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RESEARCH ARTICLE

Formulation and Evaluation of Aceclofenac Liquisolid Tablets

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ABSTRACT

In the present study, the potential of liquisolid systems to improve the dissolution properties of poorly water soluble agents was investigated using Aceclofenac. Aceclofenac is a Non steroidal anti-inflammatory drug used orally for treatment. According to BCS, Aceclofenac is class II compound i.e. poorly water soluble. The *in vitro* release pattern of LS compacts and directly compressed tablets were studied using USP-II apparatus. Different LS compacts were prepared using a mathematical model to calculate the required quantities of powder and liquid ingredients to produce acceptably flowable and compressible admixture. Avicel PH 102, Aerosil 200 and Sodium starch Glycolate were employed as carrier, coating material and disintegrant respectively for preparing LS comp. The prepared LS compacts were evaluated for their flow properties such as bulk density, tapped density, angle of repose, Carr's compressibility index and Hausner's ratio. Liquisolid compacts demonstrated significantly higher drug release rates in dissolution media compared to tablets prepared by the direct compression method. This was due to an increase in wetting properties and surface of drug available for dissolution.

KEYWORDS

Liquisolid compacts, Aceclofenac, Dissolution rate, PEG-400, Liquid medication

INTRODUCTION

Oral route is most desirable and preferred method of administering therapeutic agents for their systemic effects. In addition the oral route medication is generally considered as the first avenue investigated in the discovery and development of new chemical entities and pharmaceutical formulations mainly because of patient acceptance, convenience in administration and cost effective manufacturing process. For many drug substances, conventional immediate release formulation provide clinically effective therapy while maintaining the required balance of pharmacokinetic and Pharmacodynamic profile with an acceptable level of safety to the patient.

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Oral drug delivery system can be classified into three categories: immediate release (IR) preparations, controlled release (CR) preparations and targeted release preparations.[1]

Increased coming out of poorly water soluble active compounds presents specific obstacles for the development of both immediate release and modified release dosage forms. Poorly water soluble drugs inherently releases at a slow rate owing to their limited solubility within the GI contents. The challenge for poorly water soluble drugs is to enhance the rate of dissolution. This in turn subsequently improves absorption and bioavailability. Formulation methods targeted at dissolution enhancement of poorly soluble substances are continuously introduced.[2, 3]

Various techniques have been employed to formulate oral drug delivery system that would enhance the dissolution profile and in turn, the

absorption efficiency of water insoluble drug. Solid dispersion, drug micronisation, supercritical fluid technology, self emulsifying drug delivery system, inclusion of the drug solution or liquid drug into soft gelatin capsules are some of the methods which have been used to enhance dissolution characteristics of water insoluble drug.[4]

Liquisolid technique is a new and promising method that can change the dissolution rate of drugs. It has been used to enhance dissolution rate of poorly water-soluble drugs. For poorly soluble (BCS Class II) drugs. The novel 'liquisolid' technique may be applied to formulate liquid medications (i.e., oily liquid drugs and solutions, suspensions or emulsions of water-insoluble solid drugs carried in nonvolatile liquid vehicles) into powders suitable for tableting or encapsulation.[5]

MATERIALS AND METHODS

Material

Aceclofenac drug was kind gift from Concept Pharma. Ltd. Aurangabad. Microcrystalline cellulose (Avicel 102), Sodium starch Glycolate and Aerosil 200 provide as gift sample from Maple biotech pvt, ltd. Pune and Polyethylene Glycol-400 was procured from Unitech Laboratories, Mumbai.

Methods

Scanning of Aceclofenac in Buffer pH-7.5

The solution containing 10 µg/ml of Aceclofenac was prepared and scanned over range of 200 to 400 nm against Buffer pH 7.5 as a blank using UV spectrophotometer.

Standard Calibration Curve of Aceclofenac in Buffer pH 7.5

Stock solution of Aceclofenac was prepared by dissolving 10 mg of drug in 10 ml of Methanol and transfer in 100 ml volumetric flasks. The volume was made up to marked 100 ml with Buffer pH 7.5. Aliquots of 0.2, 0.4, 0.6, 0.8,1, 1.2, 1.4, 1.6, 1.8 ml (2-18 µg/ml) were transferred separately into 10 ml volumetric flasks from the stock solution. Volume was adjusted up to 10 ml the mark with the Phosphate Buffer pH 7.5 Absorbance's of the above solutions were taken at 273 nm against the blank.

