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DEVELOPMENT AND CHARACTERIZATION OF SOLID SMEDDS OF LORATIDINE

Nilesh Mahadeo Khutle[1], Yogesh Chaudhari[1], Suryaprakash Maurya[2], Rachel Geevarghese[3*]

[1]Assistant Professor, Department of Pharmaceutics, Dr. L. H. Hiranandani College of Pharmacy, Ulhasnagar, Maharashtra, India.
[2] Research Scholar, Department of Pharmaceutics, Dr. L. H. Hiranandani College of Pharmacy, Ulhasnagar, Maharashtra, India.
[3]Associate Professor, Department of Pharmaceutics, Dr. L. H. Hiranandani College of Pharmacy, Ulhasnagar, Maharashtra, India.

***Corresponding Author:** **Email:** rachel.geevarghese@dlhhcop.org

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ABSTRACT

The oral delivery of lipophilic drug presents a major challenge because of the low aqueous solubility of such compounds. Self-micro-emulsifying drug delivery system (SMEDDS) has gained exposure for their ability to increase solubility and bioavailability of poorly soluble drugs. The objectives of present investigation were to develop and characterized SMEDDS of Loratadine, a BCS class II drugs to improve its oral bioavailability. The components for micro-emulsion system were identified by solubility studies and tendency for self-microemulsfying in various excipients. Optimized Liquid SMEDDS (L-SMEDDS) formulation consists of Oleic acid, Chromophore RH40, Labrafil M 2125 as oil, surfactant, and co-surfactant respectively, ratio of oil and Smix 1:3 and surfactant: Co-surfactant (Smix) was 3:1. Optimized Liquid SMEDDS produces droplets in the range of 30 to 40nm, zeta potential in the range of -40 to -52mv.Optimized SMEDDS showed excellent dissolution in both SGF and SIF as compared to plain drug. L-SMEDDS was then converted to Powder SMEDDS (P-SMEDDS) and Tablet SMEDDS (T-SMEDDS) evaluated for its properties.

Keywords *– Loratadine (LOR), L-SMEDDS, P-SMEDDS, T-SMEDDS.*

1. INTRODUCTION

In recent years, lipid-based formulations such as Self Micro-emulsifying Drug Delivery System (SMEDDS) has been developed to cope with the challenge. SMEDDS is an isotropic mixture of oil, surfactant and co-surfactants which emulsify spontaneously to produce O/W micro-emulsion by the agitational motility of stomach with droplet size between 1-100nm [1].

SMEDDS are thermodynamically stable micro-emulsion as compare to emulsion. For lipophilic drug compounds that exhibit dissolution rate limited absorption, SMEDDS can offer an improvement in rate and extent of absorption, resulting in reproducible blood time profile. SMEDDS can be extended to all four categories of BCS class drugs. Lipinski's rule of five has been widely proposed as a qualitative model for oral absorption trends. [2]

Loratadine belonged to 2-nonsedating second-generation H1 antihistamine which was known as the strong long-acting drug for the symptomatic ease of allergic disorders without significant central and autonomic nervous side effects. Loratadine is belonging to BCS II and showing pH dependent solubility and hence dissolution. Very low solubility (0.004-0.006mg/mL) was obtained in high

pH media (7.5) while the high value (about 4.59mg/mL) was obtained in pH 1.2 media. A variety of formulation such as solid dispersion, micellar media, and inclusion complexes were studies to improve the dissolution rate and enhance the bioavailability of Loratadine. [3- 5]

In this study, Loratadine, initially liquid Self Micro-emulsifying Drug Delivery System (L-SMEDDS) of Loratadine was developed and evaluated. L-SMEDDS was then further converted to Powder-SMEDDS and Tablet-SMEDDS and evaluated for their properties.

Table 1: Application of SMEDDS in various BCS class category

BCS Class	Problems
BCS class I	Enzymatic degradation, gut wall efflux
BCS class II	Solubilization and bioavailability
BCS class III	Enzymatic degradation, gut wall efflux and bioavailability
BCS class IV	Solubilization, enzymatic degradation, gut wall efflux

2. MATERIALS AND METHODS

2.1 Materials

Loratadine was obtained as generous gift sample from Cipla Pvt. Ltd, Mumbai. Polyglycolyzed glycerides (Oleic acid) purchased from Alpha chemicals, Capryl 90, Capmul MCM, Captex 200, Captex 355, Capmul MCM C8 EP were obtained as gift sample from Gattefosse Pvt Ltd. Labrafac PG, Labrafil M 2125, Cremophore RH40, Cremophore EL were gifted From BASF Ltd, Navi Mumbai India.

2.2 Solubility studies of Loratadine in different vehicles solubility studies

The solubility of Loratadine in various vehicles including oils, surfactant and co-surfactant was determine using shake flask method. An excess amount of loratadine was added to each cap vial containing 2ml of vehicles. After sealing, the mixture was vertex at a maximum speed for 10 minutes in order to facilitate proper mixing of loratadine with vehicles. Mixture then shaken in water bath maintain at room temperature until equilibrium (48h). The mixtures were then centrifuged at 5000rpm for 10 minutes. The supernatant collected into glass vials and diluted approximately by methanol; the concentration of Loratadine in the solution was assayed by UV spectroscopy (Shimadzu 1600, Japan).

2.3 Surfactant Emulsification study

Different surfactants were screened for their ability to emulsify the selected oily phase. Surfactant selection was done on the basis of % transparency and ease of emulsification. Briefly, 300mg of surfactant was added to 300mg of oil phase. The mixture was heated at 50°C in water bath followed by cyclomixing. 50mg of each mixture was diluted with 50ml filtered distilled water in a volumetric flask, ease of emulsification evaluated by noting the number of flask inversion required to produce homogeneous emulsion. Emulsion was then allowed to stand for 2hr and % transparency was measured at 638.2nm against distilled water.

2.4 Co-surfactant emulsification study

The screening of co-surfactants was carried out on the basis of % transparency and ease of emulsification. Mixtures of the co-surfactant (100mg), selected surfactant (200mg), and the selected oil (300mg) were prepared and evaluated in similar manner as described in surfactant emulsification study.

2.5 Construction of Pseudo-ternary phase diagram

Pseudo-ternary phase diagrams are a tool for screening suitable components and identifying the well-suited ratios of constituents in SMEDDS. The phase diagram of oil, surfactant: co-surfactant and water were developed using water titration method. The mixture of oil and surfactant: co-surfactant (Smix) at certain weight ratios (1:9 to 9:1) were diluted with water in a drop wise

manner, for each phase diagram at specific ratio of surfactant: co-surfactant [Km 1:1, 1:2 and 1:3 (w/w)]. Then, Origin 8.0 software (Origin Lab Corp., Northampton, MA, USA) was used to construct the pseudo-ternary phase diagrams.

