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Formulation Development of Oral Liquisolid System of Poorly Water Soluble Drug, Piroxicam, Using Mixed Solvency Concept and their Evaluations

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Abstract: ***The present work are to enhance the drug loading capacity in liquisolid system, increase the flow property due to decrement in required volume of nonvolatile solvent and enhance the solubility of drug in nonvolatile solvent by using mixed solvency concept. Piroxicam was selected as model poorly water soluble drug for exploring the mixed solvency concept to enhance the solubility and hence to enhance the release rate of drug. The proposed formulation is aimed to enhance solubility of piroxicam by employing mixed solvency concept and to develop the fast release capsule of piroxicam by using liquisolid technique.***

Keywords: Solubility, piroxicam, liquisolid system, mixed solvencyconcept, fast dissolution

1. Introduction

Some of the common techniques of solubility enhancement include micellar solubilization, complexation, pH modification, salt formation, hydrotropy and cosolvency. A novel technique of solubility enhancement by use of mixed solvency concept has been proposed by Maheshwari.[1] All the substances (whether liquids, gases or solids) have solubilizing power. Innumerable solvent systems may be developed using mixed solvency concept.[2] By application of mixed solvency concept, the drug loading in various pharmaceutical formulations can be enhanced. The solubility of a large number of poorly solubledrugs have been enhanced by the application of mixed solvency concept.[3]In the present investigation, mixed solvency concept has nicely be used to prepare liquisolid system of a poorly water soluble drug, piroxicam, employing solubilizing power of solidexcipients.

Liquisolid technique is a novel and advanced method for dissolution and solubility enhancement of poorly water soluble drugs. This technique was first introduced by Spireas et al. and applied to incorporate water-insoluble drugs into rapid release solid dosage forms.[4-6]

This method involves the conversion of liquid form of drug (drug being dissolved in non-volatile solvent) in to looking dry, free flowing, non-adherent, readily compressible powder.[7-14] Here the liquid drug, drug solution, suspension or emulsion is converted into free flowing powder by simply adsorbing it on an inert carrier, with addition of various excipients such as binder, diluent and others required to prepare tablet or can be filled in capsules. The liquisolid systems were evaluated for flow properties, drug content, dissolution studies and chemical stability studies.

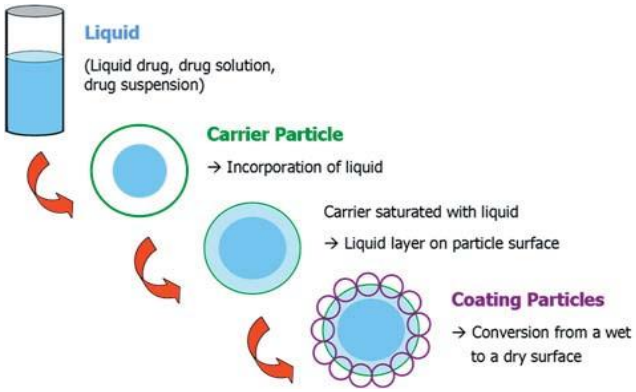

Figure1: Molecular level diagram

Mixed Solvency Concept

As per the mixed solvency concept proposed by Maheshwari R.K., each and every substance present in the universe has got solubilizing property i.e. all the liquids, gases and solids possess solubilizing power. As per his statement, each substance is solubilizer. A concentrated aqueous solution containing various water soluble substances may act as good solvent for poorly water soluble drugs.[15-40] By combining various excipients, additive and synergistic solvent actions are expected which has advantage of reducing the toxicities. For a desired solubility enhancement, a single solubilizer may prove toxic for human being but the combination of different excipients in safe smaller concentrations solves the problem of toxicity for same desired solubility of drug. In present research work mixed solvency concept has been employed to formulate liquisolid system of poorly water soluble drug, piroxicam.

2. Materials and Methods

2.1 Materials: Piroxicam was obtained as a gift sample from Schon Pharmaceutical limited, Indore.

2.2 Methods

2.2.1 Preparation of calibration curve of piroxicam in R.O. water (in presence of sodium caprylate)

The calibration curve was prepared in R.O. water in presence of sodium caprylate. The sodium caprylate solution (20%w/v) was prepared in propylene glycol. For calibration curve, 50 mg drug was taken in 50 ml volumetric flask and dissolved in 10ml of 20% sodium caprylate solution and then the volume was made up to 50 ml with R.O. water. This stock solution of 1000 mcg/ml was appropriately diluted with R.O. water to prepare solutions of different concentrations (5mcg/ml-25mcg/ml).The absorbances of these solutions were noted at 354 nm against respective reagent blanks as shown in Fig 2.

