ORIGINAL ARTICLE

Formulation and Evaluation of Ethosomal Gel of Tazarotene for Topical Delivery

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Abstract

Objective: The aim of the present work was formulation and evaluation of the ethosomal gel of tazarotene for topical delivery. **Materials and Methods:** Preparation of tazarotene-loaded ethosomes and gel base, optimization of ethosomes by varying criteria - lipid concentration, ethanol concentration, drug concentration, and stirrer time. The optimized formulation code found as F-13. Characterization of ethosomes performed by vesicle size, surface charge, entrapment efficiency, and stability study. Characterization of ethosomes containing gel performed by the measurement of viscosity, pH measurements, drug content, extrudability study, spreadability, and *in vitro* drug diffusion study. **Results:** Gel was prepared and evaluated for viscosity, % entrapment, extrudability, spreadability, and drug release study. It was found that viscosity of prepared gel EG-13 was 178.37 ± 5.07 cps, pH was 6.9, % assay was 97.57 ± 2.49, extrudability was 170 g, and spreadability (g.cm/sec) was found as 5.16 (g.cm/sec), respectively. *In vitro* drug release from ethosomes was studied using Franz diffusion cell method and found 76.65 ± 0.48% in 12 h. Drug release from ethosomal formulation was found in very sustained and controlled manner. **Conclusion:** It was concluded that prepared gel containing tazarotene-loaded ethosomal formulation was optimized and successfully formulated in the gel form can be of use for topical preparation for its antiacne affect.

Key words: Acne, ethosomes, tazarotene, topical

INTRODCUTION

The body's growing skin normally covers the surface of 2 m^2 and receives about 33% of the circulation through the body. The skin has a top layer of epidermis that has different areas: Base layers, spiny layers, stratum granulosum, uppermost stratum granulosum, and lipid membranous sheet have protein (dead) cells. These extracellular membranes are unique in their composition and are made of free ceramides, cholesterol, and fatty acids.[1] The human skin surface is known to have normal hair follicles of 10–70 and 200–250 pots per capita of the skin surface. It is one of the mainly easiest reachable organs of the person body. The ability to use unmanned skin as a gateway to controlling the human body has long been recognized. However, the skin is a very difficult problem for the penetration of materials, which allow little medicine to penetrate the indefinite period. Widespread transmission of pills - delivery of medicines to the skin and systemic circulation - it is of paramount importance to local drug-based local drug use. Transmitted drug transmission disrupts access to the skin.[2]

Numerous methodologies have been endeavored to convey medicament crosswise over skin obstruction and upgrade the efficiency. The real considerations for transdermal transplantation are body strengthening (magnetophoresis, ultrasound, microneedle, iontophoresis, and electroporation), vesicles, particulate frameworks (microemulsion, strong lipid nanoparticle, and somes [lipo, nio, and transfer]), as well as chemical activators (sulfoxides, azones, glycols, alkanols, and terpenes).[3]

Numerous reports have revealed the success of ethosomes in successful delivery of transdermal agents. It also provides a decent open space for the distribution of medium and widespread molecules. The preparation of the ethosome is simple without the inclusion of complex materials and can be measured along these lines to modern dimensions. These

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vesicular frameworks are seen as deep archives for providing molecules of lipophilia different to and through *in vitro* skin and *in vivo* in the formulation and diagnosis.[4]

The pharmacological responses, both good therapeutic efficacy and antagonistic effects of drug, depend on the concentration of drugs in the area of activity, which is based on the dosage form and the extent of drug absorption in the area.[5]

In fact, this transdermal potential policeman provides a lot for the course by avoiding unexpected premature metabolism, extending the possible and beneficial effects of diminutive half-life medications, increasing physiological and theoretical reaction, and maintaining the distance from the drug gap, the dose of treatment, and, most importantly, the patient convince. However, a major problem in transdermal drug delivery is little infiltration by the external layer of the skin.[6]

Ethosomes changed the type of liposomes with elevated ethanol content. Ethosomes are made up of phospholipid, ethanol, as well as water. They know how to infiltrate the skin and improve the delivery of together compounds to deep skin as well as system. This ethanol fluidizes mutually ethosomal lipids along with bilayers of the stratum corneum intercellular lipid. The delicate, soft vesicles at that point infiltrate the scattered lipid bilayers. Ethosomes are delicate; vesicles are primarily made primarily of phospholipids, ethanol (highly concentrated) with water. These "soft vesicles" are new vesicular carriers for improved transdermal transport to/through skin.[7,8]

Transdermal medication conveyance remains the most supported method of administration. In any case, stratum corneum shapes the mainly imposing obstruction for the infiltration of medication all the way through the skin, to conquer the stratum corneum boundary; the utilization of lipid vesicles similar to ethosomes in conveyance frameworks has pulled in expanding consideration as of late.

