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FORMULATION AND IN-VITRO CHARACTERIZATION OF THE ITRACONAZOLE LIPOSOMAL DRUG DELIVERY

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Abstract:
The main aim of the present work is Formulation and in-vitro characterization of the Itraconazole liposomal drug delivery. The objectives are liposomes are prepared by using film hydration technique by using rotary evaporator, For the preparation of liposomes cholesterol and cholins are used, to improve the bio availability of a drug, to enhance the patient compliance, Finally, completion of formulation the evaluation parameters were conducted. It was concluded that the optimized formulation F9, followed zero order release where the regression value was found to be 0.900It was also found that the drug was released by diffusion as the regression in Higuchi's plot was 0.988. The ideal liposomes film showed upheld appearance of the medicine stood out from the relieved film containing the free prescription.The in vitro release energy of medicine from the liposomes suspension and liposomes film followed the Higuchi scattering model. Moreover, the in vivo study in bunnies showed in a general sense higher rate and level of ketoconazole ingestion from sublingual fast dissolving liposomes film appeared differently in relation to that from oral business tablets.

Key words: *Formulation, In-Vitro Characterization, Itraconazole Liposomal Drug Delivery*

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INTRODUCTION:

Liposome is a microparticulate colloidal vesicle, in which aqueous medium is surrounded by single or multiple concentric layers of phospholipids. Due to their size, both hydrophilic and hydrophobic drugs (besides biocompatibility) can be incorporated, water-soluble drug being entrapped in aqueous core and fat-soluble drug in phospholipids [1,2]. It offers controlled release, targeted drug delivery, thus enhancing therapeutic efficacy, and reduced dosing frequency. Therapeutically, these are used as a carrier for drugs, viruses, bacteria, antigen, peptides, antibiotics, vaccines, genes, and diagnostic agents [3,4]. Liposomes are small artificial vesicles of spherical shape that can be created from cholesterol and natural nontoxic phospholipids. Liposome properties differ considerably with lipid composition, surface charge, size, and the method of preparation. Furthermore, the choice of bilayer components determines the "rigidity" or "fluidity" and the charge of the bilayer. For instance, unsaturated phosphatidylcholine (PC) species from natural sources (egg or soybean PC) give much more permeable and less stable bilayers, whereas the saturated phospholipids with long acyl chains (e.g., dipalmitoyl PC) form a rigid, rather impermeable bilayer structure [2]. In general, liposomes are definite as spherical vesicles with particle sizes ranging from 30 nm to several micrometers. They consist of one or more lipid bilayers surrounding aqueous units, where the polar head groups are oriented in the pathway of the interior and exterior aqueous phases. On the other hand, self-aggregation of polar lipids is not limited to conventional bilayer structures which rely on molecular shape, temperature, and environmental and preparation conditions but may self-assemble into various types of colloidal particles [5]. Liposomes are prepared using sonication, thin-film hydration, solvent dispersion method, and detergent removal methods. Drug loading can be attained either passively (i.e., the drug is encapsulated during liposome formation) or actively (i.e., after liposome formation) [6]. The liposome size can vary from very small (0.025 μm) to large (2.5 μm) vesicles. Moreover, liposomes may have one or bilayer membranes. The vesicle size is an acute parameter in determining the circulation half-life of liposomes, and both size and number of bilayers affect the amount of drug encapsulation in the liposomes. Liposomes can also be classified into one of two categories: (1) Multilamellar vesicles (MLV) and (2) unilamellar vesicles. Unilamellar vesicles can also be classified into two categories: (1) Large unilamellar vesicles and (2) small unilamellar vesicles. In unilamellar liposomes, the vesicle has a single phospholipid bilayer sphere enclosing the aqueous solution. In multilamellar liposomes, vesicles have an onion structure. Classically, several unilamellar vesicles will form on the inside of the other with smaller size, making a multilamellar structure of concentric phospholipid spheres separated by layers of water [7-9]. Liposomes are found to be suitable for localization of topically applied drugs at or near the site of application because they may act as slowreleasing vehicles. Topical drug delivery is a pleasing route for local and systemic treatment. The delivery of drug through topical route is the most effective treatment for the skin diseases [10]. Finally, liposomal drugs exhibit reduced toxicities and retain enhanced efficacy compared with free complements. However, based on the pharmaceutical applications and available products, liposomes have definitely established their position in modern delivery systems [6]. Fluconazole (FLZ) is a first-generation water-soluble triazole antifungal medication that is administered orally or intravenously. It is used to treat a variety of fungal infections, especially Candida infections of the vagina, mouth, throat, bloodstream, fungal keratitis, tinea infection, and coccidioidal meningitis. It is now available as tablet, capsule, injection, and eye drop formulations. The dosage forms have well-known side effects including nausea, vomiting, diarrhea, headache, and abdominal pain. To reduce the disadvantages, the topical gel formulation has been proposed [11]. A gel is a two-component, crosslinked three-dimensional network consisting of structural materials interspersed by an adequate but proportionally large amount of liquid to form an infinite rigid network structure, which immobilizes the liquid continuous phase within [12]. Both hydrophilic and lipophilic drugs can be easily encapsulated in liposomal formulation, and dispensing in the form of carbopol gel was found to be well suited and sound approach to obtain stable liposomal formulation [13].

Itraconazole One of the triazole antifungal agents that inhibits cytochrome P-450-dependent enzymes resulting in impairment of ergo sterol synthesis. It has been used against histoplasmosis, blastomycosis, cryptococcal meningitis & aspergillosis.Itraconazole interacts with 14-α demethylase, a cytochrome P-450 enzyme necessary to convert lanosterol to ergosterol. As ergosterol is an essential component of the fungal cell membrane, inhibition of its synthesis results in increased cellular permeability causing leakage of cellular contents. Itraconazole may also inhibit endogenous respiration, interact with membrane

phospholipids, inhibit the transformation of yeasts to mycelial forms, inhibit purine uptake, and impair triglyceride and/or phospholipid biosynthesis. Chemical formula is $C_{35}H_{38}Cl_2N_8O_4$. IUPAC Name is 1-(butan-2-yl)-4-{4-[4-(4-{[(2R,4S)-2-(2,4-dichlorophenyl)-2-[(1H-1,2,4-triazol-1-yl)methyl]-1,3-dioxolan-4-yl]methoxy}phenyl)piperazin-1-yl]phenyl}-4,5-dihydro-1H-1,2,4-triazol-5-one The main aim of the present work is Formulation and in-vitro characterization of the Itraconazole liposomal drug delivery. The objectives are liposomes are prepared by using film hydration technique by using rotary evaporator**,** For the preparation of liposomes cholesterol and cholins are used, to improve the bio availability of a drug, to enhance the patient compliance, Finally, completion of formulation the evaluation parameters were conducted.