2.6 Optimization of formulae

2.6.1 Freeze thaw cycle

The formulations from selected ternary phase diagram were then subjected to alternate freeze thaw cycle. Each formulation was subjected to refrigeration and the next 24 hrs they were subjected to room temperature. Likewise, 3 freeze thaw cycle were carried out and the mixture was observed. If any phase separation observe that formulation was unstable. (From reference list)

2.6.2 Centrifugation

Batches that pass the freeze thaw cycle test then subject to centrifuge it. Selected formulations were centrifuged for 15 min at 3500 rpm, and then observe for any sign of phase separation or drug precipitation. (From reference list)

2.6.3 Robustness to dilution

Robustness of LOR SMEDDS to dilution was studies by diluting it 50, 100, 1000 times with various dilution media like water, buffer pH 1.2, buffer pH 6.8. The dilution nano-emulsions were stored for 12h and observed for any sign of phase separation or drug precipitation.

2.7 Evaluation of optimized L-SMEDDS

The optimized batch again evaluated for properties like globule size, zeta potential and polydispersibility index and in-vitro dissolution.

2.8 Conversion of L-SMEDDS to P-SMEDDS

By using Neusilin US2 as an adsorbing agent the optimized L-SMEDDS was converted to free flowing powder.

2.9 Evaluation of P-SMEDDS

P-MEDDS formed was then evaluated for micrometrics, SEM, Particle size, zeta potential, in-vitro dissolution.

2.10 Conversion of P-SMEDDS to T-SMEDDS:

By using common excipient like superdisintigrant agent, glidant, lubricant, fillers form tablet by tablet compression machine.

2.11 Evaluation of T-SMEDDS

T-SMEDDS formed was then evaluated for hardness, friability, drug content, dis-integration time, in-vitro dissolution, particle size, zeta potential [6-57].

3. RESULTS AND DISCUSSION

3.1 Solubility studies

Identifying the suitable oil which having maximum solubility of LOR. Maximum solubility potential is very important to achieve optimum drug loading. Solubility of LOR in various oil phases in fig 1. Among the various oils screened oleic acid could solubility 420mg of LOR in just 1 gm oily phase.

3.2 Screening of Surfactant for Emulsification efficiency

The % transmittances of various dispersion are given in table. The ability of various surfactant screened Cremophore RH40.

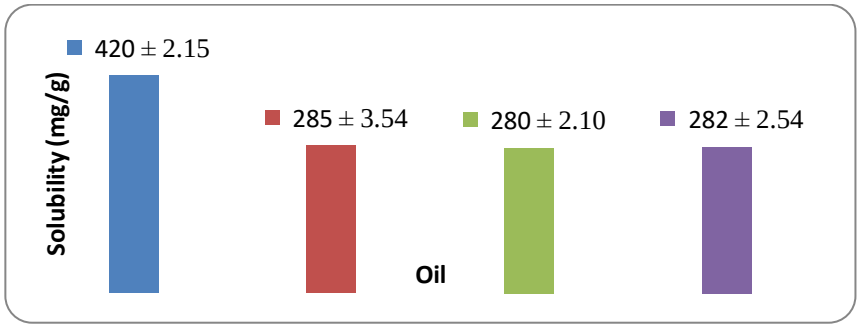


Fig 1: Solubility of LOR in various oils

Table 2: Emulsification efficiency of surfactants for Oleic acid oil

Sr. No.	Surfactant	No. of flask Inversion	% Transmittance	Appearance
1	Cremophore RH 40	7	92.98	Transparent
2	Cremophore EL	8	82.23	Slightly bluish
3	Gelucire 50/13	55	17.13	Colloidal
4	Tween 20	12	70.10	Bluish white
5	Labrafac CC	20	78.58	Colloidal

3.3 Screening of co-surfactant

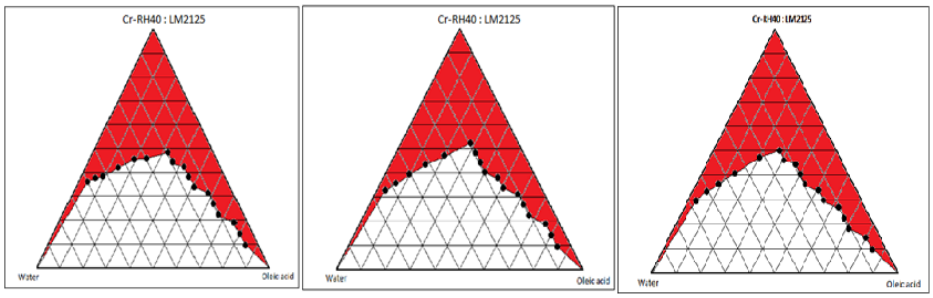
It was found that Cremophore RH40 with various co-surfactants with a flask inversion method, screened was Labrafil M 2125 CS. Thus Cremophore RH40: Labrafil M2125 pair was selected to emulsify oleic acid oil, which showed good spontaneity of emulsion. Thus combination of oil: surfactant: co-surfactant selected were, Oleic acid, Cremophore RH40, Labrafil M 2125CS.

Table 3: Spontaneity of emulsification by co-surfactants for surfactant for Cremophore RH40

Sr. No.	Co-Surfactant	Surfactant: Cremophore RH 40		Appearance
		No. of flask inversion	%Transmittance	
1	PEG 400	5	86.12	Slightly bluish
2	Plurol Oleique	15	72.89	Colloidal
3	Labrafil M 2125 Cs	2	100.20	Transparent
4	Labrafil M 1944 Cs	2	87.55	Bluish white

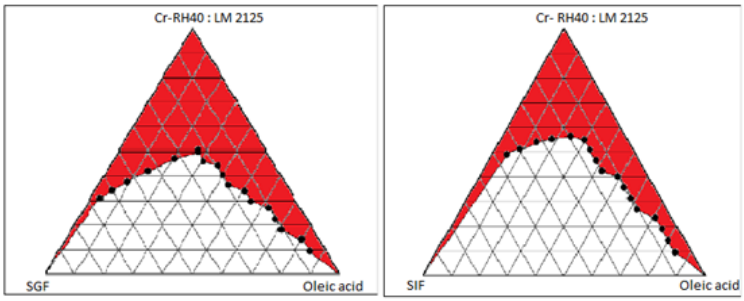
3.4 Construction of pseudo-ternary phase diagram

The phase diagram of oil, surfactant: co-surfactant and water were developed using water titration method. The mixture of oil and surfactant: co-surfactant at certain weight ratios were diluted with water in a drop wise manner, for each phase diagram at specific ratio of surfactant: co-surfactant, 1:1, 1:2 and 1:3 (w/w) (figure No.2) transparent mixture of oil ranging from 20% to 30% and drug was formed under the mixing with water and visually observed for phase clarity and flow ability. After the identification of micro emulsion region in phase diagrams, the micro emulsion formulation were selected at desired component ratio and evaluated further.



