SOLUBILITY ENHANCEMENT OF FAMOTIDINE BY LIQUI SOLID TECHNIQUE

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Abstract

The study's goal was to use the Liquisolid approach to increase Famotidine's solubility, an insoluble drug, to make it soluble, free-flowing, non-adherent powder mix that can be further used for various dosage forms. The investigation began with a pre formulation study in which the drug's appearance, melting point, solubility, and identity were determined using FTIR spectroscopy, DSC, and XRD.Calibration curve was obtained of Famotidine in Phosphate buffer pH 4.5 that indicated that good linearity as per Beer's law. Furthermore, the adsorbent load factor was calculated to estimate the approximate amount of non-volatile solvent that might be included in the Carrier-Coating System. Liqui- solid mixture was prepared by using Drug :Tween 80 1:1 &1:2. Microcrystalline Cellulose and Aerosil200 used as carrier and coating materialin 50% ratio provided greater release of drug (95.87 % in 30mins) among all trials,clearly revealing that the Liqui -solid technology has successfully improved Famotidine dissolution.This novel approach may be helpful to improve oral bioavailability.

Keywords: *Liqui- Solid Technique, Famotidine, BCS II, Solubility Enhancement.*

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1.Introduction

The solubility and dissolution, as well as bioavailability of poorly water-soluble medications are of interest to many pharmaceutical specialists.

The drug Famotidine is a member of the group of drugs referred to as histamine-2 receptor antagonists. It is mostly used to treat diseases like gastroesophageal reflux disease (GERD), peptic ulcers, and Zollinger-Ellison syndrome that are caused by excessive stomach acid production. Famotidine proved to be nine times more potent than Ranitidine, and thirty-two times more potent than Cimetidine.[9-13]Famotidine has poor bioavailability (50%) due to low gastro retention time. Famotidine is less soluble at higher pH, and when used in combination with antacids gastro retention time is increased.Because the dissolution

rate is a function of the solubility and surface area of the drug for poorly water-soluble drugs (like famotidine), and the dissolution rate is a function of the solubility and surface area of the drug, the dissolution rate will increase if the solubility of the drug is increased, as will the surface area of the drug. [2-5]

The solubility and rate of dissolution in the gastrointestinal system of certain Biopharmaceutical Classification System Class II (BCS II) drugs usually correlate with their bioavailability.[1,2] Numerous efficient formulation techniques have been developed in order to increase the solubility of medications that are only marginally soluble in water.This can be solved by **Liquisolid technology**, a recently created and sophisticated method for enhancing dissolution. First, the liquid medication is absorbed into the carrier's internal structure.The liquid layer that forms on the carrier particles' surface after the interior of the carrier has been saturated with squid medicine is immediately absorbed by the fine coating materials. In turn, orally safe and preferred water-miscible organic solvents with high boiling point, such as propylene glycol, Tween 80, and polyethylene glycol (PEG) 400 are utilised as the liquid carriers. As a result, an apparently dry, free-flowing, and compressible powder mixture is created.

Carriers are porous substances that can effectively absorb liquid medications and have a large specific surface area. As carriers, many types of Cellulose, Starch, and Lactose might be used. However, only excipients with extremely fine particle size and highly adsorptive property should be used as coating materials, such as silica powder and Aerosil200.[1,2,7,8]

Even though the medicine is in a solid state within the Liqui-solid system, it resides in a totally or partially molecularly distributed state. As a result of the greater dissolution surface, increased aqueous solubility, or superior wetting qualities, a Liqui-solid system may have a faster dissolution rate. Liquisolid system is a novel concept of drug delivery via oral route. This technique is applied to insoluble drugs and lipophilic drugs to sustain their release.

2. Materials and methods.

2.1 Materials

Famotidine was obtained by AlkemPharmaceuticals Ltd (Mumbai, India) Microcrystalline Cellulose 101 (Avicel PH 101), Colloidal Silicone Dioxide (Aerosil200), Propylene Glycol, Tween 80,PEG 400was supplied by Fine Chemicals Industries(Mumbai,India). Castor oil & Olive oil were obtained by Ashwin Fine Chemicals Pharmaceutical Ltd (Mumbai, India).