Solubility Studies

Solubility studies of Aceclofenac were carried out in different nonvolatile solvents PG, polyethylene glycol 400, Tween 80, and Water. Saturated solutions were prepared by adding excess quantities of drug to the vehicles. The mixtures were Stirred on Magnetic stirrer for 24 hrs on moderate speed. Then above mixture were filtered with the help of whatman filter paper and solutions were further diluted with Phosphate Buffer pH 7.5 and analyzed spectrophotometrically at 273 nm for their drug content.[6]

Infrared Spectroscopy (FTIR)

Pure Drug, Aerosil 200, Avicel 102 and liquisolid granules were mixed separately with IR grade KBr in the ratio of 1:1 and corresponding pellets were prepared by applying 10 metric ton of pressure in hydraulic press. The pellets were then scanned over a wave range of 4000-400cm^{-1}in FTIR instrument (1800 Shimadzu).

Application of Mathematical Model for Designing the Liquisolid Systems

To calculate the required amount of powder excipients (carrier and coating material) a mathematical approach for the formulation of liquisolid systems has been developed. Depending on the excipient ratio R of the powder substrate an acceptably flowing and compressible liquisolid system can be obtained only if a maximum liquid load, named "liquid load factor" (Lf), is not exceeded. The terms "acceptable flow" and "acceptable compressibility" imply the desired and thus preselected flow and compaction properties, which must be met by the final liquisolid formulation. R represents the ratio between the mass of the carrier (Q) and the coating (q) materials present in the formulation:

$$R = Q/q \quad \text{----------(1)}$$

$$Lf = W/Q \quad \text{----------(2)}$$

Where,

Lf = represents the ratio between; W = carrier materials Q = the mass of the liquid portion

With the desired amount of liquid, the amount of carrier and coating material can be calculated if the liquid load factor Lf is known.[3]The maximum amount of liquid loads on the carrier material, termed ‘‘load factor” (Lf). The coating/carrier ratio (R) is important for determining the ‘‘optimum flowable load factor” (Lf) which gives acceptable flowing powders and is characterized by the ratio between (W) and (Q), as shown in Eqs. 1 and 2.

$$Lf = \Phi CA + \Phi CO (1/R) \ldots\ldots\ldots\ldots \quad (3)$$

Where, Φ CA is the flowable liquid-retention potential of the carrier and Φ CO is the flowable liquid-retention potential of the coating material. The appropriate amounts of carrier and coating materials to produce acceptable flowing and compactible powders are calculated using Eqs. (1) And (3), based on the physical properties of powders termed ‘‘flowable liquid-retention potential” (Φ – value). The ratio (R) of the amount of carrier (Q) and coating (q) materials is closely related to the amount of liquid medication (W).[7]

The flowable liquid-retention potential (Φ - value) of each liquid/powder admixture was calculated using the following equation.[8]

Φ-value = weight of liquid/weight of solid. **(4)**

The Φ -value were plotted against the corresponding h. An angle of slide (for optimal flow properties) corresponding to 33^{o}_{C} of a liquid/powder admixture represented the flowable liquid-retention potential, Φ -value of its powder.

Angle of Slide

‘‘Angle of slide” measurement was used to evaluate the flow property of powder excipients (Avicel PH102 and Cab-o-sil M-5) with liquid vehicles. Several uniform liquid vehicle/powder admixtures which contain 10 g of the carrier or coating materials with increasing amounts of liquid polyethylene glycol were prepared. To measure the angle of slide, the prepared liquid/powder admixtures were placed on polished metal plates, the plate was then tilted gradually until the liquid/powder admixture was about to slide. The angle formed between the plate and the horizontal surface was defined as the angle of slide (h). The flow properties of excipients will be changed due to adsorption of the liquid vehicle.[9]

Preparation of Liquisolid Powders and Compaction into Conventional and Liquisolid Tablet

Aceclofenac conventional tablets were prepared by mixing the drug with microcrystalline Cellulose–silica and the additives for a period of 10 min mixing in a mortar and pestle .The mixture were mixed with sodium starch glycolate (5%, w/w, of the formulation) and magnesium stearate (1% w/w of the formulation) for 10 min. The mixture was compressed on a 12-mm punch and die using a tablet punching machine (karnavati Mini press II DL). Sufficient compression load was applied in order to produce tablets with the desired hardness.[10] Several liquisolid tablets were prepared as follows. The Aceclofenac was dissolved in PEG-400. Then solution was heated for 15 min, until a homogenous drug solution was obtained. The calculated weights (W) of the resulting liquid medications were incorporated into the calculated quantities of the carrier (Avicel PH 102) (Q) materials were mixed thoroughly. The resulting wet mixture was then blended with the calculated amount of the coating material (Aerosil 200) (q) using a standard mixing process to form simple admixture. Several factors were varied like concentration of the drug in liquid vehicle PEG-400 i.e.1:0.5, 1:1, 1:1.5 ratio w/w and carrier: coat ratios (different R values) ranging from 5 to 40 was employed. Different liquid load factors (L_f) ranging from 0.50 to 0.22 were employed. Finally 5 % w/w of sodium starch glycolate as the disintegrant was mixed with the above mixture for 10 min. The prepared liquisolid powder systems were compressed into tablets by tablet punching machine (Karnavati, Mini press II DL, India).