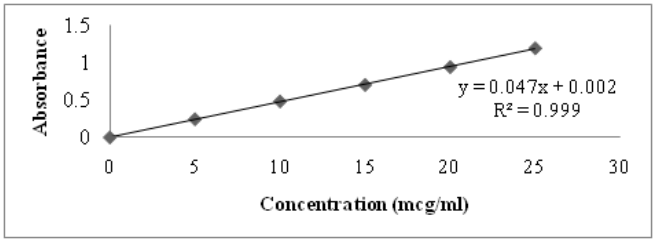

Figure 2: Calibration curve of piroxicam in R.O. water in presence of sodium caprylate at 354 nm

2.2.2Preparation of calibration curve of piroxicam in 0.1 N HCl (in presence of sodium caprylate)

The calibration curve was prepared in 0.1N HCl in presence of sodium caprylate. The sodium caprylate solution (20%w/v) was prepared in propylene glycol. For calibration curve, 50 mg drug was taken in 50 ml volumetric flask and dissolved in 20 ml of 20% sodium caprylate solution and then the volume was made up to 50 ml with 0.1 N HCl. This stock solution of 1000mcg/ml was appropriately diluted with 0.1 N HCl to prepare solutions of different concentrations (5mcg/ml-25mcg/ml). The absorbances of these solutions were noted at 333 nm against respective reagent blanks as shown in Fig. 3

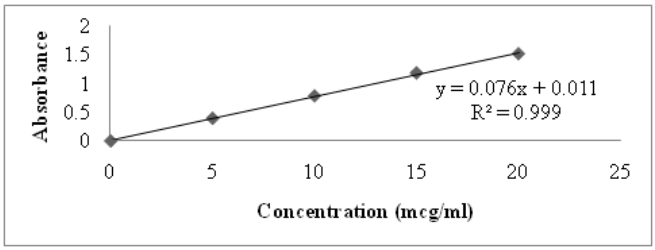

Figure 3: Calibration curve of piroxicam in 0.1 N HCl at 333 nm

2.2.3. DSC analysis of drug sample: The DSC spectrum of piroxicam was same as reported in literature. (Figure 4)

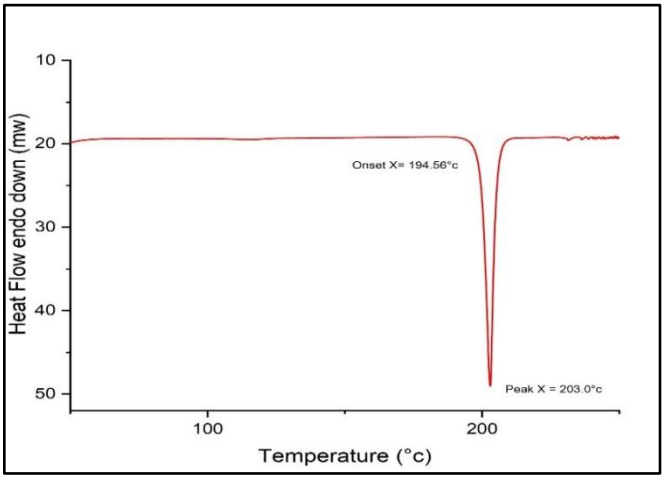

Figure 4: DSC spectrum of piroxicam drug sample

2.2.4. IR analysis of drug sample: The FTIR spectrum of drug sample had shown identical peaks as reported in reference sample of piroxicam. (Figure 5)