2.2 Preparation of Liquisolid system

Tween 80 was used as the liquid vehicle in the following study, while Avicel PH 101 and Aerosil200 were used as the carrier and coating materials, respectively. Several parameters were modified to achieve optimal Famotidine solubility in the liquisolid formulations, including the concentration of the liquid vehicle Tween 80 (10, 20, and 30 g%) and the carrier:coat ratios (varying R-values) (ranging from 30to 50).

The new fundamental powder qualities known as "flowable liquid retention potential"(Φ- value) and "compressible liquid retention potential" (Φ- value)of the constituent powder are used to calculate the composition of the carrier, coat, and liquid medication.

The flowable liquid retention potential (Φ-value) of a powder is defined as the

maximum amount of a given non-volatile liquid that can be retained inside its bulk (w/w) while maintaining acceptable flow ability.[4]

Several Famotidine Liqui-solid formulation are prepared in the batches of ratio of (1:1) & (1:2) Drug: liquid vehicles. Each formulation contains AvicelPH101 as carrier and Aerosil200 as coating material, at carrier /coat ratio (R value) of 30,40,50. The appropriate amounts of coating material, used for each formulation depend upon Lf of that formulation. The Φ Ca and Φ C0 values for each particular liquid vehicle are used to calculate Lf [Eq-(1)] of that respective liquid vehicle. Once the liquid load factor (Lf) and amount of liquid medication (W) are determined amount of carrier (Q) and coating (q) can be calculated by rearranging Eq-(2) and (3)

$$Lf=\Phi Ca+\Phi C0\times 1/R \quad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

The appropriate amounts of the solid medication and the liquid vehicle Tween 80 were previously weighed and mixed before being heated to 80-90℃ with continual stirring. The solution was then sonicated for 15 minutes, until a homogeneous drug solution was formed.[2] Following that, the calculated weights (W) of the resulting hot liquid medications were incorporated into the calculated quantities of the carrier material (Avicel PH 101) (Q), and the resulting wet mixture was blended with the calculated amount of the coating material (Aerosil200) (q) using a standard mixing process. shown in Table 4. Later, each selected Liquisolid formula was blended with 0.75% (w/w) of Magnesium Stearate as a lubricant and mixed.

2.3 Melting Point Determination

Melting point determination method is prime confirmation of drug. The melting point was determined by capillary tube method. The temperature at which the drug melts was noted as melting point.

2.4 Solubility Tests: The solubility of Famotidine (FM)was also tested in Tween 80, PEG400, PG, Castor Oil, and Olive Oil. The FM saturated solutions were then obtained by adding large amounts of the drug to the solvents and shaking the shaker at 25 °C at constant vibration (150 rpm) for 48 hours. The solution was then sampled to determine the fixed solubility content. Following that, the samples were filtered and analysed three times with a UV-spectro-photometer (Jasco v 630, Philippines) at a wavelength of 265 nm for each solvent.

2.5Ultraviolet Spectroscopy

Preparation of Famotidine Standard Stock Solution: Famotidine was weighed (100mg) and transferred to a separate 100 ml volumetric flask and dissolved by using 4.5 buffer as a solvent up to the mark to obtain standard stock solution having concentration of 100 µg/ml.From stock solution 10 ml was transferred to 100 ml volumetric flask and volume made up with 4.5 buffer solution to obtain a 10ug/ml solution

Preparation of Test Solutions:
From the above stock solution 0.5, 1 ,1.5, 2 ,2.5 ,3 ml sample were transferred to 10 ml volumetric flask and volume made up with 4.5 phosphate buffer to give working standard solution. Solutions of drug were scanned in the range of 200-400 mm and wavelength of maximum absorption was found to be at 265 nm. This spectrum also confirms that Famotidine was a pure drug sample.

2.6 Binding Capacity of Adsorbents for Solvents:

The ability of powder excipients to bind liquid without changing their flow characteristics is known as binding capacity. It was calculated using the basic technique given below:

Different powder excipients (Avicel PH101, Starch, Lactose and Di Calcium Phosphate) were consistently weighed out and transferred to individual mortar pesle.Tween 80 was added to each mortar in 0.01 ml increments. After each addition, the mixture was triturated to assist the liquid evenly distribute throughout the powder particles. Liquid addition was continued until initiation of lumps formation in the powder mixture.

