one month.

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