MATERIALS AND METHODS

Materials

Tazarotene, API Grade was acquired from Scan Laboratory, Bhopal, India; cholesterol was purchased from Thomas Baker, Mumbai, India. Disodium hydrogen phosphate, dipotassium hydrogen orthophosphate, sodium chloride, Carbopol 934p, methylparaben, propylparaben, and propylene glycol purchased from S.D. Fine-Chem. Ltd., Mumbai, India. Methanol, ethanol, and chloroform purchased from Qualigens Fine Chemicals, Mumbai, India.

Methods

Preformulation studies of the selected drug

Physical evaluation

Physical assessment was performed by tangible characters - taste, appearance/feel of the medication, smell, and so on.

Solubility determination

Dissolvability of the medication was dictated by taking amount of medication (around 1–2 mg) in the test tube independently and included 5 ml of the solvent (water, ethanol, methanol, 0.1 N HCL, 0.1 N NaOH, chloroform, and 7.4 pH buffer). It was shaken vigorously and kept for some time. Solubility of the drug was noted in various solvents (at room temperature).[9]

Melting point

It is the known parameters to pass judgment on the cleanliness of medications. In the event of unadulterated synthetics, melting point is sharp and consistent. Since the medications contain the mixed synthetic substances, they are depicted with certain range of melting point. Method for determine melting point: A little amount of powder put hooked on a tube (fusion tube). Fusion tube was set in melting point deciding device (Chemline) consisting castor oil. Castor oil temperature bit by bit expanded, the temperature on which powder began near softens and the temperature once the entire powder gets melted is considered.

Estimation (determination) of pH (1% w/v solution)

About 100 mg of powder took and made to dissolve in 100 ml of distilled water with sonication and then filtered. The filtrate pH was verified with digital pH meter.

Identification test (Fourier-transform infrared (FTIR) spectroscopy)

Infrared range is imperative evidence which give adequate data about the structure of a compound. FTIR method gives a range containing a substantial figure of absorption band as of which an abundance of data can be inferred about the configuration of an organic compound. The area comprising 0.8 μ headed up to 2.5 μ is proclaimed near infrared and other from 15 μ headed up to 200 μ is proclaimed far infrared area. The IR range of sample drug (tazarotene) demonstrates the peak values which are qualities of the medication and the graph was appeared and IR range of the drug with all excipients graph was appeared.[10]

Loss on drying

The dampness within the solid can be communicated on a wet weight otherwise dry wet basis. On a wet weight basis, the water content of a material is determined as a level of the weight of the weight solid. The term loss on drying is a declaration of dampness content on a wet weight basis.[11] Loss on drying is straightforwardly estimated with IR moisture balance. Initially calibrate the instrument through knob

then taken 5.000 g test (powder) and put the temperature at 100°C–105°C for 15 min and at steady interpretation set the knob and check % moisture.

Determination of λ_{max} and Construction of Calibration Curve of Tazarotene at λ_{max} 351 nm

The λ_{max} of tazarotene was estimated by running the range of medication arrangement in double-beam ultraviolet (UV) spectrophotometer.[12] Precisely weighed 10 mg medication was dissolved in 10 ml of 7.4 pH buffer arrangement in 10 ml of volumetric flask, the came about arrangement 1000 µg/ml and from this arrangement 1 ml pipette out and move inside the 10 ml volumetric flask and volume put together by means of 7.4 pH buffer arrangement get ready reasonable dilution to make it to a concentration series of 5–25 µg/ml. The range of this arrangement was examined in 200–400 nm extend in U.V spectrophotometer (Labindia - 3000+). The spectrum climax point diagram of the absorbance of tazarotene versus wavelength appeared.

Preparation of Tazarotene-loaded Ethosomes

Soya PC (1% w/v) was dissolved in ethanol (25–45% v/v) furthermore heated to extend of 30 ± 1°C in a water bath, closed vessel arrangement. Drug solution in distilled water (1% w/v solution), earlier heated up to 30 ± 1°C, then added gradually in a fine flow to the over ethanolic lipid solution through non-stop addition by means of a magnetic stirrer at 900 rpm. Mixing sustained for another 5 min and to conclude, the resulted vesicular dispersions were left to cool at room temperature (25 ± 1°C) for a period of 45 min.[13]

Optimization of Ethosomes Strategy

Ethosome formulation code optimized based on the evaluation of mentioned strategy procedure resting on the source of average vesicle size and (%) entrapment efficiency (EE). Optimization of lipid concentration: In the ethosomal formulation, the ratio of lipid was optimized by taking their different ratio such as 0.5, 1.0, 1.5, and 2.0% w/v ratio and all other parameters were kept remain constant. Optimization of ethanol concentration: In the ethosomal formulation, the ethanol content was optimized by taking their different quantity such as 10, 15, 20, and 25 and all other parameters were kept remain constant. Optimization of drug concentration: Drug concentration optimized by taking different concentration of drug such as 1, 1.5, and 2.0% w/v and prepared their formulation and all other parameters such as Soya PC, stirrer time kept remain constant. Optimization of stirrer time: Stirrer time was optimized by stirring the formulation for different time, i.e., 5, 10, and 15 min.