MATERIAL AND METHODS:

Materials: The materials used in the present investigation were either AR/ LR grade or the best possible pharma grade.

Table No.1 Material Details

S.NO	INGREDIENTS	MANUFACTURES
1.	Itraconazole	Aurobindo Laboratories Ltd
2.	Phosphotidylcholin	Hi-Media laboratories Pvt.Ltd,Mumbai
3.	Cholesterol	S.D.Fine chemicals Pvt.Ltd, Mumbai
4.	Chloroform	S.D.Fine chemicals Pvt.Ltd, Mumbai
5.	Tween 80	Merck specialitiesPvt.Ltd.,Mumbai
6.	Methanol	Merck specialitiesPvt.Ltd.,Mumbai
7.	Sodium chloride	S.D.Fine chemicals Pvt.Ltd, Mumbai
8.	Potassium chloride	S.D.Fine chemicals Pvt.Ltd, Mumbai
9.	Di-sodium hydrogen ortho phosphate	S.D.Fine chemicals Pvt.Ltd, Mumbai
10.	Potassium dihydrogen phosphate	Merck specialitiesPvt.Ltd.,Mumbai

Api charecterization:

Pre-formulation studies:

It is one of the important prerequisites in development of any drug delivery system. Pre-formulation studies were performed on the drug, which included organoleptic characters, determination, solubility and compatibility studie

Solubility: Solubility of Itraconazole was determined in water, acetone, methanol, ethanol, dmso (dimethyl sulfoxide)

Compatibility Studies: Compatibility with excipients was confirmed by carried out I R studies. The pure drug and its formulations along with excipients were subjected to IR studies

Standardcalibration curve:

Standard calibration curve of Itraconazole was developed using phosphate buffer pH 7.4and estimated byUV-Visible spectrophotometer at 250 nm.

General procedurefor thepreparationofcalibrationcurveby uv:

A stock solution of (1mg/ml) of standard drug was prepared, by taking 10mg of drug in 10 ml of buffer in 10ml of volumetric flask it is 1000ppm or primary stock solution. Then take 1ml from the 1000ppm in another 10 ml of volumetric flask it is 100 ppm or secondary stock solution. From this take 1 ml of solution to another 10 ml of volumetric flask and make with buffer solution it is 10ppm or tertiary stock solution. The absorbance of these solutions was measured at respective wave length of maximum absorbance, using LAB INDIA UV- Visible spectrophotometer at 250nm.Absorbancevalueswere plotted against respective concentration to obtain standard calibration curve.

Drug-excipient compatibility studies:

Infrared (IR) spectroscopy was conducted using a FTIR Spectrophotometer (Bruker) and the spectrum was recorded in the wavelength region of 4000 to 400 cm−1. The procedure consisted of dispersing a sample (drug alone or mixture of drug and excipients) in KBr and compressing into discs by applying a pressure of 5 tons for 5 min in a hydraulic press. The pellet was placed in the light path and the spectrum was obtained.

Formulation of conventional liposomes of itraconazole:

Table No.2 FORMULATION OF CONVENTIONAL LIPOSOMES OF ITRACONAZOLE

Ingredients	F1	F2	F3	F4	F5	F6	F7	F8	F9
Drug(mg/ml)	20	**20**	20	20	20	20	20	20	20
Phosphotidyl choline (mg)	150	**160**	170	180	200	210	220	230	240
Cholesterol(ml)	60	**30**	90	120	90	120	130	130	130
Chloroform(ml)	5	**5**	5	5	5	5	5	5	5
Tween 80(ml)	…..	**0.5**	…..	…..	0.5	0.5	0.5	0.5	0.5
PBS 7.4(ml)	10	**10**	10	10	10	10	10	10	10
Hydration time	20	**35**	30	20	30	30	30	30	30

Procedure for the preparation of itraconazole liposome:

The preparation of liposomes with So bean lecithin was prepared by dried thin film hydration technique using a rotary evaporator (Aditya scientific). Phospotidylcholin, cholesterol tween 80 and were dissolved in 10 mL chloroform in 250mL round bottom (RB) flask. The chloroform was evaporated under vacuum using rotary flash evaporator, which allows phospotidylcholin to form a thin dry film on the walls of the flask. This system was maintained at vacuum and 40°C for an additional 10min, after complete removal of organic solvent as indicated by visual observations. Vesicles were prepared by hydrating the lipid film in the presence of 10mL phosphate buffer pH 7.4. Liposomes formed were sonicated for 30 min. to reduce the size of the vesicles.

Drug entrapment efficiency or drug content:

Entrapment efficiency of Liposomes was determined by centrifugation method. Aliquots (1 ml) of liposomal dispersion were subjected to centrifugation on a laboratory centrifuge (REMI CM-12 PLUS) at 3500 rpm for a period of 90 min. The clear supernatants were removed carefully to separate non-entrapped Itraconazole and absorbance recorded at 250 nm. The sediment in the centrifugation tube was diluted to 100 ml with phosphate buffer pH 7.4 and the absorbance of this solution was recorded at 250 nm. Amount of Itraconazole in supernatant and sediment gave a total amount of Itraconazole in 1 ml dispersion.

The amount of drug loaded was determined by the formula:

Drug loading = Total amount of drug in solution – amount drug present in supernatant % of drug content = (amount of drug loaded / Total drug) x 100

Particle size analysis:
Particle size of the formulations was observed under a scanning electron microscope (Hitachi), one drop of Liposomes suspension was mounted on the stab covered with clean glass and coated with gold and were observed under the scanning electron microscope at an accelerating voltage of 15KV and photomicrographs of suitable magnification was obtained.

Zeta potential analysis:
Zeta potential is a physical property which is exhibited by any particle in suspension. It can be used to optimize the formulations of suspensions and emulsions. Knowledge of the zeta potential can reduce the time needed to produce trial formulation. It is also an aid in predicting long-term stability. The magnitude of the zeta potential gives an indication of the potential stability of the colloidal system. If all the particles in suspension have a large negative or positive zeta potential then they will tend to repeal each other and there will be no tendency for the particles to come together. However, if the particles have low zeta potential values, then there will be no force to prevent the particles coming to get her and flocculating.