Evaluation of Liquisolid Granules

Determination of angle of repose, Carr's index and Hausener's ratio were used to characterize flow properties of the liquisolid powder systems. The flowability of a powder is of critical importance in the production of pharmaceutical dosage forms in order to get a uniform feed as well as reproducible filling of tablet dies.

Angle of Repose

Angle of repose was determined by using fixed funnel method. 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. A free-flowing powder will form a cone with shallow sides, and hence a low angle of repose, while a cohesive powder will form a cone with steeper sides. Angle of repose was determined by substituting the values of the base radius 'r' and height of the pile 'h' in the given eq given below.[13]

$$\tan \theta = h/r \quad \ldots\ldots\ldots(7)$$

Where,

h= height of the pile

r= radius of the pile

Bulk Density

An accurately weighed quantity of powder, which was previously passed through sieve # 22 and carefully poured into measuring cylinder. Then after pouring the powder into the measuring cylinder the powder bed was made uniform without disturbing. Then the volume was measured directly from the graduation marks on the cylinder as ml. The volume measured was called as the bulk volume and the bulk density is calculated by following formula.[14]

Bulk density = Weight of powder / Bulk volume

Tapped Density

A given quantity of powder (2gm) is transferred to a measuring cylinder (10ml) and is tapped mechanically till a constant volume is obtained. This volume is the bulk volume and it includes true volume of powder and void space among the powder particles.

The tapped density is calculated by the following formula.[14]

Tapped density = Weight of powder / Tapped volume

Carr's Index

It is used to evaluate flowability of powder by comparing the bulk density and tapped density of a powder. The percentage compressibility of a powder is direct measure of the potential of powder arch or bridge strength is calculated according to the equation given below.[15]

$$\% \text{ Compressibility} = \frac{\text{Tapped density} - \text{Bulk density}}{\text{Bulk dens}} \times 100$$

Hausner's Ratio

Hauser's ratio is an important character to determine the flow property of powder and granules. This can be calculated by the following formula.[16]

$$\text{Hausener's ratio} = \frac{\text{Tapped density}}{\text{Bulk density}}$$

Evaluation of Tablet

Hardness

It is a measure of the mechanical strength of a tablet using hardness tester (Monsanto hardness tester). The mechanical strength of a tablet is associated with the resistance of a tablet to fracture or attrition.[14]

Weight Variation

Weight variation was measured by weighing 20 Tablets and average weight was found and Percentage weight variation of the individual tablet should fall within specified limits in terms of percentage deviation from the mean.

Formulation of Aceclofenac Liquisolid Tablets Prepared Using PEG-400

Table 1: Formulation of Aceclofenac Liquisolid Tablets

FORMULA	DRUG CONC. IN PEG-400	R	Lf	AVICELP^{H}102 (Q=W/ Lf) mg	AEROSIL (q=Q/R) mg	SSG 5%Mg	UNIT DOSE WEIGHT Mg
LS-1	1:0.5	30	0.50	395.0	13.10	25.40	533
LS-2		35	0.48	411.0	11.5	26.15	549
LS-3		40	0.44	438.9	10.9	27.49	577
LS-4	1:1	30	0.32	592.0	19.7	35.58	747
LS-5		35	0.30	640.0	17.9	37.89	795
LS-6		40	0.30	658.5	16.46	38.74	813
LS-7	1:1.5	30	0.28	710.0	7.1	41.66	875
LS-8		35	0.24	820.0	10.20	47.15	990
LS-9		40	0.22	850.0	12.60	48.53	998
DCT		30	-	395.0	13.10	25.40	533

Disintegration Time

The time necessary to disintegrate 6 tablets of each tablet formulation was determined using disintegration tester.

Drug Content

Three tablets from each formulation were powdered. The powder equivalent to 100mg of Aceclofenac was weighed and dissolved in phosphate buffer pH 7.5 in 100ml standard flasks. From this suitable dilution was prepared and the solution was analyzed at 273nm using UV spectrophotometer using pH 7.5 as blank.

Friability Test

Take 10 tablets and weigh accurately, keep the friabilator on and rotate up to 4 minutes at 25rpm. After 4 minutes remove the tablets and weigh the friability from initial weight to final weight.

$$\% \text{ Friability} = \frac{\text{Initial weight of tablets} - \text{Final weight of tablets}}{\text{Initial weight}} \times 100$$

In vitro Dissolution Studies

The USP dissolution apparatus II was used with 900 ml dissolution media as Phosphate buffer pH 7.5 the apparatus was run at 50 rpm on 37± 0.5°C Aliquots were withdrawn at a specified time intervals and compensated by fresh dissolution medium. Aliquots were diluted and concentrations of Aliquots analyzed were spectrophotometrically at 273 nm Using UV Spectrophotometer.