Characterization of Tazarotene-loaded Ethosomes

Vesicle size

Microscopic investigation was done to decide the average size of ready ethosomes.[14] Formulation was thinned by means of distilled water and one drop was gone up against a glass slide and secured by means of coverslip. The prepared slide was examined under trinocular microscopic at ×400. The widths of in excess of 150 vesicles were arbitrarily estimated utilizing calibrated ocular and stage micrometer. The average diameter was considered using the flowing recipe.

$$\text{Average Diameter} = \frac{\sum n.d}{\sum n}$$

Where, n=Number of vesicles and d=Diameter of the vesicles.

Surface charge and zeta potential

The vesicles size and size allocation and surface charge were dictated by dynamic light scattering strategy (Malvern Zetamaster, ZEM 5002, Malvern, UK). Zeta potential estimation of the ethosomes depended resting on the zeta potential that was determined by Helmholtz–Smoluchowski as of their electrophoretic mobility. For estimation of zeta potential, a zetasizer was utilized by means of field quality of 20 V/cm on a large bore measure cell. Samples were thinned through 0.9 % NaCl accustomed to a conductivity of 50 lS/cm.

EE[15]

EE decided through measuring the concentration of unentrapped free drug in aqueous medium. Around 1 ml of the medication loaded ethosomes, dispersion was put in the Eppendorf tubes furthermore centrifuged at 10,000 rpm for 30 min. The ethosomes alongside encapsulated drug were isolated at the base of the tubes. Plain ethosomes without tazarotene were utilized as blank sample and centrifuged in a similar way. Hence, as to measure the free drug concentration, the UV absorbance of the supernatant was determined at 351 nm.

$$\%\,\text{Entrapment efficiency} = \frac{\text{Therotical drug content-}\\ \text{practical drug content}}{\text{Therotical drug content}} \times 100$$

Stability studies

Stability study was done for drug-loaded ethosomes at two different temperatures, i.e. refrigeration temperature (4.0 ± 0.2°C) and at room temperature (25–28 ± 2°C) for 3 months. The formulation subjected for stability study was put away in borosilicate compartment to maintain a strategic distance from any interface among the formulation and glass of container. The formulations were investigated for any physical changes and drug content.

Preparation of Gel Base

Carbopol 934 (1–3%w/v) was accurately weighed and dispersed into double distilled water (80 ml) in a beaker. This solution was stirred continuously at 800 rpm for 1 h, and then, 10 ml of propylene glycol was added to this solution. The obtained slightly acidic solution was neutralized by dropwise addition of 0.05 N sodium hydroxide solutions, and again, mixing was continued until gel becomes transparent. Volume of gel was adjusted to 100 ml and then sonicated for 10 min on bath sonicator to remove air bubbles. Final pH of the gel base was adjusted to 6.5. Gel was also prepared with plain drug by adding 10 mg of drug and dispersed properly by following same procedure given above. Ethosomes preparation comparing to 0.05% w/w of drug was fused into the gel base to get the ideal concentration of drug in gel base.

Characterization of Ethosomes Containing Gel

Measurement of viscosity

Viscosity measurements of prepared topical ethosomes based gel were measured by Brookfield viscometer using spindle no. 63 with the optimum speed of 10 rpm.

pH measurements

The pH of selected optimized formulations was established with the help of digital pH meter. The pH meter was calibrated with the help of buffer solution of pH 4, pH 7, and pH 9. After calibration, the electrode was dipped into the vesicles. Then, pH of selected formulation was measured and readings shown on display were noted.

Drug content

Accurately weighed 100 mg of topical ethosomal gel was taken in beaker and added 20 ml of methanol. This solution was mixed thoroughly and filtered by means of Whatman filter paper No. 1. Then, 1.0 mL of filtered solution was engaged in 10 mL capacity of volumetric flask; moreover, volume was ready up to 10 mL by means of methanol. This solution was analyzed using UV spectrophotometer at λ_{max} 351 nm.

Extrudability study

Extrudability was determined on the amount of the gel extruded as of collapsible tube on appliance of certain load. More the quantity of gel extruded shows better extrudability. It was determined by applying the weight on gel filled collapsible tube and recorded the weight on which gel was extruded from tube.