The significance of zeta potential is that its value can be related to the stability of colloidal dispersions. So, colloids with high zeta potential (negative or positive) are electrically stabilized while colloids with low zeta potentialst end to coagulate or flocculate. Value of 25Mv (positive or negative) can be taken as the arbitrary value that separates low-charged surfaces from high-charged surfaces. The zeta potential was analyzed by MALVERN ZETASIZER

In vitro drug release study:
The in-vitro dissolution studies were performed by using 7.4 pH buffer solution as a medium. In vitro drug release studies were carried out using Franse diffusion cell apparatus at 37 ± 0. 5°C.The franse diffusion containing donor compartment and receptor compartment. The semipermeable membrane is placed on receptor compartment the prepared microspheres are kept in donor compartment. The liposomes are kept in donor medium take 5ml of 7.4 buffer solution in receptor medium take 5ml of 7.4 buffer medium the magnetic bead is placed in receptor medium. The frans diffusion cell placed on magnetic stirring the drug release studies carried out for 8 hours. The time interval is 1hour every time.

Releasekinetics (harris shoaib*et al.,* 2006):
To analyze the *in vitro* release data various kinetic models were use to describe the release kinetics. The zero order rate Eq.(2)describes the systems where the drug release rate is independent of its concentration. The first order Eq. (3) describes the release from system where release rate is concentration dependent. Higuchi (1963) described the release of drugs from insoluble matrix as a square root of time dependent process based on Fickian diffusion.
The results of *invitro* release profile obtained for all the formulations were plotted in modes of data treatment as follows:

1. Zero -order kinetic model– Cumulative% drug released versus time.
2. First–order kinetic model–Log cumulative percent drug remaining versus time.
3. Higuchi's model–Cumulative percent drug released versus square root of time.
4. Kors Meyer equation/ Peppa's model–Log cumulative percent drug released versus log time.

Zero order kinetics:
Zero order release would be predicted by the following equation:
$At = A0 – K0t$
When the data is plotted as cumulative percent drug release versus time, if the plot is linear then the data obeys Zero – order kinetics and its slope is equal to Zero order release constant K0**.**

First order kinetics:
First - order release could be predicted by the following equation:
$\text{Log } C = \log C0 – Kt / 2.303$
When the data plotted as log cumulative percent drug remaining versus time, yields a straight line, indicating that the release follow first order kinetics. The constant „K1" can be obtained by multiplying 2.303 with the slope value.

Higuchi's model:
Drug release from the matrix devices by diffusion has been described by following Higuchi's classical diffusion equation.
$Q = [D\epsilon / \tau(2A – \epsilon Cs) Cst]1/2$

When the data is spitted according to equation i.e. cumulative drug release versus square root of time yields a straight line, indicating that the drug was released by diffusion mechanism. The slope is equal to „K" (Higuchi's 1963).

Korsmeyer equation / peppa's model:
To study the mechanism of drug release from the liposomal solution, the release data was also fitted to the well-known exponential equation (Korsmeyer equation/ Peppa's law equation), which is often used to describe the drug release behavior from polymeric systems.

$Mt / M\alpha = Ktn$

Short term stability studies:
Stability studies were performed to inspect the leakage of the drug from the liposome during storage. Liposomal suspensions of ITRACONAZOLE of optimized formulations were sealed in 20 mL glass vials and stored at refrigeration temperature (2–8 °C) and room temperature (25 ± 2 °C / 60 ± 5 % R.H) for a period of 2 months. Samples from each liposomal formulation which are kept for examination were withdrawn at definite time intervals. The withdrawn samples were In-vitro drug release studies at 250 nm.

RESULTS:

physical properties:
Organoleptic properties:

Table No.3 showing organoleptic characters of the drug

Properties	Results
Description	White crystalline powder
Taste	Taste less
Odour	Odour less
Colour	White cream

discussion: The above physical parameters are done in pre formulation studies.
Solubility studies:

Table No.4 Table showing solubility studies for the drug

solvent	Results
water	in soluble
methanol	Sparingly soluble
acetone	Slightly soluble

discussion: The solubility studies are done it is freely soluble in the alcohol. soluble in ethanol and methanol.

Calibration curve of Itraconazole in 7.4 ph buffer:

Table No.5 Table showing calibration values

Concentration(µg)	**Absorbance(nm)**
0	0
10	0.2
20	0.30
30	0.47
40	0.66
50	0.74

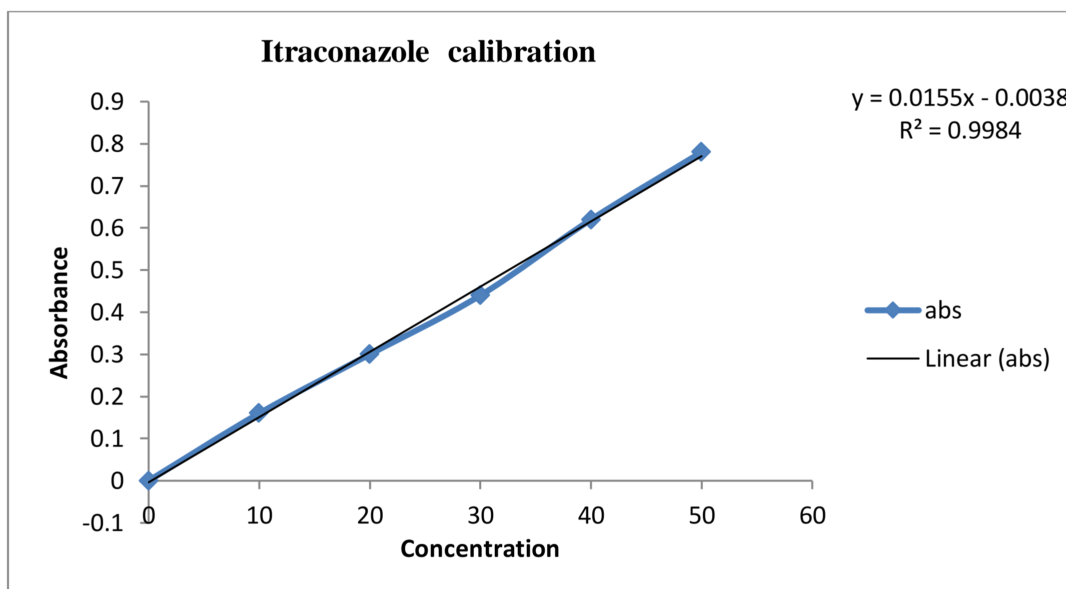


Fig.no:1 Figure showing calibration graph

FTIR: **Range of groups Wave number**

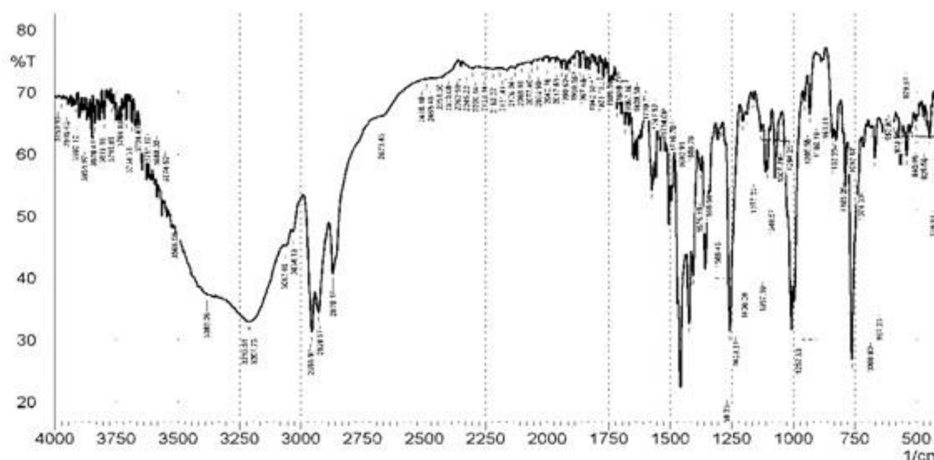


Fig.no 11: **Range of groups Wave number**

S.No.	Functional groups	Range of groups Wave number cm^{-1}
1.	N-H stretching	3400-3500
2.	C-H stretching(alkane)	2960-2850
3.	C=O stretching(aldehyde)	1720-1740
4.	N-H bending	1500-1650
5.	C=C stretching(aromatic)	1450-1600
6.	C-N vibration	1000-1400
7.	C-H bendig(aromatic)	750-850

Table.no:6: **Range of groups Wavenumber**

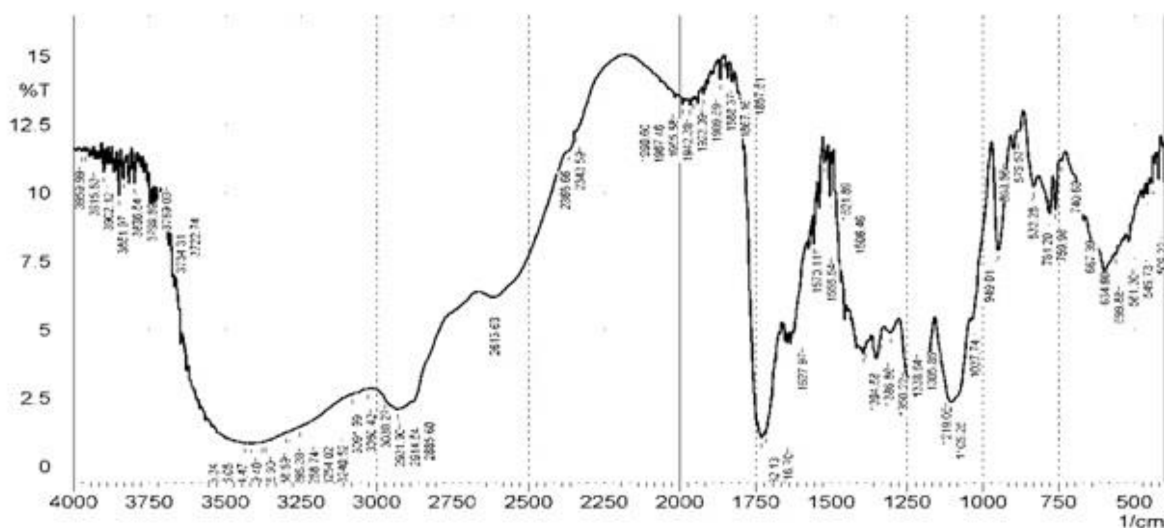


Table No.6 Range of groups Wavenumber

S.No.	Functional groups	Range of groups Wavenumber cm^{-1}
1.	N-H stretching	3400-3500
2.	C-H stretching(alkane)	2960-2850
3.	C=O stretching(aldehyde)	1720-1740
4.	N-H bending	1500-1650
5.	C=C stretching(aromatic)	1450-1600
6.	C-N vibration	1000-1400
7.	C-H bendig(aromatic)	750-850

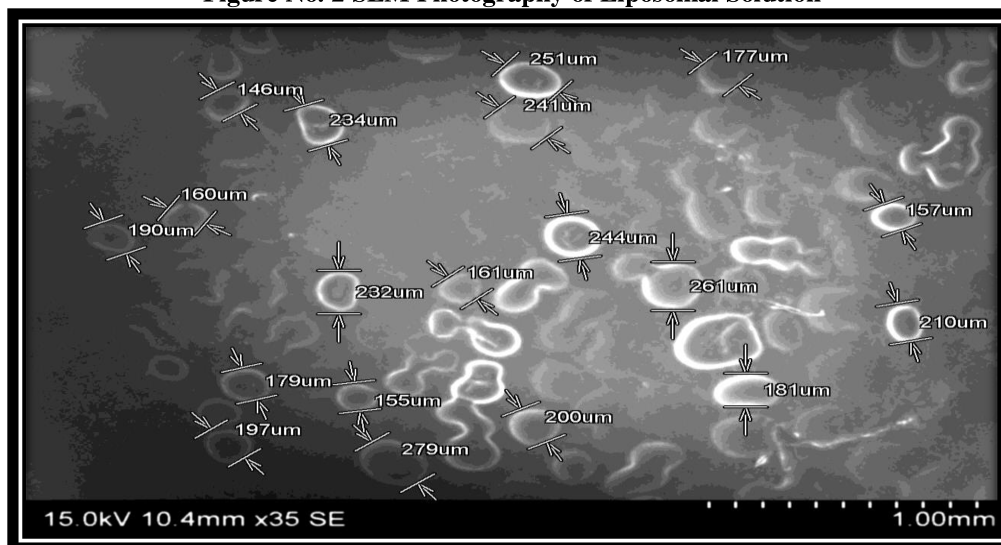
Table No.7 Drug Entrapment Efficiency of Itraconazole

S.NO	FORMULATION CODE	PERCENTAGE Entrapped Drug
1	F1	79.75
2	F2	82.96
3	F3	82.62
4	F4	78.39
5	F5	78.86
6	F6	82.32
7	F7	89.65
8	F8	90.23
9	F9	95.81

Inference:
The percentage entrapment was maximum F is 79.75% and minimum for F9 is 95.81 %. The data suggests that concentrations with respect to the formulation represent the critical value up to which the entrapment increased and beyond that its start decreasing