A) **B)** **C)**

Fig 2 (a): Pseudo ternary phase diagram consisting of oil phase (Oleic acid), S:Cos (Cr-RH40: LM2125) and water using. A) Km=1 (1:1), B) Km=2 (1:2) C) Km=3 (1:3)



D) **E)**

Fig 2 (b): Pseudo ternary phase diagram consisting oil, S:Cos and D) SGF Using Km=3 E) SIF using Km=3

3.5 Preparation of L-SMEDDS (Liquid-self-microemulsifying drug delivery system)

A series of SMEDDS were prepared using oleic acid, Cremophore RH40, Labrafil M 2125 as oil, surfactant and co-surfactant respectively (Table 4). In all formulation the amount of loratadine and oil was kept constant. The SMEDDS formulations were selected based on its ability to from large self-microemulsion region in ternary phase diagram and to obtained stable emulsion. Loratadine (10mg) was dissolve in oil in water batch up to 500◦C with continues stirring. After complete dissolution, the surfactant and co-surfactant added. The mixtures were mixed gently with a magnetic stir bar until the solution turned clear. The mixtures (containing loratadine 10mg) were left to cool to room temperature were encapsulated in hard gelatin capsules.

Table 4: Composition of various SMEDDS formulation of Loratadine

Components (mg) per unit formula	**LOR L-SMEDDS Formulation code**			
	LLS_1	**LLS_2**	**LLS_3**	**LLS_4**
Loratadine(LOR)	10.00	10.00	10.00	10.00
Oleic acid	25.00	25.00	25.00	25.00
Cremophore RH 40	16.67	33.33	41.67	50.00
Labrafil M 2125 CS	8.33	16.67	20.83	25.00
Mass fill per capsule (mg)	60.00	85.00	97.50	110.00
O : S_{mix}	1:1	1:2	1:2.5	1:3
S : Co-s	3:1	3:1	3:1	3:1

3.6 Optimization of Formulation

3.6.1 Freeze thaw cycle

The selected four systems were further subjected to freeze thaw cycle. At the end of 3rd cycle the result was found as follows:

Table 5: Results of freeze thaw cycle for selected ratios

Batch no.	Phase separation	Drug precipitation	Remark
LLS_1	Unstable	Unstable	Fails
LLS_2	Unstable	Unstable	Fails
LLS_3	Stable	Stable	Passes
LLS_4	Stable	Stable	Passes

As seen in table 5, the LLS_1 and LLS_2 were found to be unstable and hence it was eliminated.

3.6.2 Centrifugation

SMEDDS are thermodynamically stable systems with no phase separation, creaming, cracking.

Table 6: Results of Centrifugation for selected ratios

Batch no.	Phase separation	Drug precipitation	Remark
SSL_3	Stable	Stable	Passes
SSL_4	Stable	Stable	Passes

3.6.3 Robustness to dilution

It is well known that the addition of surfactants to the micro-emulsion systems causes the interfacial film to stabilize, while the addition of co-surfactant the film expand; thus, the relative proportion of surfactant to co-surfactant has varied effects on the droplet size. Hence to check the stability of the ratios robustness to dilution was carried out. Effect of dilution and pH of dilution media on SMEDDS containing LOR is shown in table 5 and table 6. Batch LLS3 failed the test for robustness to dilution. In summary, all the evaluation point like saturation of LOR, stability thermodynamically stress study and robustness to dilution study supports the rational for selection of LLS4 as an optimized formulation system for the development of L-SMEDDS of LOR.

Table 7: Results of robustness to dilution

	Dilution media	Dilution	% Transmittance	Appearance	Drug precipitation
LLS_3	**Distilled water**	50	95.06	Bluish white	Stable
		100	96.15	Slightly bluish	Stable
		1000	95.45	Bluish white	Stable
	0.1 N HCl (SGF)	50	95.13	Bluish white	Stable
		100	96.87	Slightly bluish	Stable

		1000	95.56	Bluish white	Stable
	Phosphate buffer 6.8pH (SIF)	50	95.12	Bluish white	Stable
		100	94.56	Bluish white	Stable
		1000	96.24	Slightly bluish	Stable

	Dilution media	**Dilution**	**%Transmittance**	**Appearance**	**Drug precipitation**
LLS_4	**Distilled water**	50	98.78	Clear	Stable
		100	100.11	Clear	Stable
		1000	100.12	Clear	Stable
	0.1N HCl buffer (SGF)	50	97.72	Clear	Stable
		100	99.87	Clear	Stable
		1000	99.87	Clear	Stable
	Phosphate buffer 6.8 pH (SIF)	50	97.21	Clear	Stable
		100	100.11	Clear	Stable
		1000	100.07	Clear	Stable

3.7 Characterization of L-SMEDDS

3.7.1 FTIR (Loratadine, Oil, Surfactant, Co-surfactant and L-SMEDDS compatibility study)

Prominent peaks of Loratadine was observed with peak broadening in powder S-MEDDS, nearly all characteristic peaks of loratadine was observed in L-SMEDDS this results suggested the physicochemical compatibility of drug with excipients and L-SMEDDS.