Spreadability[16]

Spreadability of formulation is necessary to provide sufficient dose available to absorb from skin to get good therapeutic response. An apparatus in which a slide fixed on wooden block and upper slide has movable and one end of movable slide tied with weight pan. To determine spreadability, 2–5 g of gel placed between two slides and gradually weight was increased by adding it on the weight pan and time required with the top plate to face the distance of 10 cm on adding 80 g of weight was noted. Good spreadability shows lesser time to spread.

$$\text{Spreadibility (g.cm/sec)} = \frac{\text{Weight tide to upper slide} \times \text{Lenth moved on the glass slide}}{\text{Time taken to slide}}$$

In vitro drug diffusion study

The *in vitro* diffusion study about is conveyed by utilizing Franz diffusion cell. Egg membrane is taken as semi-penetrable membrane for diffusion.[17] The Franz diffusion cell has receptor compartment with an effective volume roughly 60 mL and compelling surface area of permeation 3.14 sq.cm. The egg membrane is placed between the donor and the receptor compartment. A 2 cm^2 size patch taken and weighed then set on one face of membrane confronting donor compartment. The receptor medium is phosphate buffer pH 7.4. The receptor compartment is encompassed through water casing to keep up the temperature at 32 ± 0.5°C. Warmth is furnished utilizing a thermostatic hot plate with a magnetic stirrer. The receptor liquid is mixed by Teflon covered magnetic bead which is put in the diffusion cell. Amid each testing interim, samples are pulled back and replaced by equivalent volumes of fresh receptor liquid on each sampling. The samples withdrawn are analyzed spectrophotometrically at wavelength of drug 351 nm.

RESULTS AND DISCUSSION

Procured drug was odorless and light yellow powder in nature. In solubility study, it was observed that drug was without restraint soluble in ethanol, methanol, and soluble in acetone, DMSO, 0.1 N hydrochloric acid, chloroform, and phosphate buffer pH 7.4. It was completely insoluble in distilled water. Melting point of drug was found 95–96°C while it was 95°C reported in standard monograph. The pH of drug solution was found to be 6.9. Recognizable proof of tazarotene was finished by FTIR spectroscopy as for marker compound. Tazarotene was gotten as light yellow crystalline powder. It was recognized from the consequence of IR range according to specification. The obtained FTIR characteristic peaks of drug were matched with the peaks of drug given in standard monograph revealed similar [Figure 1].

The drug excipients interaction study was performed to check in interaction between drug and other formulation excipients by FTIR spectrum. There was no interface found between drug and excipients, and it was clearly seen and confirmed by FTIR spectrum scan graph of drug solution and mixture of drug and excipients. There was no fluctuation in characteristic band peaks of drug [Figure 2].

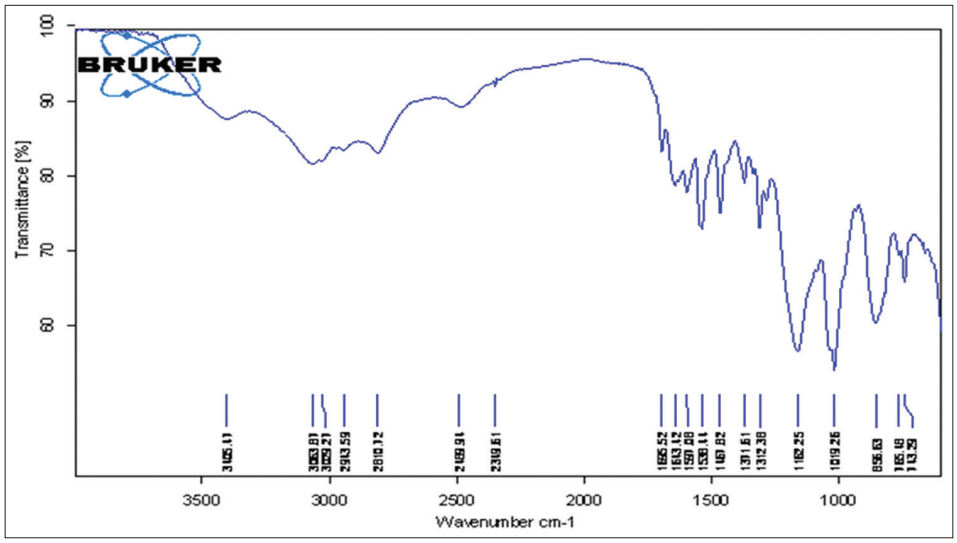

Figure 1: Fourier-transform infrared spectroscopy (FTIR) spectrum of pure drug (tazarotene)