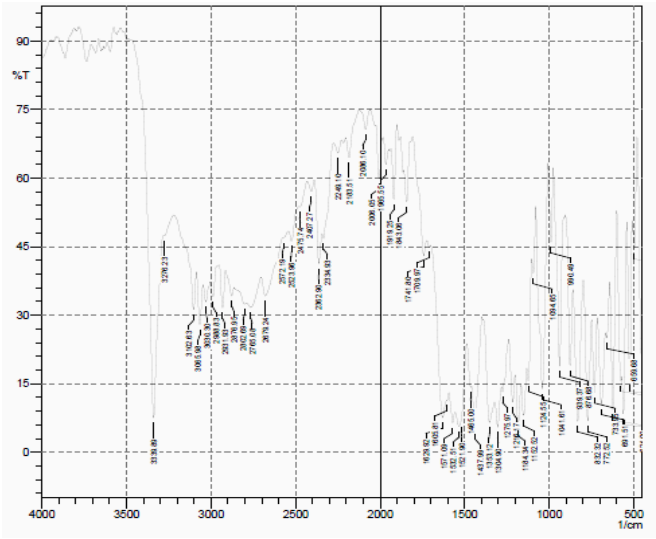

Figure 5: IR spectra of Piroxicam

2.2.5 Development of solvent system

Since the determined solubility of drug in propylene glycol is less than the desired solubility, the mixed solvency approach was used to create a solvent system in which various solid solublizers were dissolved as per their respective safe concentrations in the propylene glycol and PEG400 and making them a strong solvent which can be used for preparation of dosage form. Various solid solublizers were used individually or in combination for the preparation of blends and drug solubility studies were performed.

a) Approximate solubility of various solublizers in propylene glycol

Procedure:

1 ml of propylene glycol was taken in 10 ml volumetric flask, 10 mg sodium caprylate (SC) was added to it and shaken on vortex for about 20 minutes to get it dissolved. As soon as it gets dissolved, 10 mg more SC was added to

it and again shaken on vortex for about 20 minutes. Same procedure was repeated till a suspension was obtained. It was found that250 mg sodium caprylate was dissolved in 1 ml of propylene glycol to get clear solution. After addition of 10 mg more of SC, a suspension was obtained. Similarly, solubility of sodium acetate, niacinamide and sodium benzoate were determined in propylene glycol (Table 1).

Table 1: Approximate solubility of various solublizers in propylene glycol

Solublizers (abbreviation)	%w/v Solubility in propylene glycol
Sodium caprylate (SC)	25
Sodium acetate (SA)	25
Niacinamide (NM)	20
Sodium benzoate (SB)	5

b) Approximate solubility of various solublizers in PEG400

Procedure

1 ml of PEG 400 was taken in 10 ml volumetric flask, 10 mg sodium caprylate (SC) was added to it and shaken on vortex for about 20 minutes to get it dissolved. As soon as it gets dissolved, 10 mg more SC was added to it and again shaken on vortex for about 20 minutes. Same procedure was repeated till a suspension was obtained. It was found that 30 mg sodium caprylate was dissolved in 1 ml of PEG 400 to get clear solution. After addition of 10 mg more of SC (total 40 mg), a suspension was obtained. Similarly, solubility of niacinamide and sodium benzoate were determined in PEG 400 (Table 2).

Table 2: Approximate solubility of various solublizers in PEG400

Solublizers (abbreviation)	% w/v Solubility in PEG 400
Sodium caprylate (SC)	3
Sodium benzoate (SB)	5
Niacinamide (NM)	15

2.2.6 Determination of approximate solubility of piroxicam in propylene glycol and PEG400

Procedure

1 ml of propylene glycol was taken in 10 ml volumetric flask and 5 mg drug was added to it, with vigorous shaking on vortex for about 20minutes, since the drug remained undissolved, 0.5ml more propylene glycol was added to it, and again shaken on vortex for 20 minutes, amount of propylene glycol was slowly increased up to 3.5 ml to get 5 mg drug dissolved. Approximate solubility of drug in propylene glycol was found out to be 1.42 mg/ml.

1 ml of PEG400 was taken in 10 ml volumetric flask, and 10 mg drug was added to it, with vigorous shaking on vortex for 20 minutes, as soon as the drug gets dissolved, 10 mg more drug was added to it. This procedure was repeated till a suspension was obtained. Approximate solubility of drug in PEG400 was found out to be 70 mg/ml.

In above study, it was found that propylene glycol is weaker solvent for piroxicam. To emphasize on mixed solvency concept the use of solid solubilizer was made to enhance the drug loading in propylene glycol.