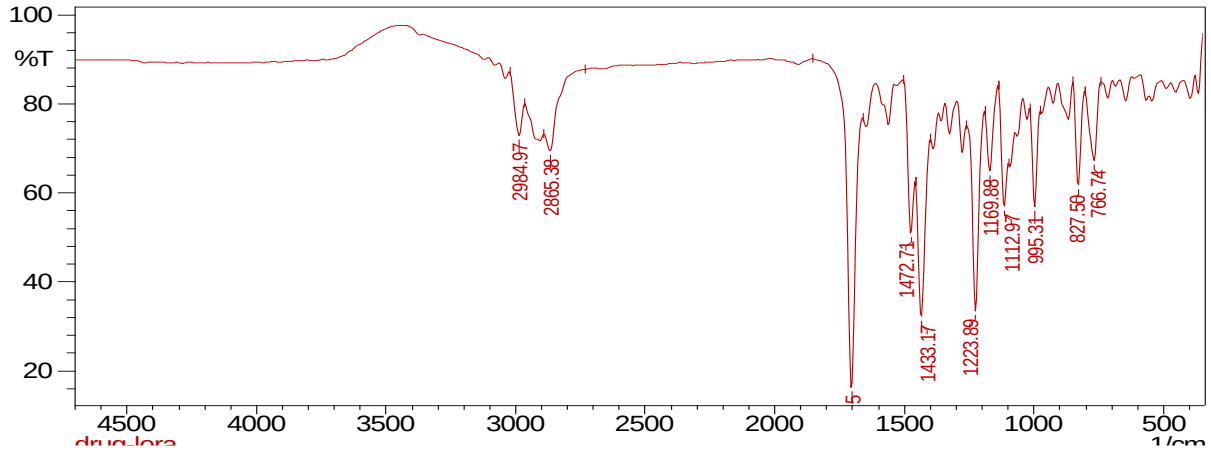


Fig. 3 (a): FTIR of Loratadine

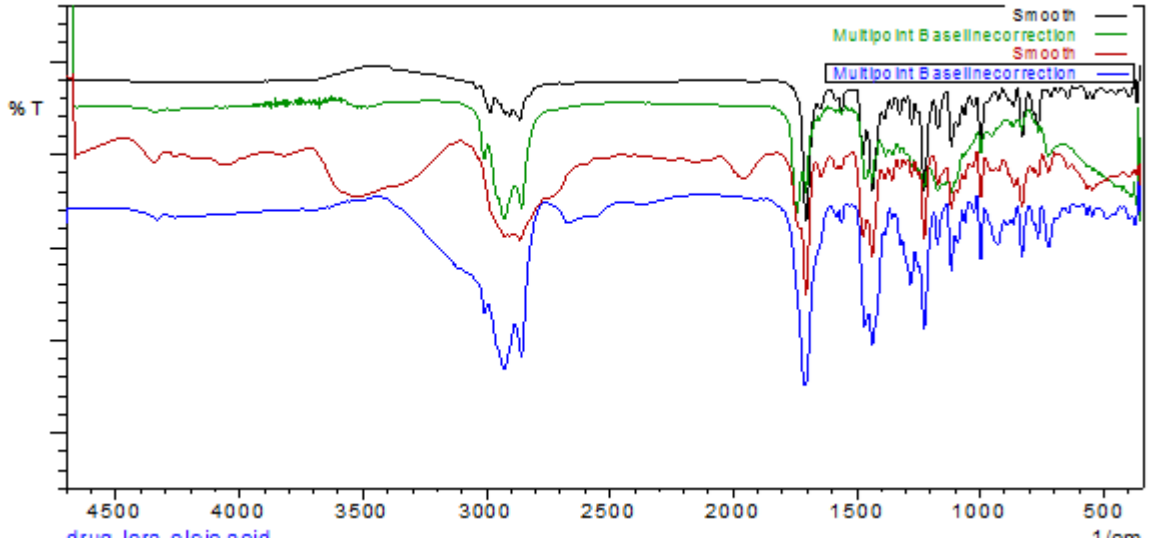


Fig. 3 (b): Compatibility FTIR spectra of Plain drug and drug with excipients

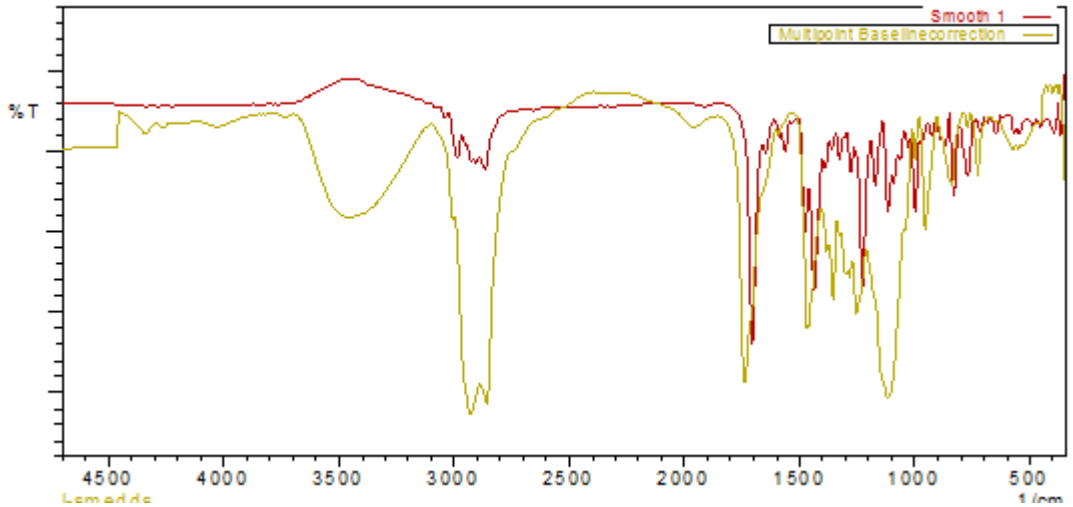
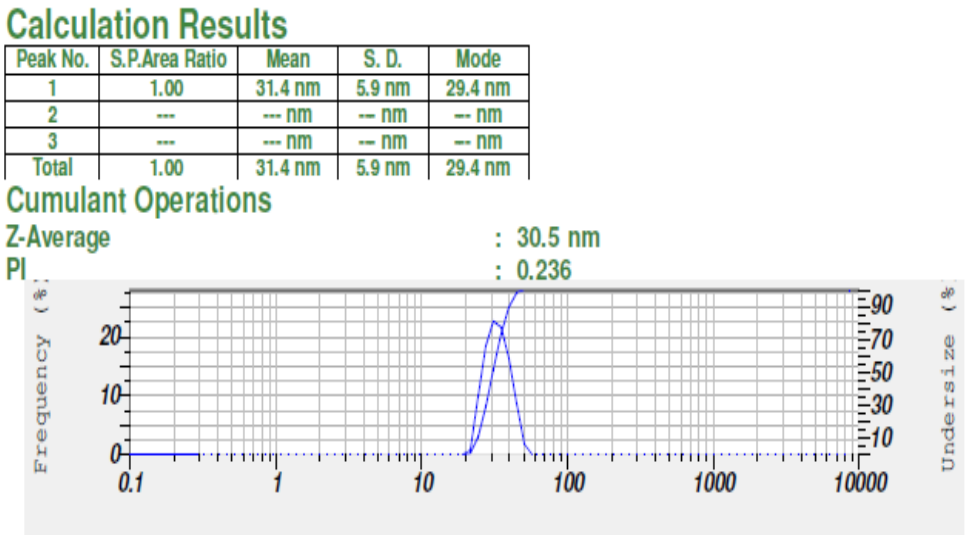


Fig. 3(c): Comparative FTIR spectra of Plain drug and L-SMEDDS

3.7.2 Particle size and zeta potential

The SMEDDS formulations (50mg) were added to 50 mL of distilled water with inversion flask mixing and keep a side for 1hr. The particle size and zeta potential of emulsion were determined by zeta sizer Horibo Japan. The measurements were repeated in triplicate and reported data represented the mean value ± standard deviation (SD).