RESULT AND DISCUSSION

Determination of λmax by UV Spectrophotometer

The solution containing 10 µg/ml of Aceclofenac was prepared and scanned over

range of 200 to 400 nm against Buffer pH 7.5 as a blank using UV spectrophotometer. The λmax was obtained at 273 nm. The plot of absorbance against wavelength is shown in Figure No 1.

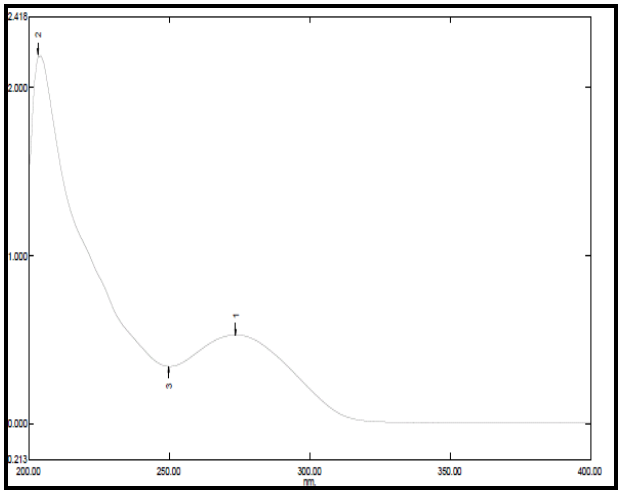

Figure 1: Scanning of Aceclofenac in Buffer pH 7.5

Preparation of Standard Calibration Curves of Aceclofenac

Aceclofenac was analyzed using UV spectrophotometer in Phosphate Buffer pH 7.5 at 273 nm. Aceclofenac was found to obey Beer's Lambert's Law in the concentration range of 2-18µg/ml, at 273 nm against Buffer pH-7.5 as a blank. The values of absorbance are given in Table No.1and the plot of absorbance vs. concentration was plotted and given in Figure 1.

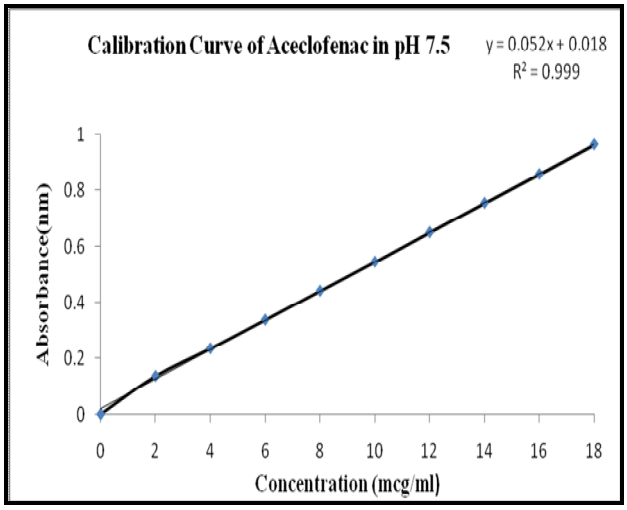

Figure 2: Standard curve of Aceclofenac in Buffer pH 7.5

Correlation coefficient (R^2) = 0.9994

Equation of regressed line →**y = 0.052x + 0.018**

Where,

X = Value for concentration

Y = Regressed value of absorbance

0.052 = Slope of regressed line

0.018= intercept

Solubility Studies

Solubility is a useful parameter mainly for poorly soluble drugs. To select the best nonvolatile solvent for preparation of liquid medication saturated solubility studies were carried out in different non volatile solvents, i.e. PG, PEG-400, Water, Tween 80 and by preparing saturated solutions of the drug in these solvents and analyzing their drug content spectrophotometrically. Maximum solubility of Aceclofenac was found PEG- 400 so it was selected as solvent for further studies. Solubility of aceclofenac in water, Tween 80, PG, PEG-400 were shown in Table 2.

Table 2: Solubility of Aceclofenac in various solvents

Sr. No.	Solvent	Solubility mg/ml
1	Water	0.15
2	Tween-80	3.69
3	PG	8.69
4	PEG-400	13.39

Fourier Transforms Infrared Spectroscopy

The IR spectrum was measured in the solid state as potassium bromide dispersion.