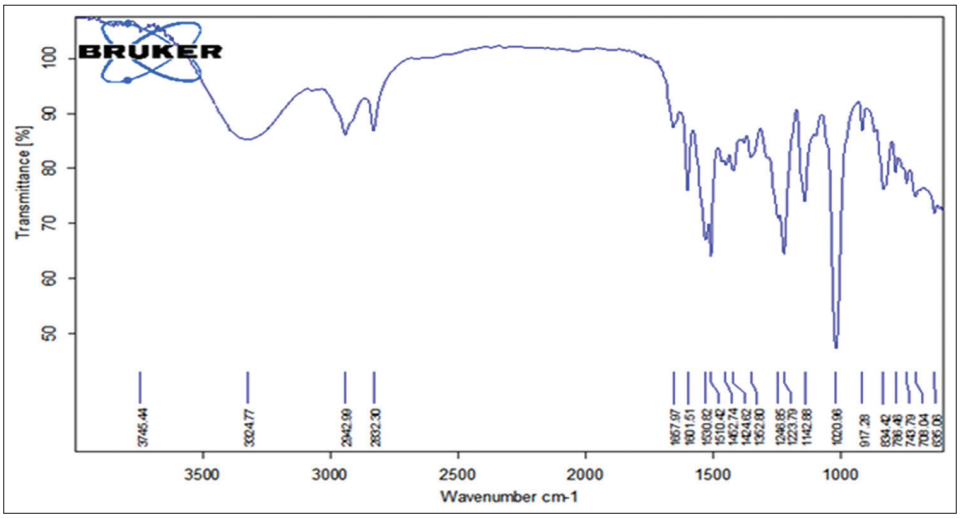

Figure 2: Fourier-transform infrared spectroscopy spectrum of pure drug and excipients (cholesterol)

IR spectrum of tazarotene + all excipients

Loss on drying is straightforwardly estimated with IR moisture balance and found the average % loss of drying as 1.72 ± 0.07. The drug solution was scan on ultraviolet-spectrophotometer at 200–400 nm in wavelength range to determine the maximum absorbance (λ_{max}) and it was found at 351 nm [Figure 3].

The calibration curve was prepared in phosphate buffer pH 7.4. The observations of the calibration curve captured in Table 1

The linear regression study was completed on absorbance data points. The outcome is as follows for standard curve [Figure 4].

Slope=0.015
The intercept=0.003
The correlation coefficient (r^2)=0.999.

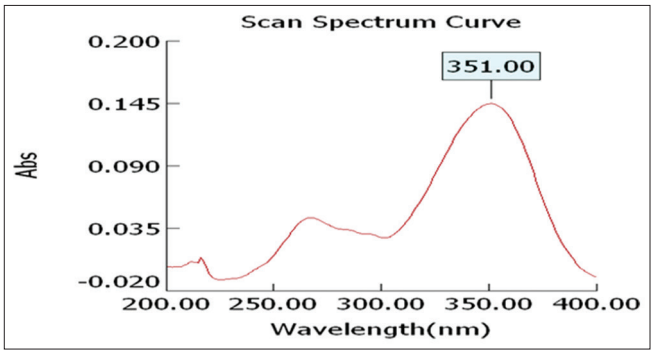

Figure 3: Wavelength maxima of tazarotene in phosphate buffer pH 7.4

The regression coefficient (R^2) was 0.999 which was showed the linearity of curve. The line of equation for the standard curve was y=0.015x + 0.003.

All the data of preformulation study were found similar as given in standard monograph which confirmed that the drug

Table 1: Calibration curve of tazarotene

Concentration (µg/ml)	Absorbances					
	I	II	III	Average	SD	%RSD
10	0.159	0.161	0.162	0.161	0.001	0.776
20	0.302	0.305	0.302	0.303	0.001	0.467
30	0.452	0.451	0.454	0.452	0.001	0.276
40	0.614	0.616	0.614	0.615	0.001	0.153
50	0.751	0.757	0.753	0.754	0.002	0.331

SD: Standard deviation

Table 2: Optimization of lipid concentration

Formulation code	Soya PC (% w/v)	Ethanol	Drug (% w/v)	Average vesicle size (nm)	% entrapment efficiency
F1	0.5	10	1.0	356.02±4.23	76.5±4.78
F2	1.0	10	1.0	251.05±3.12	72.03±3.39
F3	1.5	10	1.0	230.87±1.90	41.48±3.23
F4	2.0	10	1.0	287.43±1.90	28.73±2.14

Table 3: Optimization of ethanol concentration

Formulation code	Soya PC (% w/v)	Ethanol	Drug (% w/v)	Average vesicle size (nm)	% entrapment efficiency
F5	0.5	10	1.0	321.02±4.23	68.5±4.78
F6	1.0	15	1.0	248.05±3.12	75.03±3.39
F7	1.5	20	1.0	266.87±1.90	41.48±3.23
F8	2	25	1.0	274.43±1.90	28.73±2.14

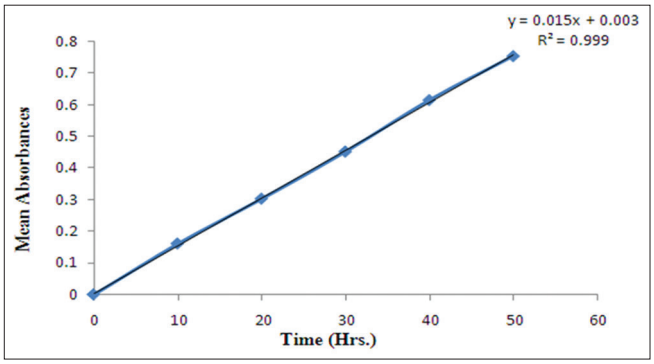

Figure 4: Curve (Calibration) of tazarotene within phosphate buffer pH 7.4 at 351 nm