2.7 Calculation of Loading Factor: The carrier and coating powder materials can retain only certain amount of liquid while maintaining acceptable flow and compression properties. Hence, the excipient ratio (R) or the carrier: coat ratio of the powder system used should be optimized.

$$R=Q/q \quad \text{……..(2)}$$

Where, R represents the ratio between the weights of carrier (Q) and coating material (q) present in the formulation." Liquid load factor" (Lf) is defined as the ratio of the weight of the liquid drug (W) over the weight of the carrier powder (Q) in the system.

$$Lf=W/Q \quad \text{…….(3)}$$

The maximum amount of solvent that can be loaded onto the carrier is calculated.[7,8]

2.8Evaluation studies of a prepared liquid-solid mixture

Various tests were undertaken prior to guarantee the compatibility of the selected excipients, including differential scanning calorimetry (DSC), X-ray diffraction (XRD), and FTIR. Flowability investigations were also conducted in order to find the best liquid-solid mixtures.

X-ray diffraction (XRD) patterns for Famotidine, Avicel PH 101, physical mixtures (1:1) of Famotidine: Avicel PH 101 and Famotidine: Aerosil 200, and finally for the liquisolid system created were determined to better characterise the crystalline state.The powder X ray diffraction patterns was recorded using an X-ray diffractor meter (Bruker D8 advance) with 2.2 KW copper as an anode material and dermic X-ray tube as a source.

FTIR: The infrared absorption spectra of pure Famotidine and mixturewas used. Attenuated total reflectance (ATR) FTIR (8400, Shimadzu, Japan) was used to produce the absorption spectra in the 3500-750 cm region.

DSC analysis was performed by using Differential Scanning Calorimeter (DSC1 Mettler Toledo. Switzerland), in order to assess the thermotropic properties and the thermal behaviours of the drug (Famotidine), Avicel PH 101, Aerosil200, as well as the liquisolid system prepared.Samples were sealed in standard aluminium pans and heated from 40°Cto 30°C at a heating rate of 10K/min under nitrogen gas purging with 40-60ml/min flow rate.[18]

Flow Properties of Liqui-solid Mixture-

Angle Of Repose: The angle of repose was determined by using fixed funnel method. The powder is poured from a funnel onto a horizontal surface, it will form a cone. The angle between the sides of the cone and the horizontal is referred to as the angle of repose. The angle is a measure of the cohesiveness of the powder, as it represents the point at which the interparticle attraction exceeds the gravitational pull on a particle. The angle of reposeθ was determined by substituting

the values of the base radius 'r' and height of the pile 'h' in the following equation

Tanθ= h/r……..(4)

Bulk density is the ratio between given mass of powder and its bulk volume. Bulk density was measured by placing fixed weight of powder in graduated cylinder and volume occupied is measured to calculate bulk density. It is expressed in gm/ml.

D = M / V ……...(5)

where: D: Bulk density (g/l)

M: Weight of the full container (g)

V: Container volume (l)

Tapped density(TD) is the ratio of weight of dry powder to its Tapped Volume (TV). The weighed (W) quantity of dry powder was taken is a graduated cylinder. The cylinder was placed on the tap density tester (M/s. Inco) and subjected to 100 taps. The volume of powdered bed is measured. The tapping is continued until the difference of last two volume measurement is zero.[21,234]

TD(g/ml)= W/TVe …….....(6)

The Compressibility Index (Carr's Index) is a measure of the property of a powder to be compressed. Compressibility Index (CI) is calculated using the following equation.[21,34]

CI = [TD-BD/TD] x100 ……..…(7)

The smaller value of the CI% the superior the flow properties of the powder.

Hausner's Ratio (HR) is an important character to determine the flow property of powder and Granules. This can be calculated by the following formula:

HR= TD /BD……..(8)

Values less than 1.25 indicate good flow (=20% carr's), and greater than 1.25 indicates poor flow (=33% carr's). Between 1.25 and 1.5, added glidant normally improves flow**.**

The experiments and calculations were done in triplicate and Carr's compressibility index and Hausner's ratio with the corresponding standard deviations for each of the prepared formulae were then calculated.[21,34]

Drug Content : At this stage, three samples of Liqui-solid mixture from each batch were chosen at random to be examined for drug content. They were then weighed and were diluted with phosphate buffer pH4.5 and filtered through Whatman filter paper. Finally, absorbanceat 265 nm using UV spectrophotometer was used to assess the drug's content in accordance with the US Pharmacopoeia.