Calculation Results

Peak No.	Zeta Potential	Electrophoretic Mobility
1	-44.0 mV	-0.000341 cm2/Vs
2	— mV	— cm2/Vs
3	— mV	— cm2/Vs

Zeta Potential (Mean) : -44.0 mV
Electrophoretic Mobility Mean : -0.000341 cm²/Vs

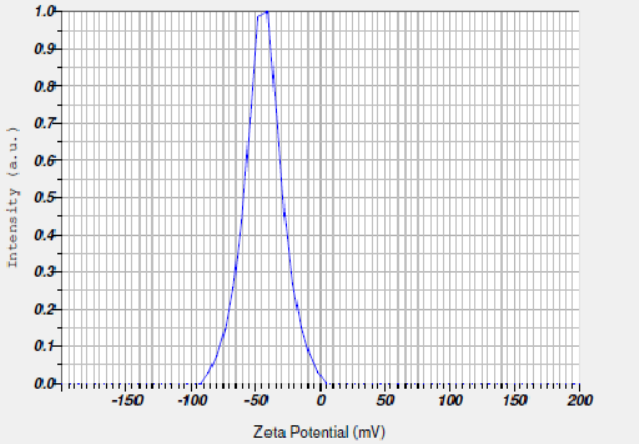


Fig. 4: Globule size distribution and P.I. obtained from LOR L-SMEDDS (LLS_4) in Water

Table 8: Data of globule size, polydispersity index (P.I.) and zeta potential of LLS_4 in a various dilution media.

Distilled water			**0.1N HCl (SGF)**			**Phosphate buffer pH 6.8 (SIF)**		
Globule size (nm)	P.I	Zeta potential (mV)	Globule size (nm)	P.I.	Zeta potential (mV)	Globule size (nm)	P.I.	Zeta potential (mV)
30.5± 3.27	0.236	-44	39.2 ±3.15	0.417	-23	35.5± 3.15	0.412	-28

The results indicate that the optimal LOR L-SMEDDS produce a resultant emulsion with a small mean droplet size and uniform particle size distribution in buffer. Zeta potential (surface charges) of the micro-emulsion form SMEDDS to play its bioavailability. All parameters was found to be satisfactory for L-SMEDDS

3.7.3 Determination of % drug content

The dispersed system of loratadine (LOR) were assayed UV spectroscopy for the drug content at the wave length 247.2 nm with proper dilution of formulation taking methanol as a blank.

Table 9: Drug content

Batch No.	**Drug content (%)**
LLS_4	102.56*

*Value are expressed as Mean ± standard deviation of 3 replicates

3.7.4 Dissolution studies in vitro

The content of loratadine in the samples was analyzed by UV-spectroscopy at a wavelength of 288 nm for 0.1N HCL (SGF) and 247.2 nm for SIF.

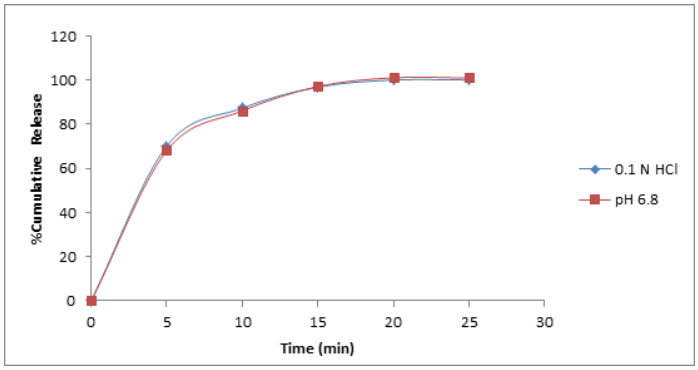


Fig 5(a): In vitro dissolution profile of L-SMEDDS in 0.1N HCl and pH 6.8 buffer dissolution media

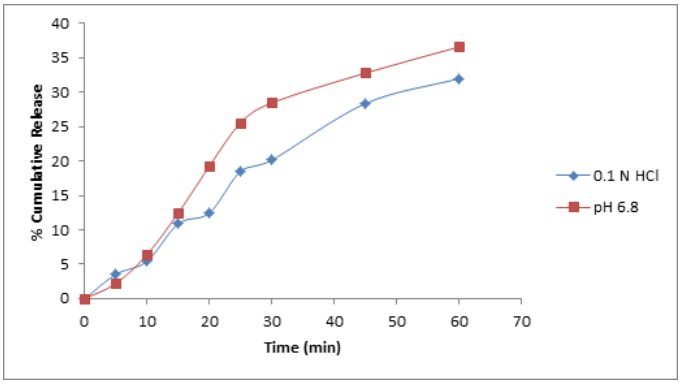


Fig 5(b): In vitro dissolution profile of plain drug in 0.1N HCl and pH 6.8 buffer dissolution media

3.7.5 TEM (Transmission Electron Microscope)

TEM was performed on the optimized L-MEDDS formulation after 1000 fold dilution by distilled water, the image confirm the ability of Loratadine L-SMEDDS to produce spherical oil globules were equally distributed all over the film. This observation of TEM image is an agreement with the result obtained from droplet size analysis.

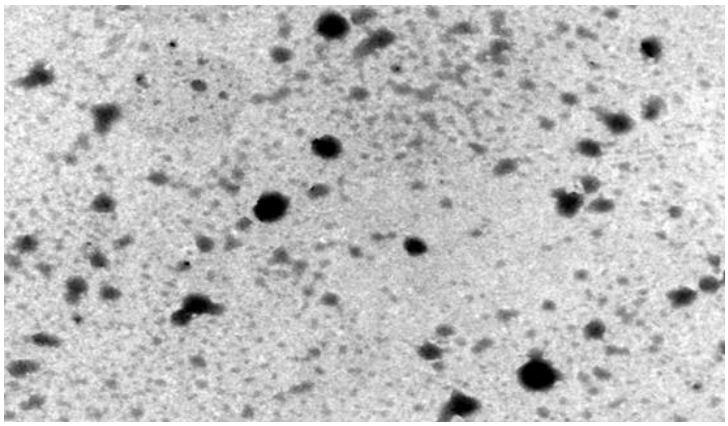


Fig 6: TEM image obtained by 1000 folded dilution of Loratadine L- SMEDDS in distilled water

3.8 Conversion of L-SMEDDS and P-SMEDDS

3.8.1 Preparation of Powder SMEDDS using Adsorption to solid carrier

MCC, Aerosil 200 and Neusilin US2 (2gm) were used as solid carrier, for conversion of L-SMEDDS to Powder-SMEDDS. The conversion process involved addition of liquid formulation on adsorbing agent under continues mixing in a blender, sieved after mixing, for all three adsorbing agents employed to produce P-SMEDDS. It was confirmed from these results that due to highly

porous nature and large specific surface area Neusilin NS2 hold the higher capacity to adsorb oily solution, there for neusilin NS2 was selected as adsorbing agent. It was found that 2 gm of Neusilin US2 could consume about 3.6gm of formulation.