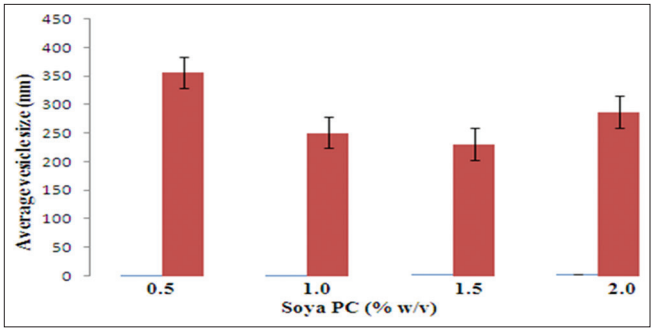

Figure 5: Optimization of lipid concentration

was authenticated and pure in form and it could be used for formulation development of tazarotene-loaded ethosomes.

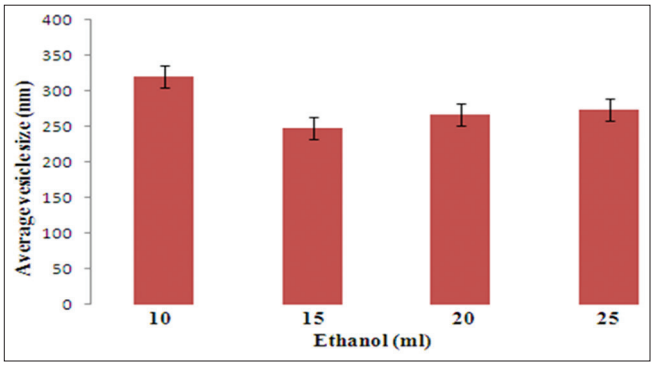

Figure 6: Optimization of ethanol concentration

Optimization of the ethosomes to generate the formulation code was done using the strategy as reflected in Table 2 and Figure 5 optimization of lipid concentration, Table 3 and Figure 6 optimization of ethanol concentration, Table 4 and Figure 7 optimization of drug concentration, and Table 5 and Figure 8 optimization of stirrer time. It was observed that the vesicles dimension of ethosomes was increased with raising the concentration of phosphatidylcholine and ethanol. There was no noteworthy difference observed in average vesicle size with increasing the drug concentration, but with increase in the stirrer time the size of vesicle decreased from 218.42±6.09 to 145.29±7.80 after 15 min of stirring. Considering the EE [Figures 9-12], it was observed that the percent drug entrapment decreased with escalating the concentration of ethanol and on escalating

Table 4: Optimization of drug concentration

Formulation code	Soya PC (% w/v)	Drug (% w/v)	Average vesicle size (nm)	% entrapment efficiency
F9	1.0	1.0	251.02±1.09	69.03±2.39
F10	1.0	1.5	262.25±3.37	75.56±2.49
F11	1.0	2.0	230.87±2.29	70.25±3.23

Table 5: Optimization of stirrer time

Formulation code	Soya PC: (% w/v)	Drug (% w/v)	Stirrer time (min)	Average vesicle size (nm)	% entrapment efficiency
F12	1.0	1.5	5	218.42±6.09	72.03±2.39
F13	1.0	1.5	10	178.37±5.07	73.03±2.49
F14	1.0	1.5	15	145.29±7.80	45.48±3.23