The IR spectrum of Aceclofenac

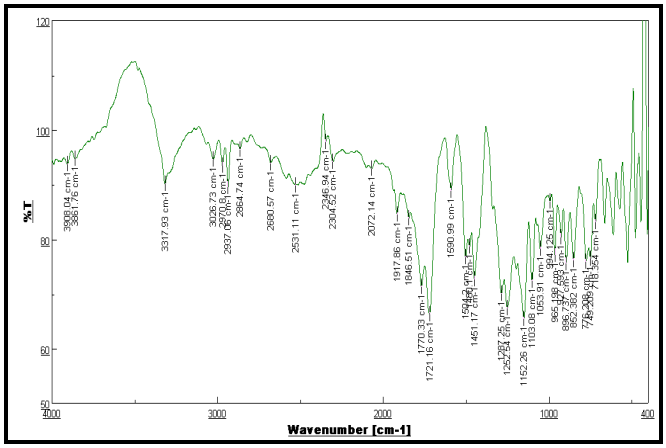

Figure 3: Infrared spectrum of Aceclofenac

Table 3: Peak and chemical group present in IR spectrum of Aceclofenac.

Peak(cm^{-1})	Chemical group
3317.98	NH Stretching vibrations.
2970.80	O-H Stretching.
1721.18	C= O Stretching.
1287.25	CN Aromatic amine.
1451.17	O-H in plane blending.
965.98	O-H out plane blending.
749.20	Out plane blending for N—H

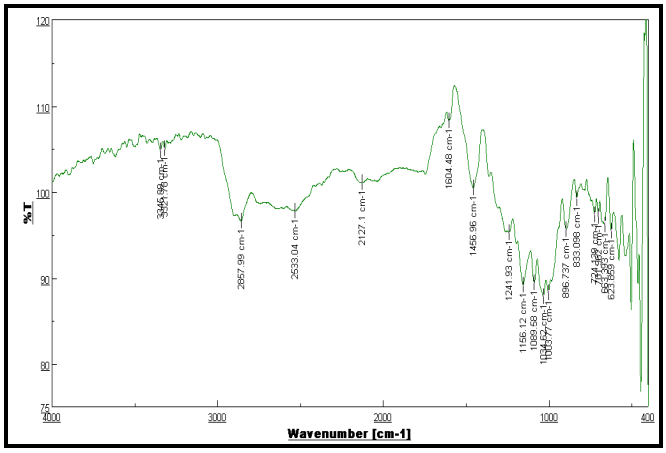

Figure 4: IR spectrum Avicel 102

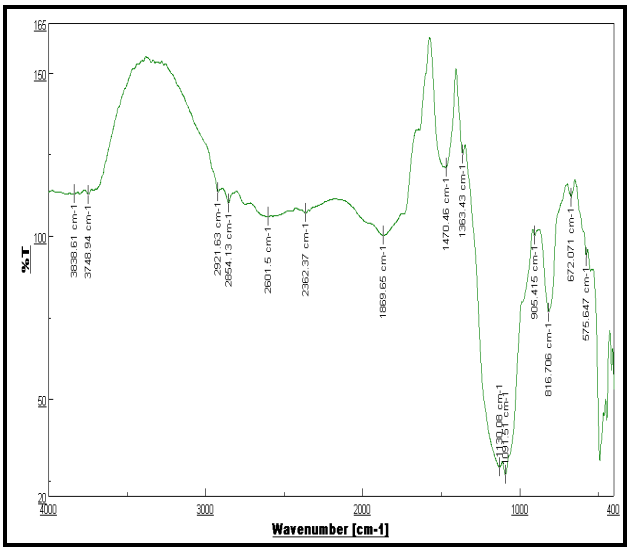

Figure 5: IR spectrum of Aerosil 200

IR spectrum of Liquisolid Granules

It's important to check any kind of compatibility between drug candidate and inactive ingredient in formulation. The inactive ingredient which is to be incorporated into formulation should be compatible with the drug. This compatibility study or interaction study was done using Fourier transformed infrared spectroscopy. IR spectra of pure Aceclofenac and inactive ingredient were taken along with both in the combinations. The FT-IR spectra are shown as follows-

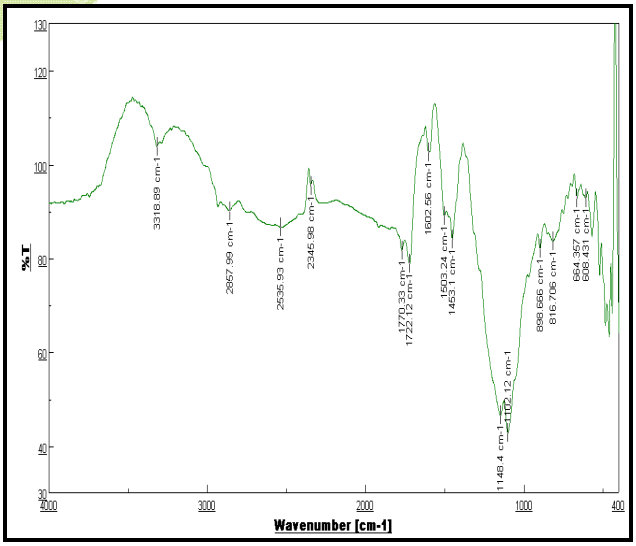

Figure 6: Infrared spectrum of Liquisolid granules

Table 4: Interpretation of Peaks for Liquisolid granules

Peak(cm^{-1})	Chemical group
3318	N-H Stretching.
1722	C = O Stretching.
1451	Aromatic C-C Stretching for NH
1453	O-H in plane bending.