3.8.2. Characterization of Powder SMEDDS (P-SMEDDS)

3.8.2.1 FTIR study of P-SMEDDS

FTIR spectrum was recorded for Loratadine, Liquid SMEDDS, and P-SMEDDS using FTIR spectrophotometry.

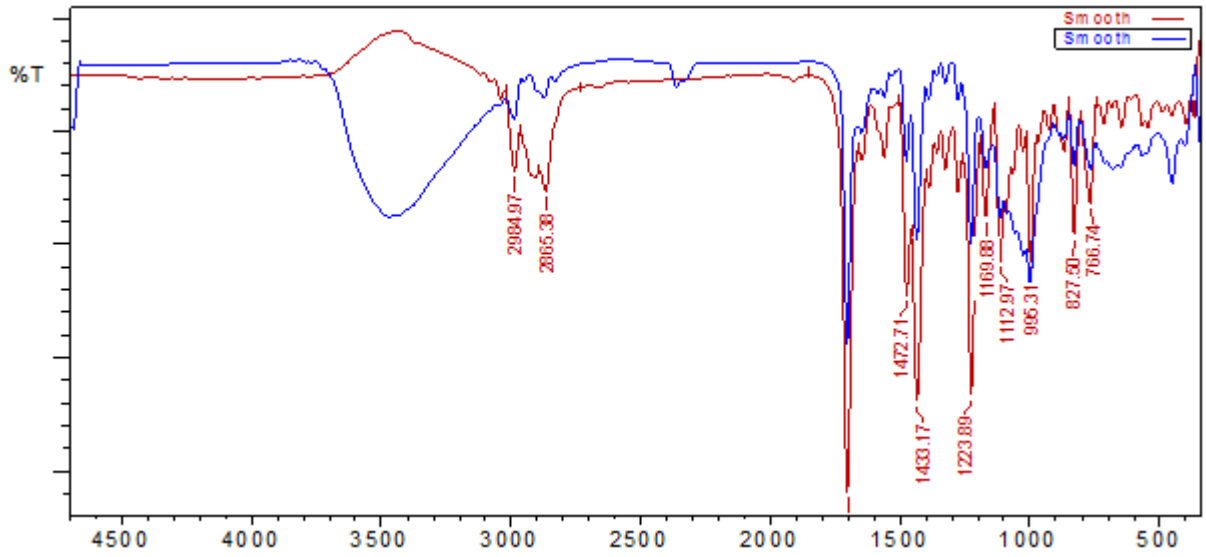


Fig. 7: FTIR

3.8.2.2 Micromeritics properties of P-SMEDDS

Prepared P-SMEDDS was evaluated for micro meritic properties such as angle of repose, bulk and tapped density, compressibility index and Hausner Ratio.

Table 10: Micro-meritic properties of P-SMEDDS

Parameters	Angle of Repose (Degree)	LBD (g/mL)	TBD(g/mL)	Carr's index	Hausner Ratio
Observations	26°43'	0.4124±0.008	0.4867±0.004	15.26	1.18

3.8.2.3 Determination of drug content

Drug content was estimated by extracting Loratadine from P-SMEDDS. In brief P-MEDDS was dissolved in sufficient quantity of methanol. Solution was sonicated for 10-15 minutes for extraction of loratadine in methanol and filtered. The absorbance of filtrate was read at 247.2nm on UV-Visible spectrophotometer.

Table 11: Drug content

Drug content (%)
102.42 ± 2.15

3.8.3 DSC (Differential Scanning Microscope)

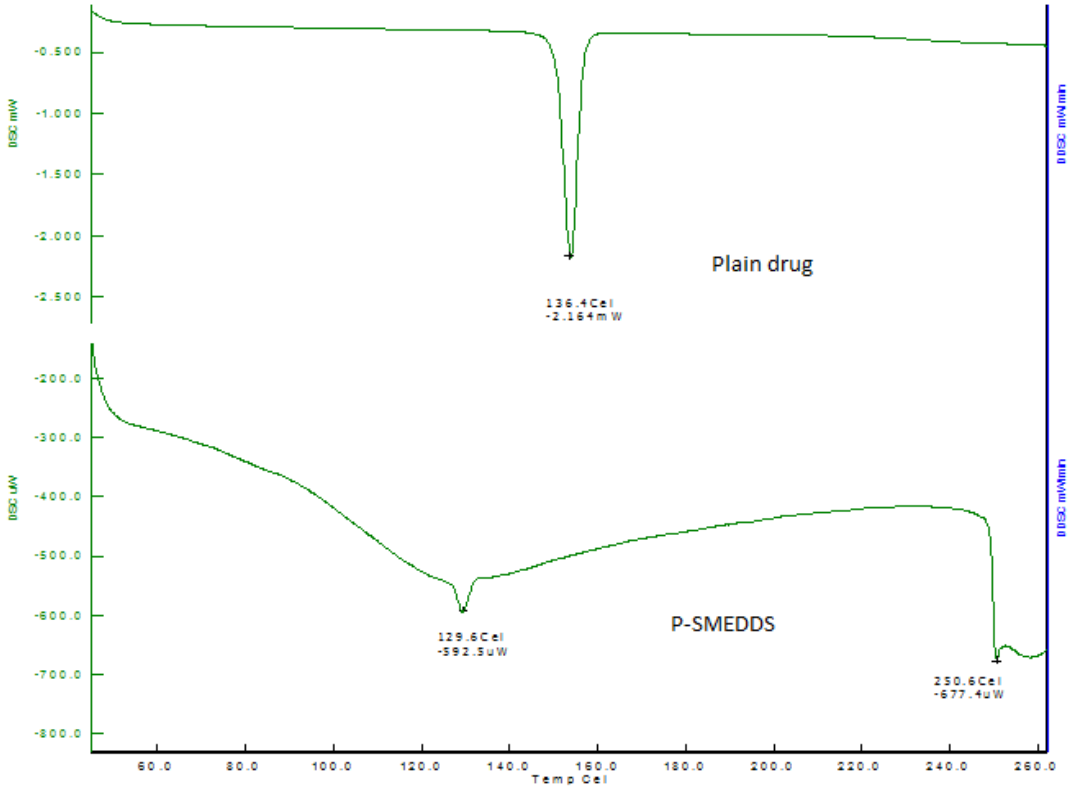


Fig 8: DSC thermogram of Plain LOR, and P-SMEDDS

Physical state of Loratadine in P-SMEDDS was characterized using differential scanning calorimeter. Thermograms of Loratadine, and P-SMEDDS were obtained using DSC.

3.8.4 Scanning Electron Microscopy (SEM)

A concentrated aqueous dispersion of nanoparticle was finely spread over a slab and dried under vacuum. The sample was shadowed in a cathodic evaporator with gold layer (20 nm thick). The surface morphology of the nanoparticles was observed by SEM.