Dissolution Examinations: In-vitro dissolution tests were performed on three samples ofliquid-solid mixture of each formulation using the USP dissolution equipment No II (paddle technique) for 30 minutes at 50 rpm in a 900 mL phosphate buffer at pH 4.5 and 37 °C temperature. Then, at5,10, 15, and 20 ,25, 30 minutes, 5 ml of medium was withdrawn from each dissolution vessel and replaced with new dissolution medium.[5,8]

Stability Studies:

According to ICH recommendations, a study on the liquid-solid mixture's Accelerated temperature stability was conducted. The liquid solid mixtures prepared are subjected to stability studies at 40℃. After each month, the mixture's physical appearance, dissolution and drug content were checked.

RESULTS AND DISCUSSION:

Melting Point -Melting point of Famotidine determined by capillary tube method. It was found to be 163℃ as shown in Table 1

Table 1: Melting Point of Famotidine

Sample	Reported	Observed
Famotidine	163-164℃	163℃

Solubility Study:

The standard curves of FM solution were linear in the concentration ranges of 5 to 25 g/mL, according to the data. Table 2 also shows the solubility of FM in Propylene Glycol (PG), Polyethylene Glycol 400 (PEG400), Polysorbate 80, Castor Oil, Olive Oil. FM exhibited the highest level of solubility in Tween 80, it was selected as a non-volatile solvent to create the Liquisolid systems.

Table 2: Solubility of Famotidine in Non-Volatile Liquid Vehicles:

Nonvolatile solvent	Concentration (mg/ml)
Propylene Glycol	9.20 mg/ml
Peg 400	10.7 mg/ml
Tween 80	14.7 mg/ml
Castor Oil	1.2 mg/ml
Olive Oil	6.9 mg/ml

UV Spectroscopy Study of Famotidine: From calibration curve it can be concluded the sample follows Beer Lambert's Law in linearity ranges of concentration of 0-25 µg/mland thus gave linear equation with coefficient of correlation equal to 0.993. As Shown in Figure 1.

Table 3 Calibration curve of Famotidine in 4.5 Phosphate buffer:

Concentration (µg/ml)	Absorbance± S.D n=3
5	0.189 ± 0.03
10	0.380 ± 0.06
15	0.478 ±0.08
20	0.692 ± 0.12
25	0.892 ± 0.13

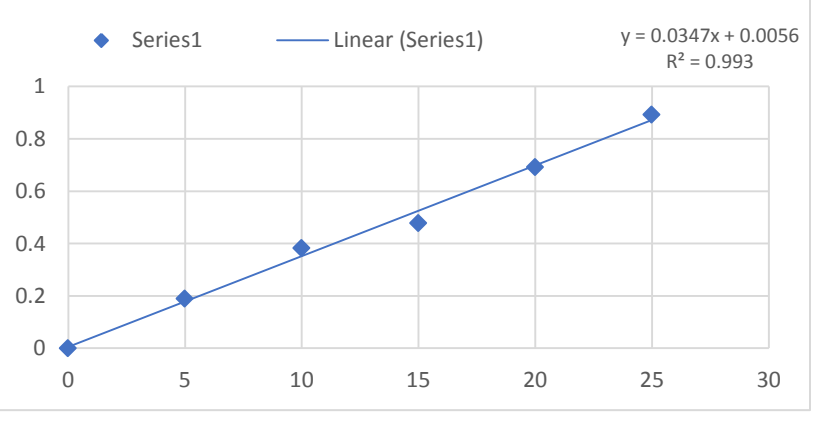

Figure 1 Calibration curve of Famotidine

Binding Capacity of Adsorbents For this Solvents:

The Micro Crystalline Cellulose, was selected as carrier based on its binding

capacity for the Tween 80-based system.shown in Table 4.

Table 4: Binding capacity of Adsorbents

Adsorbents	Capacity (mg/ml)
Lactose	2.4
Dicalcium Phosphate	2.2
Starch	3.0
Avicel PH 101	6.2

This adsorption feature is mostly reliant on the Solid surface area of the carrier that is available for adsorption, which is reliant on its Porosity. MCC Is known to possess high intra particle porosity.

Values of Load Factor :

The value of load factor was calculated by given formula Lf= W/Q.

Tween 80 has more solubility ,thus the adsorbent of carrier is more which shows more load factor shown in Table 5.