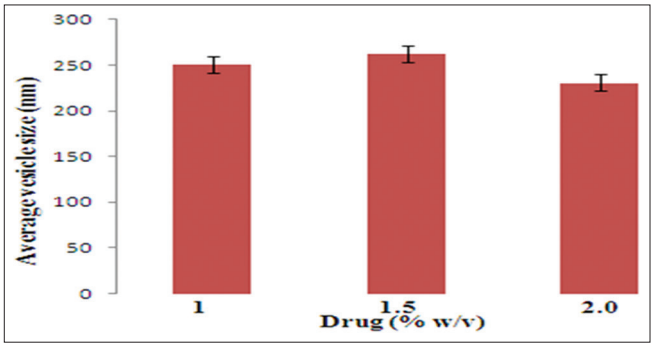

Figure 7: Optimization of drug concentration

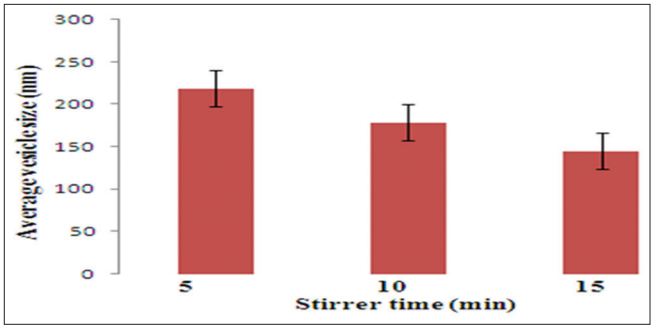

Figure 8: Optimization of stirrer time

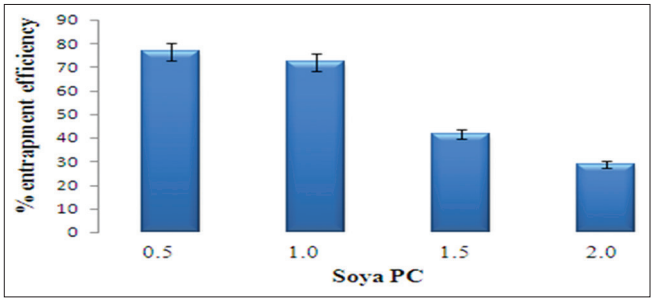

Figure 9: Effect of different ratio and concentration of soya PC on % entrapment efficiency

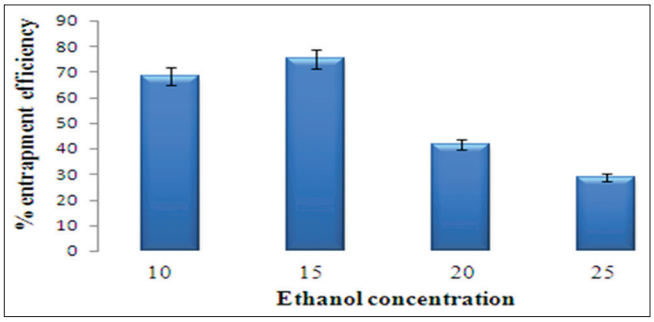

Figure 10: Effect of ethanol concentration on % entrapment efficiency

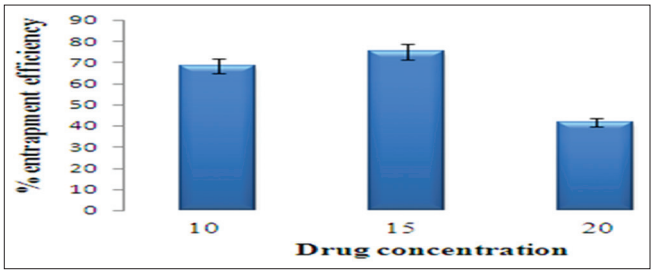

Figure 11: Effect of drug concentration of drug on % entrapment efficiency

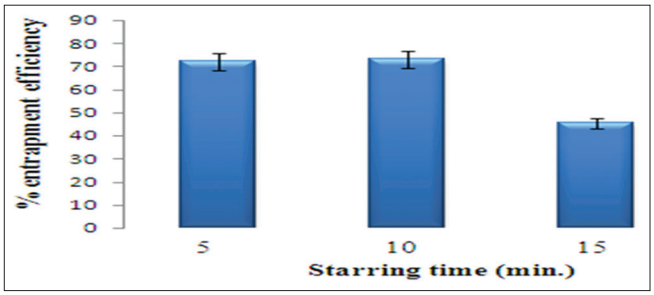

Figure 12: Effect of stirring time on % entrapment efficiency

the time of stirring. It is due to the leaching out the drug from vesicles on increasing the mechanical force by stirrer and size reduction of ethosomes on increasing the concentration of ethanol. It was clearly shown when formulation was stirred for 5, 10, and 15 min then the % EE was 72.03 ± 2.39, 73.03 ± 2.49, and 45.48 ± 3.23. 10 min

is selected as optimized time for stirrer because it provided the required size of vesicle 178.37 ± 5.07 nm and good % EE, i.e., 73.03 ± 2.49.

The resulted formulation code F-13 [Table 6] was considered as the optimized formulation. The average vesicle size of optimized formulation (F-13) observed as 178.37 ± 5.07 nm, zeta potential observed as −17.3 ± 2.4, and %EE was found as 73.03 ± 2.49%.

Stability study was performed on optimized formulation (F-13) and its characterization depicted in Table 7.

Stability study data revealed that the optimized formulation (F-13) was stable after 3 months of storage at 4.0°C ± 0. 2°C while at 25–28±2°C, the formulation was found unstable. Stability of formulation was observed on the basis of % drug remain, average vesicles size, and physical appearance [Figure 13].

Table 6: Optimized formulation ethosomes

Formulation code F-13	
Phospholipid (% w/v)	1
Drug (% w/v)	1.5
Ethanol (ml)	15
Stirrer time (min)	10

Prepared gel of ethosome loaded with tazarotene (EG-13) was prepared and evaluated for viscosity, pH, % drug content, extrudability, spreadability, and drug release study. It was found that viscosity of prepared gel was 178.37 ± 5.07 cps, pH was 6.9, % drug content was 97.57 ± 2.49, extrudability was 170 g of weight to extrude a 0.6 cm ribbon of gel in 6 s, and spreadability (g.cm/sec) was found as 5.16 (g.cm/sec), respectively. *In vitro* drug release (Table 8 and Figure 14) from ethosomes was examined using Franz diffusion cell method and found 76.65 ± 0.48% in 12 h. In the first 30 min, it was 14.56 ± 0.12 drug release which was slightly high. It was due to the release of free drug present in bag after leaching from ethosomes. Drug release from ethosomal formulation was found in very sustained and controlled manner.