2.2.7 Results of equilibrium solubility studies in various blends of solublizers in propylene glycol

Table 3: Results of equilibrium solubility studies

Blend	Solublizers	Equilibrium solubility of drug (mg/ml)	Solubility enhancement ratio as compared to propylene glycol	Solubility enhancement ratio as compared to DM water
A	20% SA	123.29	86.82	2408.00
B	20%SC	118.680	83.57	2317.96
C	10%SA+10%SC	122.55	86.30	2393.55
D	10%SA	64.361	45.32	1235.33
E	10%SC	60.638	42.70	1184.33
F	5%SC+5%SA+2.5%NM+2.5%SB	76.914	54.16	1502.22
G	10%SA+2%SC+1.5% NM	73.085	51.46	1427.44
H	3%+SA+5%SC+1.5% SB+2%NM	61.805	43.52	1207.12
I	7.5%SC+5%SA+2%SB+1%NM	79.04	55.66	1543.75
J	8%SA+8%SC+1%SB +1%NM	95.957	67.57	1874.16
K	10%SC+5%SA+1%NM	92.446	65.1	1805.58

SA - Sodium acetate**, SB** - Sodium benzoate, **SC** - Sodium caprylate, **NM** – Niacinamide

2.2.8 Solubility of piroxicam in different medium

Solubility studies in different aqueous mediums were carried out by adding an excess amount of drug (piroxicam) in the 5 ml of respective medium and keeping the screw capped tubes containing these solutions, on a mechanical shaker at room temperature for 12 hrs, so that equilibrium solubility can be achieved and solutions were allowed to equilibrate undisturbed for 24 hrs. Then, the solutions were filtered through Whatman grade 41 filter. One ml of the filtrate was suitably diluted with the R.O. water or 0.1 M HCl. The absorbances of the solutions were measured at 354 nm (333 nm in case of 0.1 N HCl) on a double beam UV/Visible spectrophotometer .The results are reported in Table 3 & Table 4.

Table 4: Solubility of piroxicam in different medium

S. No.	Solvent	Solubility (mg/ml)	Description
1	Demineralized water	0.0512	Practically insoluble
2	0.1 N HCl	0.112	Practically insoluble

2.2.9 Drug–solublizers interference studies in uv spectrophotometric analysis

It was important to study that the solublizers to be used should not interfere with absorbance of drug to make accurate estimation. For this, 50 mg of drug was taken in 50 ml volumetric flask and dissolved in 40ml ethanol by shaking on vortex for about 30 min. to get drug dissolved, then the volume was made up to 50 ml with ethanol. So, 1000mcg/ml stock solution was prepared.

100 mg sodium caprylate was taken in another 100 ml volumetric flask, and dissolved using 50 ml of R.O. water and then the volume was made up to 100 ml with R.O. water to get 1000mcg/ml stock solution.

1ml of drug solution and 10 ml of sodium caprylate solution was then taken in another 50 ml volumetric flask and volume was made up to 50 ml using R.O. water. So here, 20mcg/ml drug solution was prepared and the solution of sodium caprylate was of 200mcg/ml and absorbance of drug was noted against reagent blank at 354nm.

Similar experiment was performed for all the other excipients such as niacinamide, sodium acetate, sodium benzoate, propylene glycol and lactose. Here it is important to know that the absorbance of drug solution of concentration 20mcg/ml which was reported to be 0.949 against de-mineralized water.

The values of absorbances in presence of solubilizers and the absorbance of drug solution were nearly same. Hence it was evident that the solublizers were not interfering in the UV analysis of drug at 354 nm.

2.2.10Drug excipient interaction studies

The compatibility of the drug with the excipient was assessed by drug-excipient interaction studies. The drug was mixed with excipient in 1:1 ratio in separate clear glass vials which were then properly sealed and kept undisturbed at different temperature conditions; at room temperature, and in refrigerator for a period of one month. After every week, vials were withdrawn and contents were observed for any change in their physical appearance. The results so observed indicated that no changes were found in the appearance.

2.2.11 Selection of carriers

Carrier serves the dual purpose as adsorbent and diluents so it is very important to choose carrier, so that the liquisolid system retains its flow properties as a powder and should not leak out the drug during compression. For good flow and compressible properties, large amounts of carrier and coating materials are required. Microcrystalline cellulose (MCC) is a suitable carrier to prepare liquisolid system in terms of flow ability, compressibility, and dissolution profile. Various grades of cellulose, starch and lactose can also be used to prepare liquisolid system. Also it is important that it should release the drug and should not re-adsorb the drug when present in media. Various carriers were chosen from the available literature and different trial batches were made.