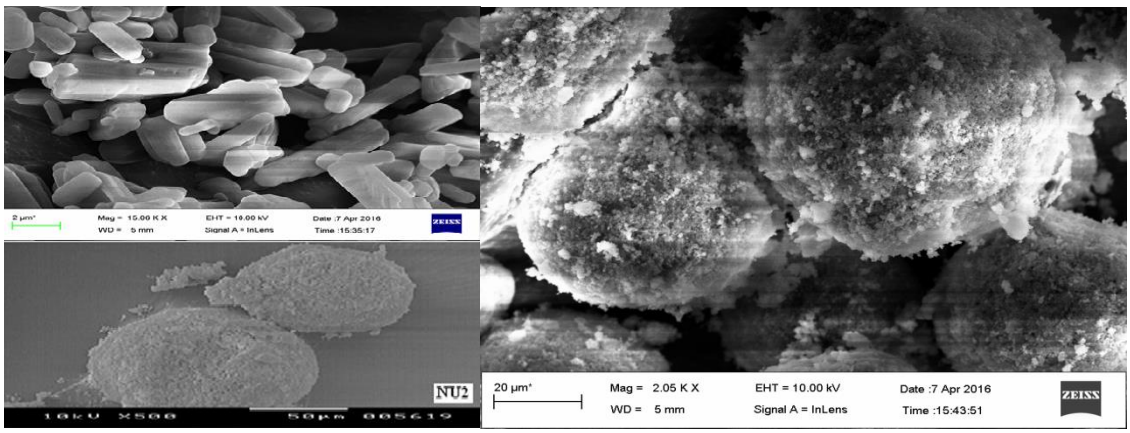


Fig 9: Scanning electron microscopy images of Plain LOR, Neusiline US2 (NU2) and LOR P-SMEDDS

3.8.4 Effect of solidification on globule size, properties of P-SMEDDS

Table 12: Data of globule size, P.I. and Zeta potential of LOR P-SMEDDS

Distilled water			0.1N HCl (SGF)			Phosphate 6.8 pH (SIF)		
Globule Size (nm)#	P.I.	Zeta potential* (mV)	Globule Size (nm)#	P.I.	Zeta potential* (mV)	Globule Size (nm)#	P.I.	Zeta potential* (mV)
36.00 ± 2.12	0.285	-36	47.5 ± 2.19	0.498	-39	56.5 ± 1.28	0.362	-31

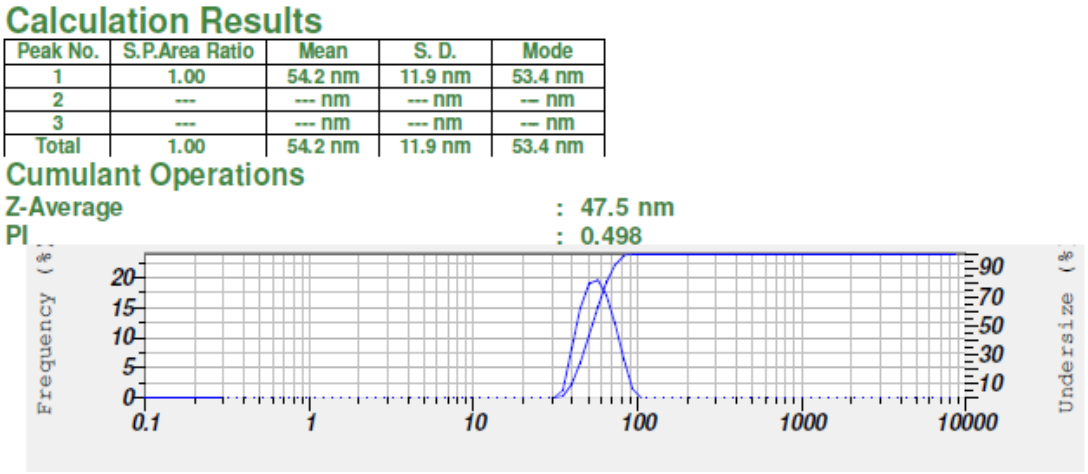
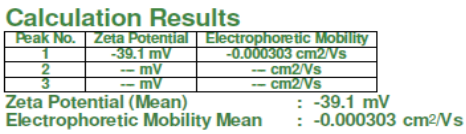


Fig 10(a): Globule size distribution of LOR P-SMEDDS



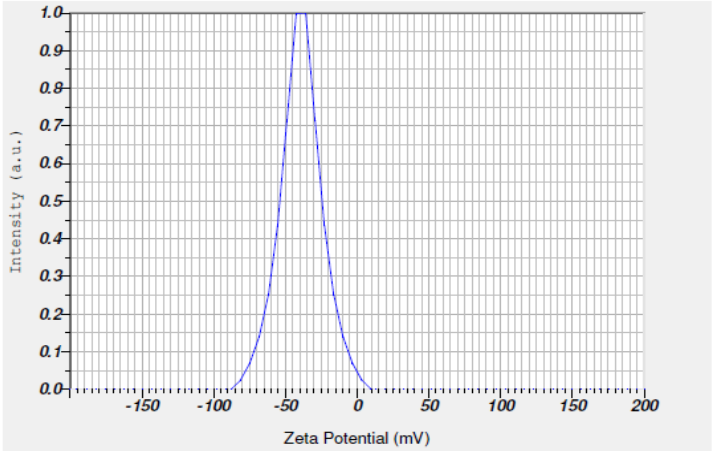


Fig 10(b): Zeta potential of LOR P-SMEDDS

3.8.5 In-vitro Dissolution study of P-SMEDDS

The release of drug from P-SMEDDS formulations filled in capsules and pure drug was determined using a USP type II dissolution apparatus. The dissolution media buffer 0.1 N pH 1.2 and pH 6.8 and temperature of the dissolution medium was maintained at 370C operated at 50 rpm. A 5 ml sample was withdrawn at predetermined intervals 5, 10,15,20,25 and 30 minutes and filtered through 0.45 µm pore size membrane filters. The amount of drug dissolved was determined using UV spectrophotometry.