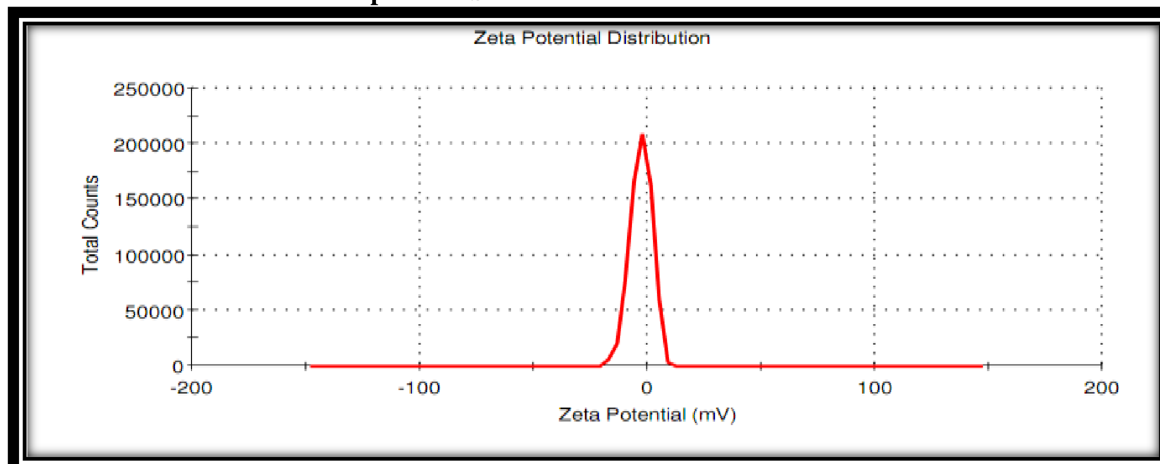
Particle size analysis:
SEM Photography of Liposomal Solution for F9 Formulation:

Figure No. 2 SEM Photography of Liposomal Solution



Inference: The shape and morphology of the liposome droplet was determined by SEM show the round shape, smooth surface and nano size range of vesicle. Demonstrating Multi lamellar vesicles structure under electron microscopic study confirming the vesicle characteristics.

Zeta Potential for Decitabine Liposomal Solution forF9 Formulation:



Fg.no3: **Zeta Potential for Decitabine Liposomal Solution forF9 Formulation**

Inference: The zeta potential of optimized formulation (F9) which is selected based on entrapment efficiency. The value was -0.271 mV which indicates that the surface of liposomes is dominated by the anions and proved that prepared liposome has sufficient charge to avoid aggregation of vesicles.

In vitro dissolution data:

Table No.8 In Vitro Cumulative % Drug Release Profile of itraconazole Liposomal Formulations

Time(Hr)	F1	F2	F3	F4	F5	F6	F7	F8	F9
0	0	0	0	0	0	0	0	0	0
1	8.29	5.68	10.65	12.74	13.11	15.13	17.23	19.56	19.31
2	15.36	12.21	20.21	25.31	26.05	28.06	25.64	26.53	26.53
3	33.53	25.34	32.85	40.5	42.92	45.01	48.65	49.32	52.34
4	78.21	32.56	45.56	49.9	53.53	62.62	64.53	66.53	68.95
5	95.85	48.65	52.56	59.78	64.86	68.07	72.35	75.42	78.23
6	-	62.35	67.59	70.84	74.25	78.67	80.35	82.34	84.65
7	-	73.56	71.65	75.32	79.65	80.86	82.65	86.95	90.95
8	-	75.13	78.65	85.32	87.32	88.98	90.65	89.65	96.53

Fig No.: all comparative drug profile

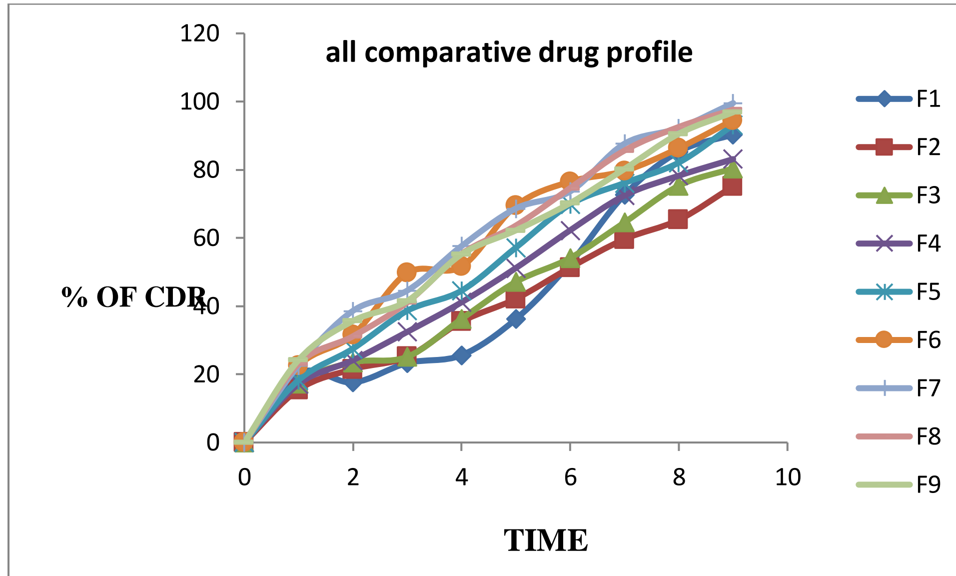


Table No.9 Comparative profile for F1-F3:

Time(Hr)	F1	F2	F3
0	0	0	0
1	8.29	5.68	10.65
2	15.36	12.21	20.21
3	33.53	25.34	32.85
4	78.21	32.56	45.56
5	95.85	48.65	52.56
6	-	62.35	67.59
7	-	73.56	71.65
8	-	75.13	78.65

Fig4. **F1-F3 GRAPHS**

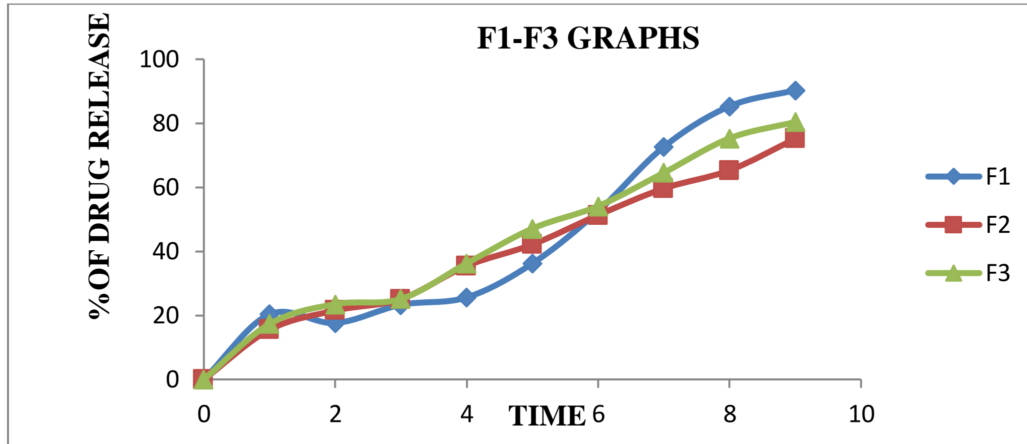


Table No.10 Comparative profile fro F4-F6:

Time(Hr)	F4	F5	F6
0	0	0	0
1	12.74	13.11	15.13
2	25.31	26.05	28.06
3	40.5	42.92	45.01
4	49.9	53.53	62.62
5	59.78	64.86	68.07
6	70.84	74.25	78.67
7	75.32	79.65	80.86
8	85.32	87.32	88.98

Fig.no5: **F4-F6 GRAPHS**

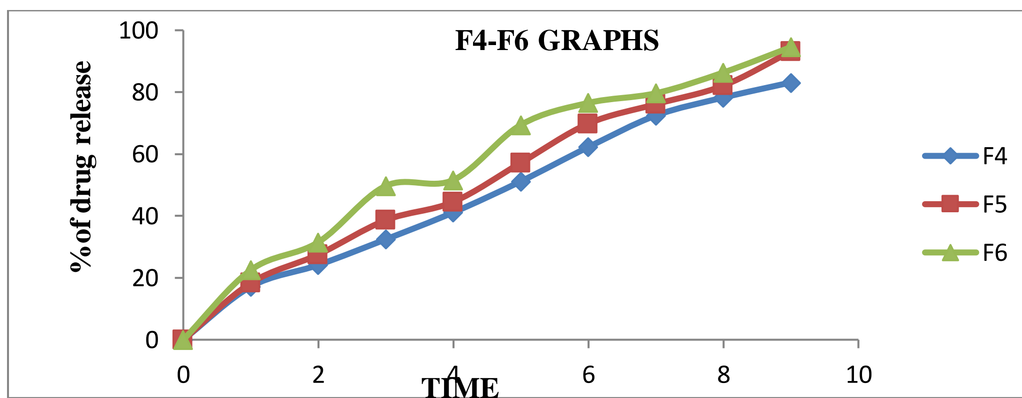
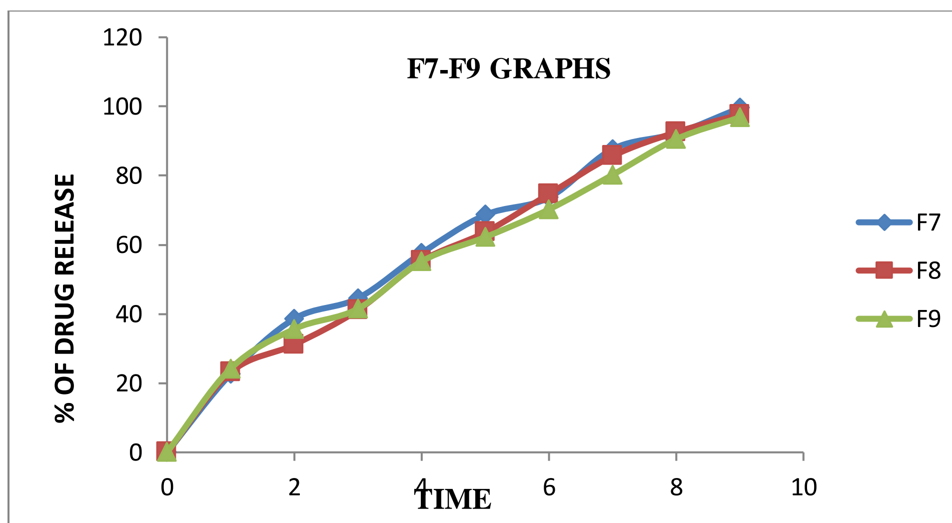


Table No.11 Comparative profile for F7-F9:

Time(Hr)	F7	F8	F9
0	0	0	0
1	17.23	19.56	19.31
2	25.64	26.53	26.53
3	48.65	49.32	52.34
4	64.53	66.53	68.95
5	72.35	75.42	78.23
6	80.35	82.34	84.65
7	82.65	86.95	90.95
8	90.65	89.65	96.53

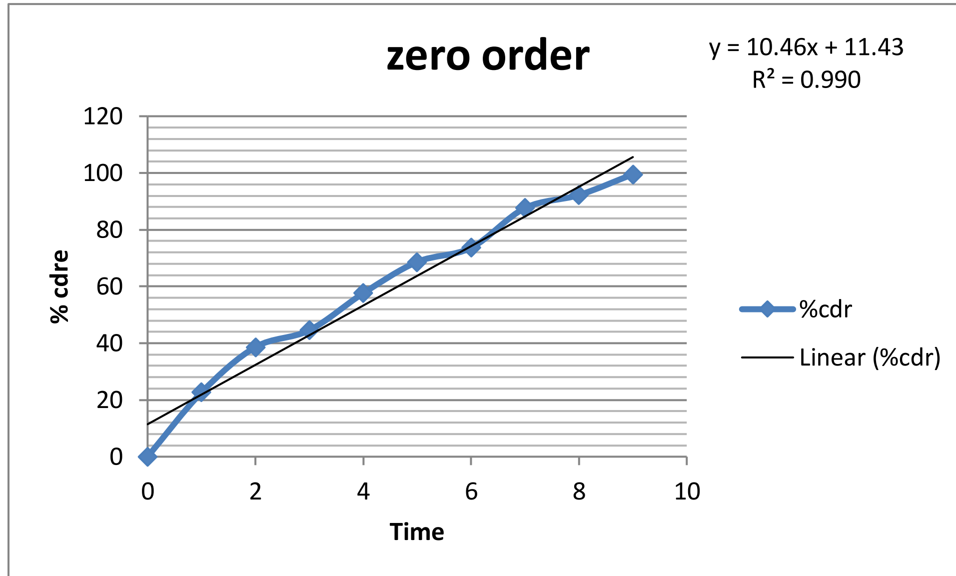
Table No.12 Kinetic studies for optimised formulation(F9):



Time	%cdr	Log T	√T	Log%cdr	ARA	Log%ARA
0	0	1	0	1	100	2
1	19.31	0	1	1.373	77.35	1.882
2	26.53	0.303	1.414	1.597	61.38	1.7808
3	52.34	0.472	1.732	1.658	55.44	1.7359
4	68.95	0.66	2	1.775	42.38	1.6061
5	78.23	0.697	2.236	1.842	31.35	1.4821
6	84.65	0.771	2.449	1.873	26.35	1.4039