Procedure

For the selection of carriers, 1ml of "blend C" was taken in mortar and sufficient amount of carriers were added (little at a time) till free flowing powder was obtained using trituration with pestle. For this, excess amount of carrier was weighed and kept on tared butter paper and then carrier was added little at a time in mortar. After getting free flow properties, remaining carrier was reweighed and the amount needed for free flow is obtained by substraction. Selection of carrier was done on the basis of release of drug from liquisolid system when that carrier material was used, and flow characteristics.

2.2.12 Preparation of liquisolid mass

The blend C was taken (1 ml) in the cleaned and dried pestle mortar and accurately weighed 100 mg drug was dissolved in it by mixing it by trituration, yielding a yellow coloured clear solution. Into the solution, gross amount of carrier was added and allowed to adsorb the drug. The mixture was then triturated to allow and check the uniform mixing and adhesiveness of the powder and the remaining amount of carrier was again added to reduce the adhesiveness. Further, coating material was added to it by continous mixing it by trituration. Different carriers and combination in various proportions of the same were used to adsorb the drug solutions and batches were developed (Table 5). Considering 10 mg as the dose of drug piroxicam, 10 doses of liquisolid system were prepared using 1 ml of blend C and 100 mg of drug.

Table 5: Quantity of carrier and coating material used for dosage form designing

Batch no.	Carrier material	Amount of carrier used (mg)	Coating material	Amount of coating material used (mg)	Blend	Volume of blend used (ml)	Net wt. (gm)
LSC-01	AvicelPH200 + Lactose	3125+650	Aerosil	25	C	1	4.800
LSC-02	AvicelPH200 +Lactose	3125+575	Aerosil	5	C	1	4.705
LSC-03	AvicelPH200 +Lactose	3125+500	Aerosil	5	C	1	4.630
LSC-04	AvicelPH200+Lactose	3000+575	Aerosil	5	C	1	4.580
LSC-05	AvicelPH200 +Lactose	3000+575	Aerosil	25	C	1	4.600
LSC-06	AvicelPH200 + Lactose	3250+575	Aerosil	25	C	1	4.850
LSC-07	AvicelPH200 +Lactose	3000+650	Aerosil	15	C	1	4.665
LSC-08	AvicelPH200	8090	Aerosil	30	K	2.2	10.516

NOTE- 1ml volume of blend gives weight equal to approximately 1000 mg.

3. Evaluations of Prepared Liquisoid System

a) Drug content

To determine the drug content, liquisolid formulation equal to 10mg drug was taken in 1000 ml volumetric flask. About 500 ml of 0.1NHCl was added to the volumetric flask and the flask was briskly shaken for 15 minutes and the volume was made up to 1000 ml with 0.1 N HCl. After filtration, the absorbance was then taken at 333 nm. Results of drug contents are recorded in Table 6.

Table 6: Drug content in various batches

Batch No.	Drug present (%)
LSC-01	92.14
LSC-02	101.46
LSC-03	94.175
LSC-04	97.89
LSC-05	95.02
LSC-06	101.66
LSC-07	100.36
LSC-08	97.30

b) Dissolution profile

Dissolution profile of each batch was studied to select the most suitable batch for scale up. For dissolution studies, 0.1NHCl was taken as dissolution media and the paddle rotation speed was kept at 50 rpm at 37±0.5˚C in 900ml of media. After 2 minutes, 20 ml sample was withdrawn from dissolution media for analysis, so 20 ml of 0.1N HCl was replaced in dissolution media. After 4 minutes, again 20 ml sample was withdrawn, and again dissolution media was replaced by 0.1N HCl. Similar procedure was repeated after different time intervals. Data for dissolution studies of different batches were recorded in Table 7.

Table 7: Data for dissolution study of liquisolid batches

Time (min)	(%) Cumulative drug release							
	Batch 1	Batch 2	Batch 3	Batch 4	Batch 5	Batch 6	Batch 7	Batch 8
02	57.16	58.68	56.81	65.36	55.52	53.29	57.28	56.69
04	72.73	77.21	71.90	80.17	73.74	63.50	71.67	72.71
06	80.40	86.51	81.78	91.4	82.97	73.92	82.02	82.25
08	85.52	91.87	90.11	95.94	86.74	80.75	89.04	86.48
10	91.67	98.26	94.92	99.84	93.51	86.49	97.24	92.39
12	96.70	98.18	97.58	99.89	96.88	94.46	97.49	97.58
15	96.20	97.73	97.45	98.98	96.59	94.03	97.35	97.68
30	96.12	97.27	97.16	97.88	96.98	93.33	97.18	96.45

- **Dissolution profile of pure drug (piroxicam) in 0.1 N HCl**

Same dissolution study was performed for pure drug in 0.1 N HCl. Results are presented in Table 8.