The peaks obtained in the spectra of each formulation correlates with the characteristic peaks (O-H, C=O, and N-H) of drug spectrum. It does not show any well-defined interaction between Aceclofenac and excipients. This indicates that the drug is compatible with the formulation components.

Evaluation of Liquisolid Granules

The Determination of angle of repose, Carr's index, Hausener's ratio is important before formulation because it influence compressibility, tablet porosity and dissolution. As a general guide angle of repose greater than 50^o have unsatisfactory flow properties whereas minimum angle close to 25^o correspond to very good flow property. Powders showing Carr's index up to 21 are considered of acceptable flow property.[18, 19]

Evaluation of liquisolid Tablet

Hardness

Hardness was found to be in the range of 3.4 ± 0.02 kg/cm^2 to 3.9 ± 0.04 kg/cm^2. It is seen that as the amount of Avicel goes on increasing, hardness also increases. With decrease in R values, hardness was decreased. This low hardness could be attributed to the less amount of added Avicel and poor compressibility of Aerosil.

The hydrogen bonds between hydrogen groups on adjacent cellulose molecules in Avicel P^H 102 may account almost exclusively for the strength and cohesiveness of compacts.[18] the high compressibility and compactness of Avicel pH 102 can be explained by the nature of the microcrystalline cellulose particles themselves which are held together by hydrogen bonds, when compressed, such particles are deformed plastically and a strong compact is formed due to the extremely large number of surfaces brought in contact during the plastic deformation and the strength of the hydrogen bonds formed. Tablets with low hardness were not considered because they were not able to withstand abrasion in handling.

Weight Variation Test

Weight variation test results were shown in Table 6. All the formulations pass the weight variation test.

Disintegration Time

The disintegration time test revealed that the liquisolid tablet formulae disintegrated within 5 min which is as per specifications given for the uncoated tablets in the IP. Microcrystalline cellulose has disintegration property, which could facilitate disintegration of tablets and dissolution of drug. Because of the presence of a nonvolatile solvent acting as a binding agent in the liquisolid formulation, delayed disintegration time is expected. However, in the liquisolid tablets containing microcrystalline cellulose, a fast disintegration of tablet occurred which can be explained by the disintegrating property of microcrystalline cellulose.[36] In addition use of SSG accelerate the disintegration of tablets by virtue of its ability to absorb a large amount of water when exposed to an aqueous environment. The absorption of water results in breaking of tablets and therefore faster disintegration.[20]

Drug Content

A fundamental quality attribute for all pharmaceutical preparations is the requirement for a constant dose of drug between individual tablets. Uniform drug content was observed for all the formulations (97.0 ±2.51 % to 99.1 ±0.78 %),

Hardness

Table 5: Results of Preformualtion Study

Formula	Angle of repose (θ) ± SD	Bulk density (gm/ml)	Tapped density (gm/ml)	Carr's index %	Hausner's ratio
LS-1	33.4 ±0.01	0.36 ± 0.02	0.44 ±0.03	18.18	1.22
LS-2	33.2 ±0.65	0.38 ± 0.03	0.47 ±0.01	19.14	1.23
LS-3	32.4 ±.82	0.36 ± 0.04	0.46 ±0.02	21.73	1.27
LS-4	34.4 ±1.05	0.35 ± 0.01	0.46 ±0.04	23.91	1.31
LS-5	34.2 ±1.1	0.31 ± 0.02	0.40 ±0.03	22.50	1.29
LS-6	30.0 ±1.6	0.36 ± 0.03	0.46 ±0.01	21.70	1.27
LS-7	31.0 ±0.77	0.36 ± 0.01	0.40 ±0.02	19.51	1.11
LS-8	31.0 ±0.51	0.34 ± 0.02	0.40 ±0.03	17.34	1.17
LS-9	32.50±0.69	0.36 ± 0.02	0.44±0.03	18.18	1.22
DCT	25.25 ±0.73	0.32 ± 0.01	0.40 ±0.04	16.67	1.20