7	90.95	0.848	2.645	1.947	12.35	1.0549
8	96.53	0.909	2.828	1.978	7.77	0.678

Table.No:12 Table showing kinetic profile data



Zero order plot:
Fig.**No: 9 Picture showing zero order kinetic graph of F9**
First order:

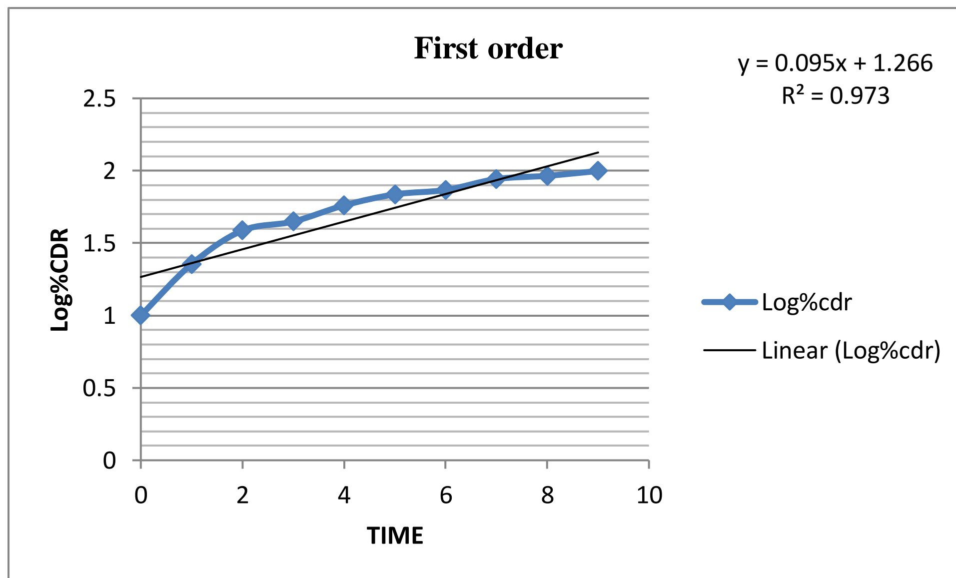


Fig.No: 6 Picture showing first order kinetic graph of F9

Higuchi order:

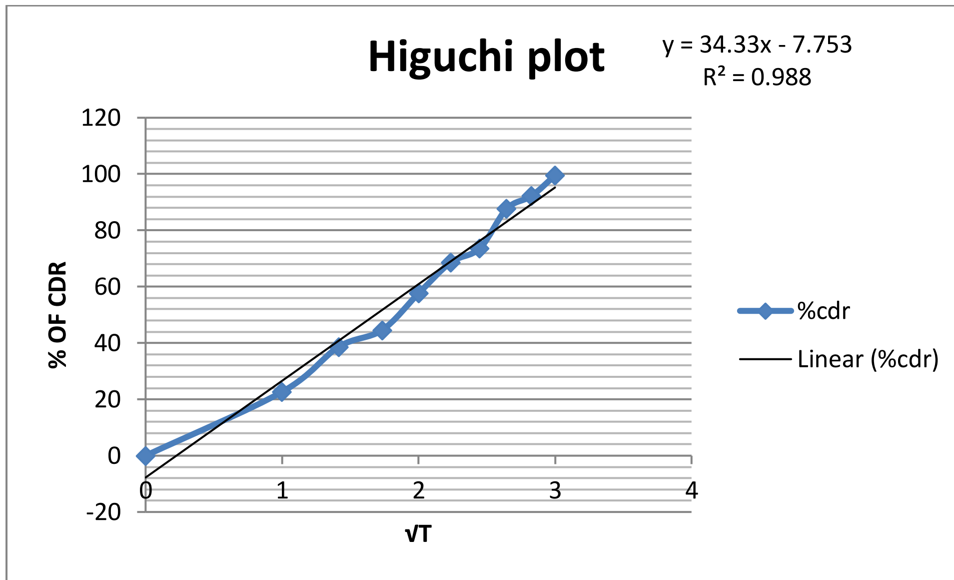


Fig.No: 7 Picture showing higuchi kinetic graph of F9

Korsmeyerpeppas plot:

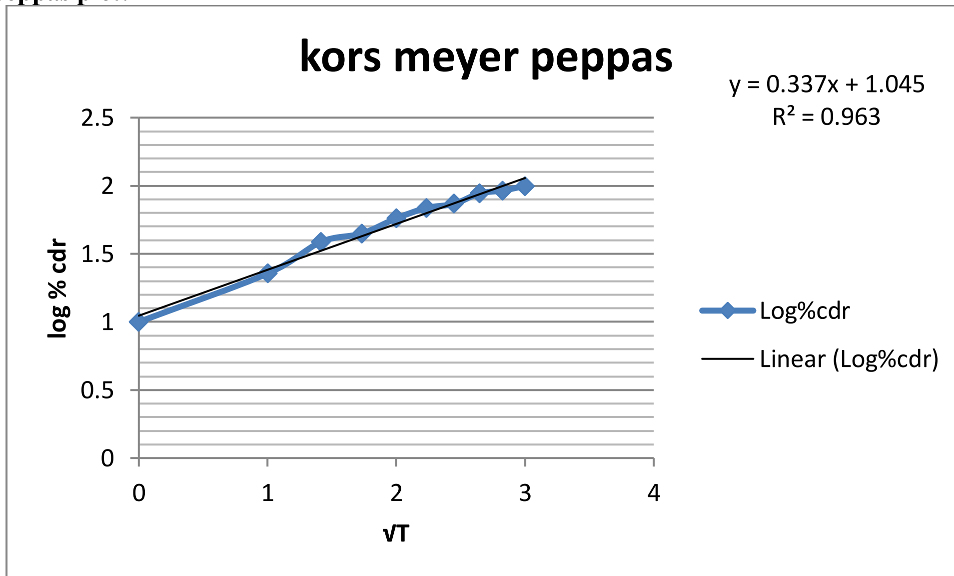


Fig. No: 8 Picture showing korsmeter kinetic graph of F9

S.no	**Zero order**	**First order**	**Higuchi**	**Krossmayerpeppas**
Code	R^2	R^2	R^2	R^2
F9	0.990	0.973	0.988	0.963

Table.No: 13: Table showing values of the kinetic data:

Discussion: It was concluded that the optimized formulation F9, followed zero order release where the regression value was found to be 0.900It was also found that the drug was released by diffusion as the regression in Higuchi's plot was 0.988.