Table 8: Data for dissolution study of pure drug

Time (min)	(%) Cumulative drug release
02	4.50
04	9.29
06	14.8
08	22.74
10	22.98
12	27.14
15	29.01
30	36.90

From the various dissolution profiles of the different batches, it was shown that almost all the batches released 75 % of drug within 6 minutes, as compared to pure drug where 14.8% drug was released within 6 minutes. Further, flow properties of these batches were performed to decide the suitable optimized final batch for further studies.

c) Flow property

Tapped density is considered as a basic parameter to judge the flow behavior and a tool to judge the compressibility of the powders. It determines the efficiency of compression and is responsible for affecting various parameters of an ideal tablet. The tapped density of the liquisolid system thus developed was calculated by Electrolab Tap density Tester by USP II method, having 250 taps per minutes. Data for flow properties of different batches were given in Table 9.

Table 9: Data for flow properties of liquisolid batches

Flow properties	Data for flow properties							
	Batch 1	**Batch 2**	**Batch 3**	**Batch 4**	**Batch 5**	**Batch 6**	**Batch 7**	**Batch 8**
Bulk density	0.332 gm/ml	0.430 gm/ml	0.367gm/ml	0.373 gm/ml	0.422 gm/ml	0.383 gm/ml	0.362 gm/ml	0.338 gm/ml
Tapped density	0.396 gm/ml	0.467 gm/ml	0.449 gm/ml	0.423 gm/ml	0.500 gm/ml	0.478 gm/ml	0.453 gm/ml	0.412 gm/ml
Compressibility Index	16.327%	7.843 %	18.33%	11.818%	15.53 %	20 %	20 %	17.931 %
Hausner ratio	1.195	1.085	1.224	1.13	1.184	1.250	1.250	1.218

d) Thin layer chromatographic studies

In order to examine the possibility of interaction between drug and solubilizers, thin layer chromatographic studies were performed. Plates of silica gel GF 254 were activated at 110°C for 1 hour and then used. A vial was taken, in that solution of piroxicam in blend C was prepared for spotting of drug sample. Similarly another vial was taken, in that solution of drug was prepared in organic solvent. Two activated TLC plates were taken, in both plates, solution of piroxicam DCM alone and, the drug solution containing piroxicam in blend C were spotted with the aid of microdropper on the base line.

Two solvent jars saturated with different solvent systems were prepared, sodium benzoate 30% solution was prepared as a solvent system to perform TLC. Similarly another solvent jar system saturated with hexane + ethyl acetate (1:1) was used as solvent system to perform TLC. The solvent system was made to run for about 5 cm. Finally, the plates were allowed to air dry for 5 min and were observed for visualization of spots under UV light and iodine chamber. The respective R_f values were determined and recorded in table 10.

Table 10: R_f values of piroxicam

S. No.	Solvent system for TLC plates	Solvent used to dissolve drug	R_f value
1.	30% Sodium benzoate solution	Blend C	0.86
2.	30% Sodium benzoate solution	DCM	0.88
3.	Hexane + Ethyl acetate (1:1)	Blend C	0.86
4.	Hexane + Ethyl acetate (1:1)	DCM	0.88

Result and Discussion

The results of TLC study revealed that there was no significant change in R_f values of piroxicam solubilized in hexane + ethyl acetate and piroxicam solubilized in solublizers blend solutions. From the results of TLC study, it can be concluded that there was no chemical reaction between drug and solubilizers. Sodium benzoate 30% gave the exactly same results as given by organic solvent (hexane + ethyl acetate). It can be concluded that toxic organic solvents can be safely replaced by safe hydrotropic agents. TLC done by 30 % sodium benzoate solution also proved that, the solids possess the solubilizing power.

4. Final Batch Preparation

From the trial batches, LSC-04 was selected as the final batch on the basis of dissolution profile and flow properties. Same procedure was repeated as with liquisolid preparation in the trial batches. Considering 10 mg as the dose of drug piroxicam, 50 doses of liquisolid system were prepared using 5 ml of blend C and 500 mg of drug.