Table 8: *In vitro* drug release study of prepared gel formulation

Time (hour)	% cumulative drug release
0.5	14.56±0.12
1	22.25±0.25
2	38.98±0.36
4	45.56±0.32
6	55.65±0.25
8	68.98±0.14
12	76.65±0.48

Table 7: Characterization of optimized formulation of the ethosomes formulation

Characteristic	Time (month)					
	1 month		2 months		3 months	
Temperature	4.0±0.2°C	25–28±2°C	4.0±0.2°C	25–28±2°C	4.0±0.2°C	25–28±2°C
Average particle size (nm)	178.37±5.07	192.56±3.43	179.32±2.49	238.54±4.87	186.84±5.84	265.54±6.99
% EE	67.37±2.52	65.62±1.39	62.37±2.52	60.25±1.08	59.56±2.52	55.69±2.11
Physical appearance	Normal	High turbid	Normal	High turbid	Normal	High turbid and agglomeration

EE: Entrapment efficiency

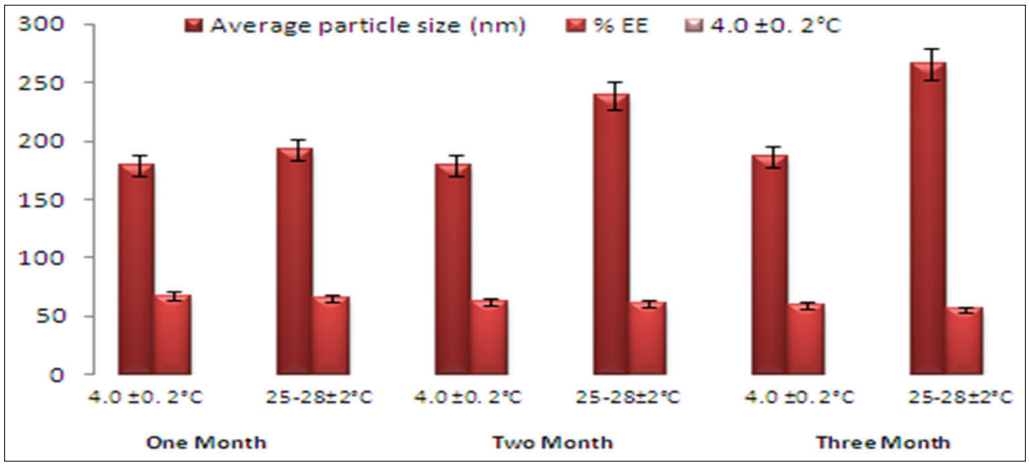

Figure 13: Average vesicle size of after storage at different temperatures for 3 months

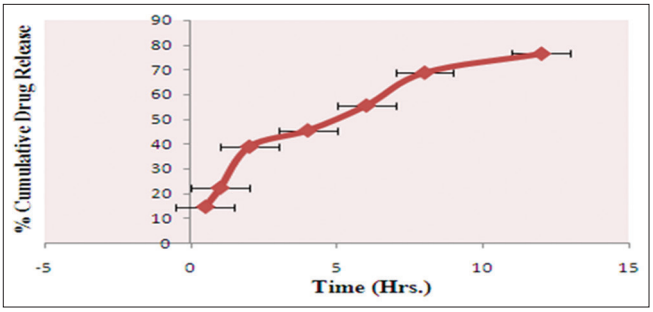

Figure 14: *In vitro* drug release of gel-based ethosomal gel

CONCLUSION

Ethosomes were prepared by and optimized on the base of average vesicle size and % drug entrapment. The optimized formulation was further incorporated with gel base (Carbopol gel) and characterized for their viscosity, pH, % drug content, extrudability, spreadability, and drug release study. Optimized formulation (F-13) of ethosome resulted in average vesicle size as 178.37 ± 5.07 nm, zeta potential as −17.3 ± 2.4 mv, and % EE as 73.03 ± 2.49%, and stability study data revealed that the optimized formulation was stable after 3 months of storage at 4.0° ±0.2°C. Prepared gel of optimized formulation viscosity was 178.37 ± 5.07 cps, pH was 6.9, % drug content was 97.57 ± 2.49, extrudability was 170 g, spreadability (g.cm/sec) was 5.16 (g.cm/sec), and *in vitro* drug release found as 76.65 ± 0.48% in 12 h, respectively. It can be concluded that prepared gel containing tazarotene-loaded ethosomal formulation was optimized and successfully formulated in the gel form can be of use for topical preparation for its antiacne affect.

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