Table 5: Loading Facots

Sr. no.	Solvent	0.5ML	1.0ML	1.5ML	2.0ML	2.5ML
	LOAD FACTOR					
1.	PEG 400	0.16	0.24	0.31	0.38	0.40
2.	Tween 80	0.16	0.24	0.32	0.38	0.42
3.	PG	0.15	0.23	0.31	0.37	0.40
4.	Olive oil	0.14	0.23	0.31	0.36	0.32
5.	Castor oil	0.14	0.22	0.31	0.34	0.34

Evaluation parameter of Liquisolid System: Mechanical considerations, as with many other drug delivery systems, have the potential to influence the properties of the liquisolid powder system. Environmental and physical characteristics. [21] Carr's index has been reasonable as a flow feature up to 22. As a result. Hausner's ratio (HR) has been linked to inter-particle friction. Furthermore, powders with lower inter-particle friction had a ratio of almost 1.21, indicating an acceptable flow. Finally, the LS F6 system with an HR of 1.21 and a Carr's index (CI)[23] of 22 was considered for future research shown in Table 5.

Angle of repose to 33* is regarded as optimal flow behaviour. All the Liqui-solid mixtures demonstrates angle of slide value in the range of 32 -39 degree. Compressibility index show good to fair for all Liqui-solid mixtures. Hausner Ratio values less than 1.25 indicate good flow (=20% carr's), and greater than 1.25 indicates poor flow (=33% carr's).

Between 1.25 and 1.5, added glidant normally improves flow.[23]

Table 6 Formulations Trails of Liqui solid mixture:

SR. no.	Formulation	Drug (mg)	Tween 80 (mg)	Avicel(mg) (Q)	Aerosil (q)	Unit Dose Wt(mg)	R=(Q/q)
1	LS F1	20	20	0.245	0.008	0.293	30
2	LS F2	20	20	0.284	0.007	0.331	40
3	LS F3	20	20	0.305	0.006	0.351	50
4	LS F4	20	40	0.390	0.013	0.463	30
5	LS F5	20	40	0.400	0.008	0.468	40
6	LS F6	20	40	0.450	0.009	0.519	50

Table 7Flow properties Of Liquisolid Mixture

Formulation Code	**Angle of repose θ ± SD***	**Bulk density (g/ml)±SD***	**Tapped density (g/ml) ± SD***	**Carr's Index (%) ± SD***	**Hausner's ratio ± SD***
LS F1	33.37±1.54	0.610 ±0.05	0.71 ± 0.05	21.1± 0.05	1.22 ± 0.05
LS F2	34.16±1.83	0.66± 0.84	0.83 ± 0.02	20.4± 0.84	1.09 ± 0.02
LS F3	32.79±0.47	0.65 ± 1.04	0.83± 0.01	20.01 ± 1.04	1.12± 0.01
LS F4	39.30±2.54	0.640± 0.41	0.75±0.05	22..00± 0.41	1.096 ± 0.05
LS F5	34.69±0.67	0.620 ± 0.05	0.81±0.04	20.50 ± 0.05	1.192 ± 0.04
LS F6	32.00±1.54	0.66 ± 0.05	0.76±0.02	18.02 ± 0.05	1.055 ± 0.02

X-RAY Diffractive (XRD) The XRD results agreed well with the data from the thermal analysis. The X-ray diffraction patterns in Fig.2 indicated that pure Famotidine was clearly crystalline, with sharp distinct peaks at 20 diffraction angles of 11.5°, 15.5°, 19.5°, and 20.5°.

The absence of Famotidine constructive reflections (specific peaks) in the liquisolid X-ray

Fig.3 diffractogram indicates that Famotidine has almost entirely converted from crystalline to amorphous or solubilized form. This lack of crystallinity in the liquisolid.system was thought to be

due to Famotidine solubilization in the liquid vehicle that was absorbed into and adsorbed onto the carrier material (Avicel PH 101).

This amorphization or solubilization of Famotidine in the liquisolid system may thus Famotidine bioavailability. Mura et al. [32] and Ghebremeskel et al. [33] lead to an increase in the dissolution rate, apparent solubility, and thus Famotidine bioavailability may lead to an increase in the dissolution rate, apparent solubility, and

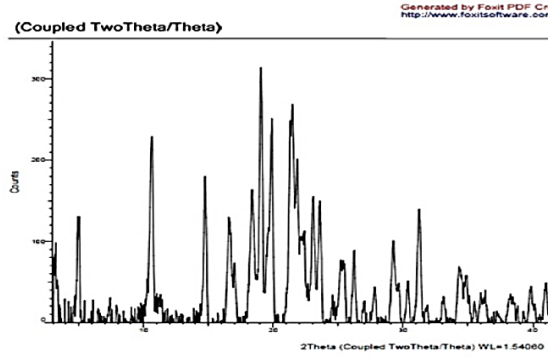

Figure2:XRDofPureDrug(Famotidine).