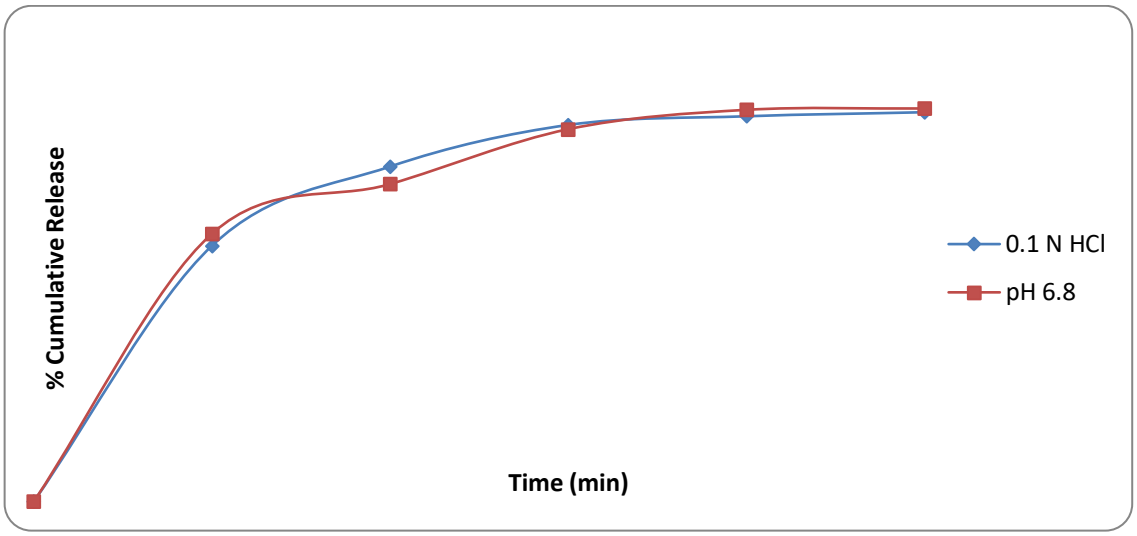


Fig 11: In-vitro dissolution profile of LOR P-SMEDDS in various dissolution media

3.9 Conversion of P-SMEDDS to Tablet SMEDDS (T-SMEDDS)

The commonly used super disintegrating agent Croscarmellose sodium, Crosspovidone and sodium starch glycolate were for ability to disintegrate T-SMEDDS with maintaining hardness of tablets. MCC was used as directly compressible diluents, while magnesium stearate and talc was added as glidant and lubricant respectively.

Crospovidone was selected as disintegrating agent. P-SMEDDS blend with crosspovidone and MCC, followed by addition of Magnesium stearate and talc, the obtained blend was then mixed thoroughly. The resultant powder mixture was compressed into tablet by using a single punch tablet machine using 10mm punch. Sufficient pressure was applied to keep the hardness of 3.5-4 kg/cm^2.

Table 13: Composition of optimized LOR Tablet-SMEDDS (LOR T-SMEDDS)

Ingredients	Quantity per Tablet (mg)	Property
Loratadine	10.00	API (Anti-allergic)
Liquid SMEDDS	100.00	Self-emulsifying system
Neusilin US_2	60.00	Adsorbing agent
Crospovidone	12.00	Super disintegrants
Magnesium Stearate	6.00	Glidant
Talc	6.00	Lubricant
MCC	146.00	Directly compressible Diluents
Total weight of Tablet (mg)	350	LOR T-SMEDDS

3.9.1 Characterization of Tablet SMEDDS (T-SMEDDS)

Table 14: Physical properties of T-SMEDDS

Parameters	Observation	Inference
Thickness	4.2mm	Within the limit
Hardness	3.5-4kg/cm^2	Within the limit
Weight variation	3.12%	Pass the test
Friability (%)	0.54	Pass the test
Drug content (%)	102.52 ± 2.56	Within the acceptance limit
Disintegration time	2min 45 sec	Pass the test

3.9.2 In-vitro dissolution study of T-SMEDDS

In-vitro dissolution study of T-MEDDS of loratadine and marketed tablet was determined described in L-SMEDDS Fig 5(b).

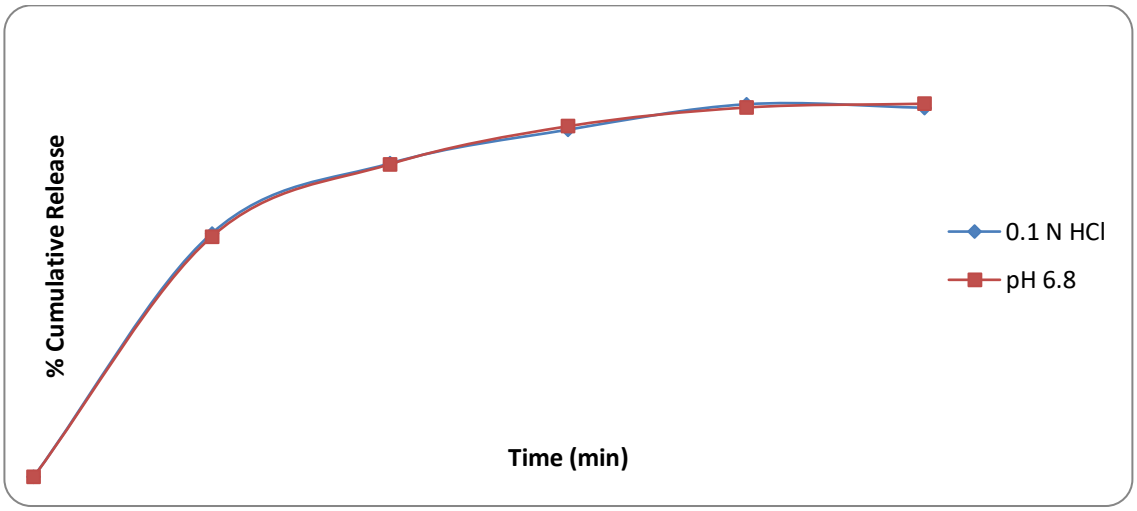


Fig 11: In-vitro dissolution profile of LOR T-SMEDDS in various dissolution media

3.10 Stability studies of the SMEDDS formulations

The stability study of SMEDDS formulations of Loratadine were performed at 40^{0}C ± 2 / 75 ± 5 % RH for 3 months. Powder SMEDDS (P-SMEDDS) and T-SMEDDS were performed also at 40^{0}C ±2 / 75 ± 5% RH for3 Months respectively. At predetermined timed time intervals, the samples were characterized in terms of particle size, zeta potential and assay for L-SMEDDS , for P-SMEDDS Particle size, zeta potential , angle of repose, bulk density, tapped density, Carr's index, Hausner ratio, for T-SMEDDS hardness, friability, weight variation, di-integration time, dissolution and assay.

4. CONCLUSION

Solid Self Micro-emulsifying formulation of Loratadine containing Oleic acid as oily phase, Cremophore RH40 as surfactant and Labrafil M2125 as co-surfactant were prepared. An improvement in in-vitro dissolution profile was evident due to presence of LOR in solubilised form in oil microdroplets.Conversion of LOR loaded Liquid SMEDDS to Powder SMEDDS and Tablet SMEDDS also serve to overcome the traditional drawbacks of Liquid SMEDDS. The result of DSC clearly suggests the conversion of LOR into amorphous form. Uniform and spherical particles of P-SMEDDS were confirmed by SEM. Image obtained from TEM indicating the small, uniform and oval shaped oily globules of microemulsion obtained from L-SMEDDS.

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6. CONFLICT OF INTEREST

Author has no conflicts of interest to disclose.

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