4.1 Evaluations

The LSC-04 was chosen as the final batch and after preparation of this batch, the formulation was subjected to evaluation for various parameters.

For the evaluation of the formulation, the tests performed were;

- Determination of drug content of liquisolid formulation
- Disintegration time of capsules filled with liquisolid formulation
- Comparative dissolution profile
- Flow properties of liquisolid formulation
- Stability studies of liquisolid formulation

a) Drug content

To determine the drug content, liquisolid formulation equal to 10 mg drug was taken in 1000 ml volumetric flask. About 500 ml of 0.1 N HCl was added to the volumetric flask and the flask was briskly shaken for 15 minutes and the volume was made up to 1000 ml with 0.1 N HCl. After filteration the absorbance was then taken at 333 nm in UV spectra. Drug content in scale-up batch was found out to be 98.93%.

b) Disintegration

Six capsules were placed in disintegration tubes individually. Nine hundred ml 0.1 N HCl was filled in the disintegration beaker and disintegration was performed at 37°C ± 2°C, at a frequency of 28-32 cycles per minutes. Disintergration time of capsules filled with liquisolid was found out to be within 4 min 30 sec to 5 min 30 sec.

c) Comparative dissolution profile

The dissolution of the prepared batch was conducted against the same for pure drug (PD) and tablet of marketed formulation (MF). Liquisolid formulation equal to 10 mg drug was filled in "0" size capsule. Dissolution studies of capsule were performed using 0.1 N HCl as dissolution

media and the basket rotation speed was kept at 50 rpm at 37±0.5˚C in 900 ml of media. After 2 minutes, 20 ml sample was withdrawn from dissolution media for analysis, so 20 ml of 0.1 N HCl was replaced in dissolution media. After 4 minutes, again 20 ml sample was withdrawn, and again dissolution media was replaced by 0.1 N HCl. Similar procedure was repeated after different time intervals. After UV analysis, results are presented in Table 11.

Table 11: Comparative dissolution profiles of final batch preparation, pure drug and marketed formulation

Time (min)	(%) Cumulative drug release			
	Pure Drug	Marketed 20 mg tablet"Dolonex" (MF)	Liquisolid powder (final batch)	Capsule containing liquisolid (final batch)
02	4.50	10.30	58.68	12.51
04	9.29	22.625	77.21	29.90
06	14.8	35.68	86.51	57.86
08	22.74	46.70	91.87	73.77
10	22.98	55.40	98.26	82.39
12	27.14	63.91	98.18	87.30
15	29.01	69.30	97.73	93.32
30	36.90	81.37	97.27	97.88

From the dissolution profile of the final batch, it was shown that the capsule containing liquisolid formulation released 82.39% of drug within 10 minutes, as compared to marketed formulation only 55.40% drug was released from the tablet within 10 minutes.

d) Flow property

Tapped density is considered as a basic parameter to judge the flow behavior and a tool to judge the compressibility of the powders. It determines the efficiency of compression and is responsible for affecting various parameters of an ideal tablet. The tapped density of the liquisolid system thus developed was calculated by Electrolab Tap Density Tester by USP II method, having 250 taps per minutes. The parameters are presented in Table 12.

Table 12: Data for flow properties

Flow properties	Results
Bulk density	0.395 gm/ml
Tapped density	0.448 gm/ml
Compressibility Index	11.830 %
Hausner ratio	1.134

e) Stability studies

Stability studies of Liquisolid system of piroxicam were performed for three months at room temperature and at refrigerator temperature (2-8ºC)and percent drug remaining for first formulation (LSC- 04 batch) at room temperature was found out to be 99.21% and at refrigerator temperature (2-8ºC)was found out to be 99.60% . Percent drug remaining for second formulation (LSC- 02 batch) at room temperature was found out be 99.07% and refrigerator temperature (2-8ºC) was found out to be 99.02%. The results of stability studies of piroxicam liquisolid system (powder) were reasonably good.

5. Conclusion

Present research work nicely explains that the solubilizing properties of solids can be employed for the formulation development using mixed solvency concept. The research findings showed that, a stable liquisolid system containing piroxicam was successfully developed using mixed solvency concept showing dissolution rate enhancement which may further enhance the bioavailability of piroxicam. The proposed techniques would be economical, convenient and safe. This study opens the chances of preparing such other formulations of poorly water soluble drugs. If chemical stability of the drug remains unaffected, to open a new era of more stable economic and safe products in the market.

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