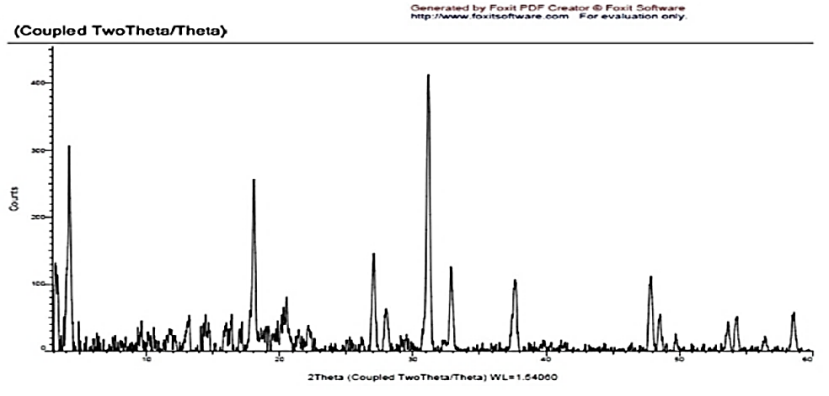

Figure3:XRDofLiquisolidmixture(LS6)

FTIR SPECTROSCOPY Infra-red spectroscopy analysis was performed by Fourier transformation infrared spectrophotometer. The spectra were scanned over the wave number range of 3500 to 750cm'. The characteristic peaks of Famotidine were reproduced in the IR spectra of the Liquisolid mixture thereby confirming the integrity of the drug and compatibility with the excipients as shown in Fig 4 & Fig

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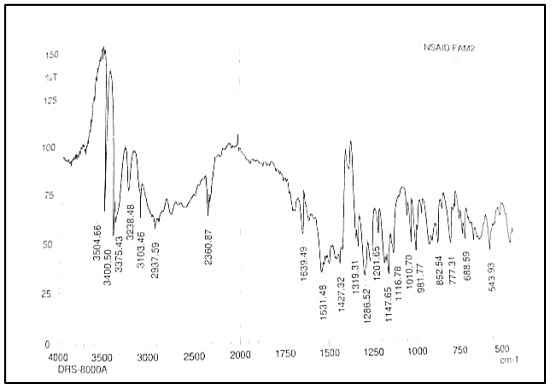

Figure 4 FTIR Spectra of Famotidine

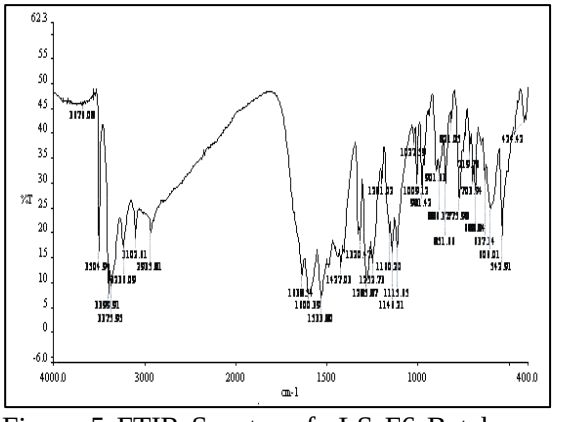

Figure 5 FTIR Spectra of LS F6 Batch:

DIFFERENTIAL SCANNINGCALORIMETRY (DSC):

The thermal behaviours of the pure components, as well as the thermal behaviour of the final liquisolid system created, are depicted in Fig.6 & fig 7 Famotidine peaks with a sharp typical endothermic peak at 163.8 °C, which corresponds to its melting temperature (Tm); such a sharp endothermic peak indicates that the Famotidine used was pure crystalline. The liquisolid system thermogram in Fig.7, on the other hand, the melting peak of optimised formulation LS F6 was shifted to 164.1 °C with 16.49 mJ /mg enthalpy value. The change in melting endotherm of drug and breakdown of the entire liquisolid system. The total suppression of all drug thermal characteristics indicates the creation of an amorphous solid solution.[30]