Stability Results:

Stability samples are stored at

- Accelerated: 40±2^{0}C/75±5% RH
- Intermediate: 30±2^{0}C/65±5% RH
- Long term: 25±2^{0}C/60±5% RH

Testing Intervals

- Accelerated: Initial, 3months.

Table 14: showing values of the kinetic data

S.NO.	TIME(Hrs)	intial	F-9 1M	F-9 2M	F9 3M
1	0	0	0	0	0
2	1	19.31	18.50	19.26	17.20
3	2	26.53	26.50	28.10	27.10
4	3	52.34	50.48	52.45	55.75
5	4	68.95	65.10	64.65	68.56
6	5	78.23	77.27	79.14	77.22
7	6	84.65	84.36	86.42	87.52
8	7	90.95	92.58	90.15	91.27
9	8	96.53	97.64	98.64	97.58

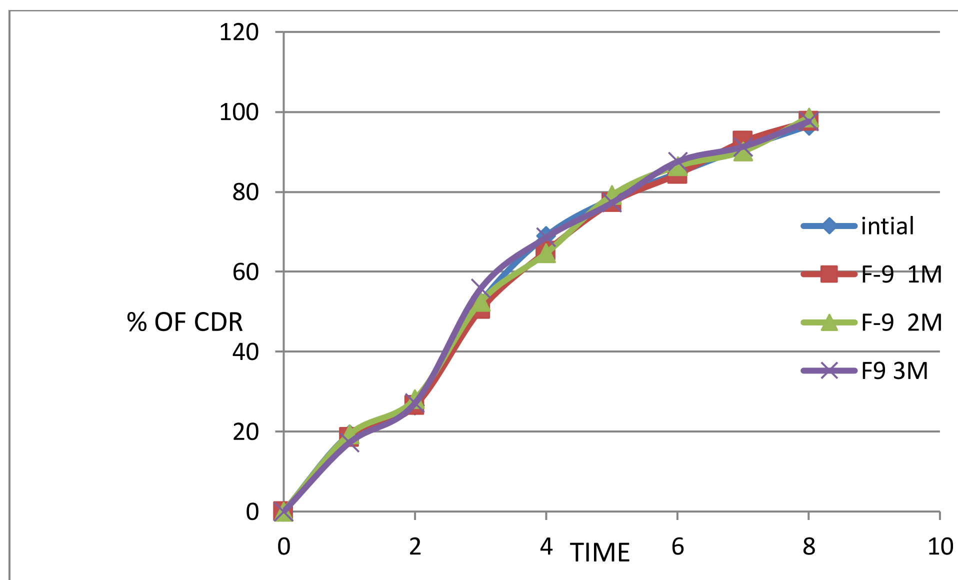


Fig.no 9:**showing values of the kinetic data**

SUMMARY AND CONCLUSION:

Pre-itemizing study for the prescription surfactant similitude by FTIR gave consistence about their prudence and showed no correspondence among drug and picked surfactant various definitions were made by using nonionic surfactants (cholesterol, length 60) these are wobbly film hydration.

Made liposomes were surveyed for size and shape, surface morphology, drug catch viability, in vitro drug release studies, trustworthiness properties. The best snare viability and the best in-vitro drug release profile were refined by definitions. it was contemplated that, itraconazole was actually exemplified into liposomes.

A couple in vitro and in vivo depictions of both the medicine stacked liposomes and motion pictures were performed.
itraconazole was first trapped in different liposomes definitions, and prescription stacked liposomes with little size, low polydispersity, and high EE were picked for joining into different speedy dissolving films, which were then evaluated for different real characteristics.

The ideal liposomes film showed upheld appearance of the medicine stood out from the relieved film containing the free prescription.

The in vitro release energy of medicine from the liposomes suspension and liposomes film followed the Higuchi scattering model. Moreover, the in vivo study in bunnies showed in a general sense higher rate and level of ketoconazole ingestion from sublingual fast dissolving liposomes film appeared differently in relation to that from oral business tablets.

Accordingly, the inside and out bioavailability of the prescription after sublingual association was in a general sense higher than that after oral tablet association. These results exhibited that the coordinated sublingual fast dissolving liposomes film could have potential as a useful transport system to redesign the bioavailability and drag out the supportive effect of Ketoconazole, as such dealing with the patient consistence by discarding the necessity for customary dosing of the prescription.

REFERENCES:

1. Abolfazl A, Rogaie RS, Soodabeh D, Sang WJ, Nosratollah Z, Younes H, et al. Liposome: Classification, preparation, and applications. Nanoscale Res Lett 2013;8:102.
2. Agnieszka EW, Emilian A. Interfacial properties of phosphatidylcholinebased dispersed systems. Ind Eng Chem Res 2015;54:6489-96.
3. Zhenjun H, Xuan L, Ting Z, Yanzhi S, Zhennan S, Jing L, et al. Progress involving new techniques for liposome preparation. Asian J Pharm Sci 2014;9:176-82.
4. Maximiliano G, Claudia S, Carlos B, Adriana MC. Percutaneous drug delivery systems for improving antifungal therapy effectiveness: A review. Int J Pharm Pharm Sci 2014;6:8-16.
5. Loveleenpreet K, Prabhjot K, Khan MU. Liposome as a drug carrier-A review. Int J Res Pharm Chem 2013;3:121-8.
6. Kamra M, Diwan A. Liposomes in dermatological diseases. J Appl Pharm Res 2017;5:1-8.
7. Bhupendra P, Narendra K, Suman S, Amit R. Liposome: Method of preparation, advantages, evaluation and its application. J Appl Pharm Res 2015;3:1-8.
8. Gyati S, Davinder S, Abhay A. Novel vesicular carriers for topical drug delivery and their applications. Int J Pharm Sci Rev Res 2013;21:77-86.
9. Marilene E, Maria HA, Jaime C, José MS. Evolution of liposomal carriers intended to anticancer drug delivery: An overview. Int J Curr Pharm Res 2015;7:26-33.
10. Prasanthi D, Lakshmi PK. Vesicles-mechanism of transdermal permeation: A Review. Asian J Pharm Clin Res 2012;5:18-25.
11. Sudipta D, Arnab S, Ananya B. Design, development and evaluation of fluconazole topical gel. Asian J Pharm Clin Res 2015;8:132-5.
12. Gagan G, Tarun G, Basant M, Gaurav C, Goutam R, Amit KG. Development and characterization of niosomal gel for topical delivery of benzoyl peroxide. Drug Deliv 2016;22:1027-42.
13. Susanta P, Mayukh J, Anannya B, Sunirmal B, Joyeeta GR, Puja C. Topical liposomal gel: A new strategy of novel drug delivery. World J Pharm Pharm Sci 2016;6:568-77.