Table 6: Evaluation of liquisolid Tablets

Batch Code	Weight variation	Hardness (kg/cm^2)	Disintegration Time (min)	Drug Content (%w/w)	Friability %
LS-1	535 ±3.0	3.6 ±0.03	2.5±0.98	98.0 ±2.58	0.71
LS-2	550 ±1.20	3.4 ±0.02	2.3 ±0.1.23	97.8 ±1.49	0.70
LS-3	575 ±2.09	3.5 ±0.04	2.8±0.58	99.1 ±0.78	0.73
LS-4	745 ±3.11	3.5 ±0.05	2.4 ±1.40	97.0 ±3.45	0.71
LS-5	780±15.22	3.7 ±0.01	2.2 ±1.10	97.4 ±5.49	0.74
LS-6	820 ±6.20	3.9 ±0.02	2.7 ±0.58	99.0 ±7.58	0.72
LS-7	870 ±5.10	3.7 ±0.03	2.2 ±1.23	98.8 ±1.67	0.73
LS-8	980±10.0	3.9 ±0.04	3.4 ±1.40	98.2 ±3.56	0.53
LS-9	990 ±8.00	3.7 ±0.02	3.6 ±0.97	97.0 ±2.51	0.55
DCT	530±8.00	3.5±0.02	3.6 ±0.97	97.0 ±2.51	0.44

Friability

All the liquisolid compacts had acceptable friability as none of the tested formulae had percentage loss in tablet's weights that exceed 1%. Friability below 1% is an indication of good, mechanical resistance of the tablets. This ensures that tablets could withstand to the pressure, shocks during handling, transportation and manufacturing processes. The acceptable friability value is 0.5 to 1%.

The *In-vitro* Dissolution Study of Aceclofenac Liquisolid Tablet

The results of *in-vitro* percentage amount of drug released at different time intervals plotted against time to obtain the release profiles. All the liquisolid compacts showed higher drug release than the DCT. The enhanced dissolution rates of liquisolid compacts compared to DCT may be attributed to the fact that, the drug is already in solution in PEG 400, while at the same time, it is carried by the powder particles (microcrystalline cellulose and silica).Thus, its release is accelerated due to its markedly increased wettability and surface availability to the dissolution medium. The wettability of the compacts by the dissolution media is one of the proposed mechanisms for explaining the enhanced dissolution rate from the liquisolid compacts. PEG-400 facilitates wetting of drug particles by decreasing interfacial tension between dissolution medium and tablet surface.

The dissolution profiles of the liquisolid tablet formulations together with the dissolution profile of Aceclofenac DCT are presented in following Figure.

A) Formulation Containing 1:0.5 Ratio

In vitro dissolution study done by paddle dissolution apparatus USP Type II, containing Buffer pH 7.5 as dissolution media. Cumulative percent drug release has shown in following Table.

B) Formulation Containing 1:1 Ratio

In vitro dissolution study done by paddle dissolution apparatus USP Type II containing Buffer pH 7.5 as dissolution media. Cumulative percent drug release shown in below.

Table 7: Cumulative percent Drug Release of Aceclofenac Liquisolid Formulation Containing 1:0.5 ratio

Time (Min)	LS_1	LS_2	LS_3	DCT
0	0	0	0	0
5	14.70	13.50	11.06	9.00
10	25.56	20.55	22.56	11.10
15	34.60	24.48	34.02	17.21
20	44.54	37.67	49.76	34.70
30	57.28	48.74	57.38	42.51
40	61.54	68.89	69.32	54.32
50	77.90	78.88	76.89	69.11
60	85.70	85.95	86.88	73.42

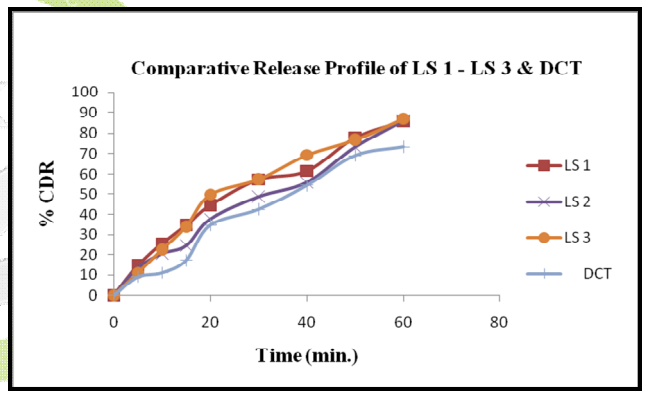

Figure 7: Cumulative percent Drug Release of Aceclofenac Liquisolid Formulation Containing 1:0.5 ratio