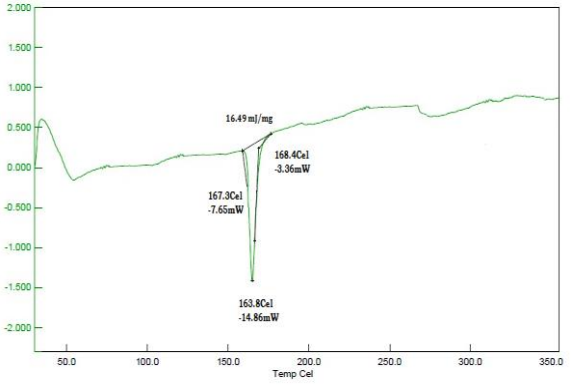

Figure 6 DSC Of Pure Drug (Famotidine)

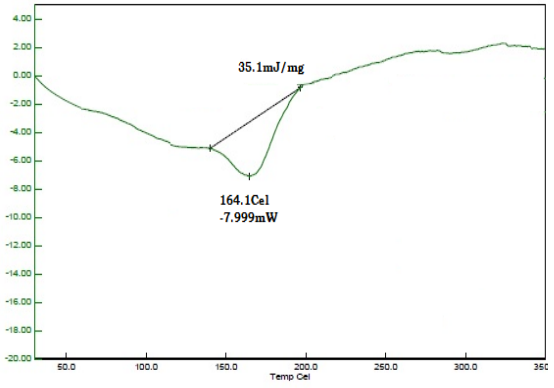

Figure 7 DSC of LS F6 batch.

DRUG CONTENT The percentage drug content for all formulations was found to be in the range of 92.00% to 98.00%, ensured the uniformity of the drug content. The results indicated all the formulations were within the limits as per USP (Limit: not less than 90.0% and not more than 110.0%).LS F1 on the other hand had a Famotidine concentration of 92.70% w/w on average. The more uniform Famotidine content in formulae LS F6 that is 97.70 % may be attributed to their high R-values of 50, respectively; such high R-values reflect greater Avicel PH 101 (carrier) concentrations, which may lead to a more consistent Famotidine content uniform distribution of the drug by either adsorption onto or absorption into the carrier, therefore having more homogeneous distribution throughout the batch.

The more uniform Famotidine content in the formulae LS F6 may be due to the fact that these formulae have high R-values of 50 respectively; such high R-values represent higher AvicelPH 101 (carrier) concentrations that might lead to a more uniform distribution of the drug by either adsorption onto or absorption into the carrier, therefore having more homogeneous distribution throughout the batch

DISSOLUTIONSTUDIES A maximum of 96% drug release was obtained at the end of 30 Minutes from the Liqui-soild Mixtures. Formulation LS6 with Drug Carrier Coat (1:2) and Q/q of 50 was found to release maximum drug with highest solubility. The dissolving profiles of the selected Famotidine Liquisolid , are shown in Fig. 8. Formula LS F6 clearly exhibits the best dissolution pattern in terms of both rate and extent of medication dissolved. The proportion of After only 30 minutes, Famotidine dissolved from LS F6 reached 95.87%. shown in Table9 and thefigure 8 shows the cumulative drug release.

It was apparent that formula LS F6 has the highest dissolution pattern in both the rate and the extent of drug dissolved.

Table 9 Cumulative drug release value of liqui solid mixture.

TIME IN MINUTES	CUMULATIVE PERCENTAGE DRUG RELEASE ± SD, n=3					
	LS F1	LSF2	LS F3	LS F 4	LS F5	LS F6

5	7.38±1.26	7.435±2.05	7.595±1.91	7.59±1.26	7.885±1.48	8.785±1.65
10	17.09±2.0	17.25±1.48	17.57±1.13	17.54±2.51	18.02±1.11	19.08±1.00
15	9.3±2.85	29.59±1.04	30.04±1.88	30.07±1.13	30.99±2.36	33.38±2.05
20	45.13±3.8	46.03±2.14	46.56±0.78	45.97±2.70	47.45±2.13	50.53±1.14
25	64.2±3.12	65.40±1.08	67.01±0.91	66.65±1.00	68.9±3.61	72.07±2.45
30	85.4±1.13	87.22±2.11	89.57±1.10	90.21±2.00	92.56±2.20	95.87±1.02