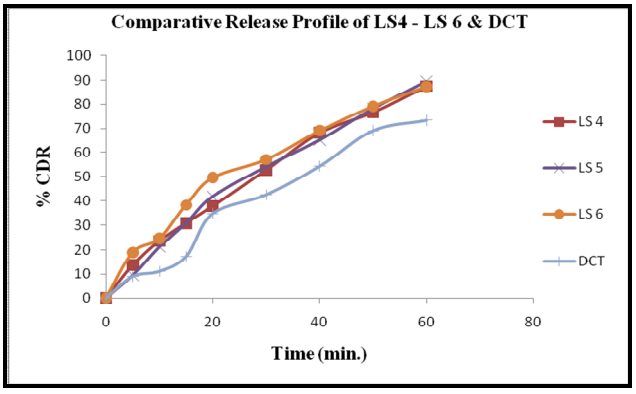

Figure 8: Cumulative percent Drug Release of Aceclofenac Liquisolid Formulation Containing 1:1 ratio

Table 8: Cumulative percent Drug Release of Aceclofenac Liquisolid Formulation containing 1:1 ratio

Time (Min)	LS_4	LS_5	LS_6	DCT
0	0	0	0	0
5	13.67	9.39	18.87	9.00
10	23.67	21.17	24.65	11.10
15	30.82	30.76	38.25	17.21
20	37.83	41.76	49.58	34.70
30	52.78	54.10	57.12	42.51
40	68.19	65.17	69.06	54.32
50	76.76	78.19	79.21	69.11
60	87.49	89.45	88.41	73.42

From the Cd 1:1% release graph it was clear that as the drug concentration increase % drug released also increase.

C) Formulation containing 1:1.5 Ratio

In vitro dissolution study done by paddle dissolution apparatus IInd, containing Buffer pH 7.5 as dissolution media. % drug released shown in below.

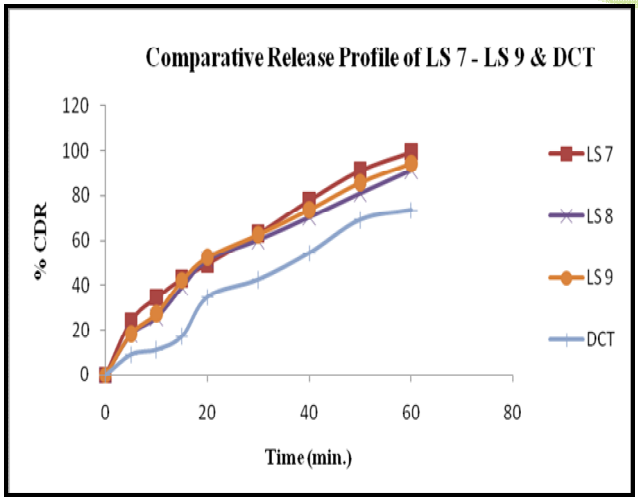

Figure 9: Cumulative percent Drug Release of Aceclofenac Liquisolid Formulation Containing 1:1.5 ratio

Table 9: Cumulative percent Drug Release of Aceclofenac Liquisolid Formulation Containing 1:1.5 ratio

Time (Min)	LS_7	LS_8	LS_9	DCT
0	0	0	0	0
5	24.11	17.96	18.25	9.00
10	34.51	25.54	27.36	11.10
15	42.91	39.08	42.06	17.21
20	49.48	51.25	52.36	34.70
30	62.98	60.12	62.56	42.51
40	77.97	70.26	73.70	54.32
50	91.23	80.98	85.78	69.11
60	97.46	91.15	94.34	73.42

From the Cd 1:1.5% formulation containg had Higher % drug released than 1:1 and 1:0.5. But it still higher than plane drug DCT, it clear that formulation show enhance dissolution rate.

The drug release from DCT was less as compared to liquisolid compacts. From above figure, it was apparent that formulations LS-7 have the highest drug release rate. Among all the formulations, the liquisolid compact having drug concentration i.e. drug: PEG-400 ratio 1:1.5 exhibits greater release than the liquisolid compact containing. The drug: PEG 400 ratio 1:1 exhibits greater release and liquisolid compact containing (drug: PEG 400 ratio 1:0.5). From the above results it is clear that as there was increase in amount of liquid vehicle, there was increase in the dissolution rate.

CONCLUSION

Aceclofenac release from Liquisolid tablet is faster than conventional tablet. Liquisolid technique change the properties of Aceclofenac particle by simply dispersed the drug particle in non-volatile hydrophilic liquid vehicle, which in turn increase the wetting properties and surface area of drug particle, and hence improve the dissolution profile and might be oral

bioavailability of the drug. It can also be concluded that from this study, the liquisolid compact of Aceclofenac with PEG-400 is their liquid vehicle, in different drug dissolution rates which are directly proportional to the molecularly dispersed drug in their liquid medication.

The release rate increase with rising fraction of dissolved drug in the liquid portion so for highest dissolution rate with liquisolid system containing a drug solution as liquid portion. Therefore, if the drug dose high or solubility of drug is low in liquid. Solvent, a high amount of solvent needed finally required high amount of carrier and coating materials. This results in an increase in tablet weight usually leading to unacceptably tablet size.

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