Table 8 Drug Content of Liqui-solid

Sr. NO	**FORMULATION CODE**	**DRUG CONTENT (%) ± SD***
1	LS F1	92.7± 0.00
2	LS F 2	93.60 ± 0.15
2	LS F 3	94.7 ± 1.04
3	LS F4	95.11 ± 0.98
4	LS F5	96.00 ± 0.58
5	LS F6	97.70 ± 0.98

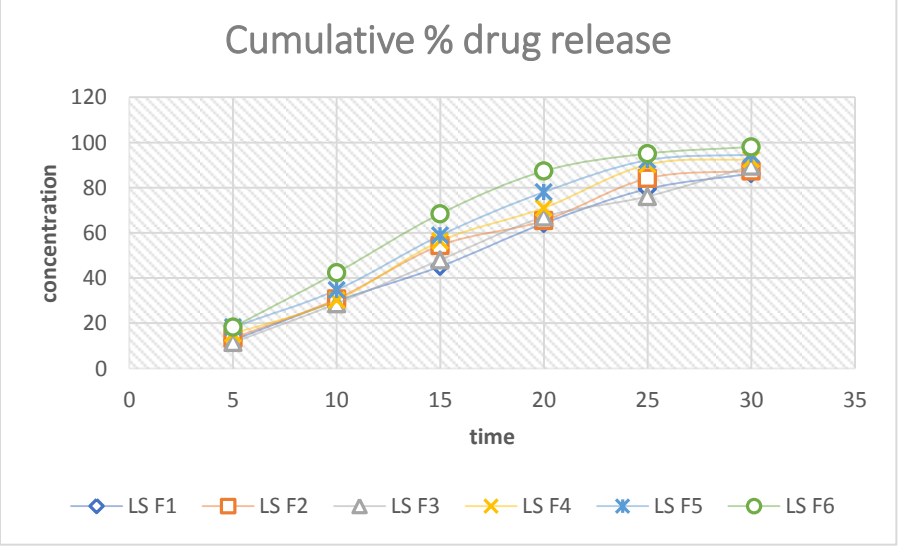

Figure 8 Cumulative drug release curve of liqui solid mixture

Stability study Table 10 shows the stability study of Ls mixture of F6 batch. According to ICH recommendations, a study on the liquid-solid mixture's Accelerated temperature stability was conducted. The liquid solid mixtures prepared are subjected to stability studies at 40℃. After each month, the mixture's physical appearance, dissolution and drug content were checked and was found to be stabilized.

Table 10 Stabilityof Liqui-solid mixture:

Temperature maintained at 40℃±5℃ **Liqui Solid Mixtures (LS F6)**				
Parameter	**Initial**	**1 month**	**2month**	**3month**
Description	Fine yellowish amorphous powder	Fine yellowish amorphous powder	Fine yellowish amorphous powder	Fine yellowish amorphous powder
Drug Content	97.70±0.78	96.400±0.54	96.11±0.78	95.78±1.54
Dissolution study	95.87±1.02	95.54±0.78	94.23±1.32	94.01±1.20

ConclusionThe liquisolid tablet technique can be effective way for dissolution rate improvement of water insoluble drugs such as Famotidine. Tween 80 was used as a liquid vehicle. The liquid vehicle plays a contributing role in improving the dissolution profiles of a water insoluble drug in the liquisolid formulations, besides choosing a suitable liquid vehicle according to its viscosity and HLB value. The results of flow studies which indicates that the prepared powder blend of all the formulations possess good flow properties. Drug content and In vitro dissolution studies of all the formulations showed immediate release of drug.Enhanced dissolution rates obtained in the present study in turn indicates increase in oral bioavailability due to increased wetting and surface area available for dissolution. The dissolution trials conducted to estimate the percentage of drug released at the end of 30 minutes (Q^{30}) clearly reveal that the Liquisolid technology has successfully boosted Famotidine dissolution. The highest drug release of LS F6(1:2) formulation has been demonstrated.Hence we can conclude that liquid-solid mixture was prepared by using Tween 80 (1:1 &1:2 of drug and Tween 80) and 50 ratio of Microcrystalline Cellulose and Aerosil200 provide greater release of drug (95.87 % in 30mins) among all the formulations, and this ratio can be used to enhance the solubility and dissolution rate of poorly water soluble drug Famotidine. This novel approach to

the formulation may be helpful to improve oral bioavailability.

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