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**REVIEW ARTICLE**

# REVIEW ON ETHOSOMES

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**ABSTRACT:**
Transdermal medication delivery refers to self-contained, discrete dosage forms that, when applied to undamaged skin, release the drug to the systemic circulation through the skin at a controlled rate. Ethosomes are noninvasive drug delivery systems comprised of phospholipids, water, and high concentrations of ethanol that allow medications to reach deep into the epidermal layers or the systemic circulation. This review article provides an overview of the composition, preparation method, evaluation, and applications of ethosomes as well as their structure, benefits, and drawbacks.

***Keywords:*** *Novel Drug Delivery, Transdermal, Skin Anatomy, Ethosomes.*

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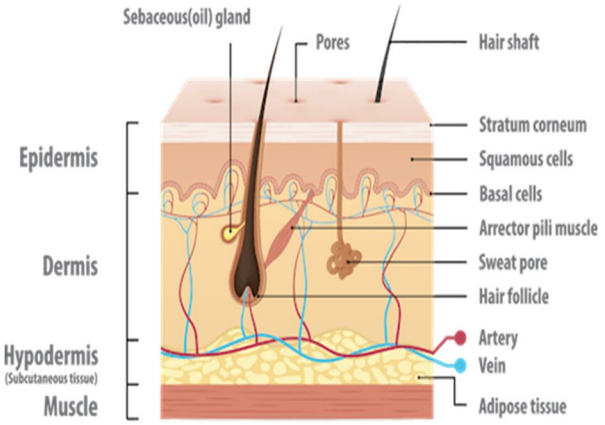
## INTRODUCTION:

The skin, the largest and most permeable organ in the body, may serve as a possible route for systemic drug delivery. The strongest barrier to drug penetration across the skin is the stratum corneum, which limits the transdermal bioavailability of drugs. Therefore, unique carriers are required to get past the skin's natural barrier and transmit drug molecules with different physicochemical qualities to the systemic circulation.(1)

Transdermal drug-delivery devices avoid the liver's first-pass metabolism, have controlled drug distribution, require fewer doses, and have higher patient compliance because they are noninvasive and self-administered [2,3] In 1979, the US approved the first scopolamine-containing transdermal patch for the management of motion sickness.Touitou et al., which resulted in the identification of a unique lipid vesicular system known as ethosomes, Cevc and Blume developed deformable or elastic liposomes, also known as transfersomes, in 1992[5]. Ethosomal systems, which also contain phospholipids and water, differ from liposomes in that they have very high amounts of ethanol [6,7] In an effort to enhance vesicular characteristics and skin permeation, numerous generations of ethosomal systems have since been created by adding more components to the original ethosomal formula. The elder ethosome generations and them have not yet been clearly separated from one another, though. The numerous types of these vesicles are categorised in this article based on the materials used in their production and the effects these materials have on ethosomal properties. Ethosomal systems are discussed in detail. This research also includes ethosome production techniques, pharmaceutical dosage forms, in vivo studies, and clinical trials on these potential nanocarriers for dermal/transdermal delivery.

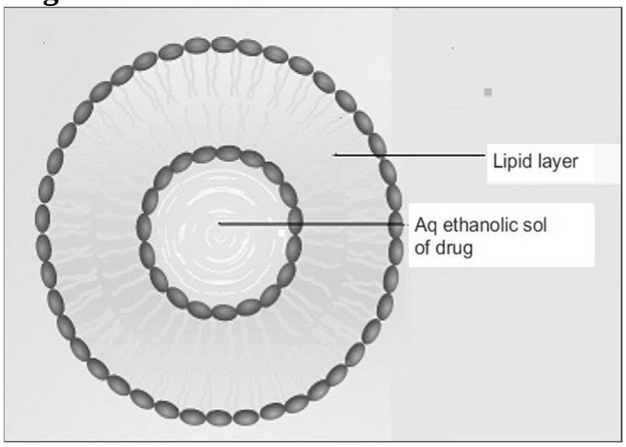
**Figure 1: Structure of Skin**




**Ethosomes:**

They are mostly used for transdermal drug administration. Drugs can be trapped by ethosomes with a variety of physicochemical characteristics, such as hydrophilic, lipophilic, or amphiphilic qualities [8,9]. Ethosomes, which are flexible, soft vesicles that can enter the bloodstream and/or deep epidermal layers, are used to deliver medications. Ethosomes can be anywhere from nanometers to microns in size [10]. Ethosomes are modified liposomes that contain a lot of ethanol. Ethosomes are ethanol-rich liposomes that have been modified. The ethosomal system is composed primarily of water, a large quantity of alcohol (ethanol and isopropyl alcohol), and phospholipids (phosphatidylcholine, phosphatidylserine, and phosphatidic acid). Because ethanol, which is found in high amounts in ethosomes, disrupts the structure of the skin's lipid bilayer, the ability of the veice[11].

**Figure 2: Structure of Ethosomes:**




**TYPES OF ETHOSOMES:**

**1. Classical ethosomes**

Classical ethosomes are a variant of traditional liposomes and are made up of phospholipids, water, and ethanol in high concentrations (up to 45% w/w). For transdermal drug delivery, conventional ethosomes were reportedly superior to conventional liposomes due to their smaller size, negative -potential, and higher entrapment efficiency. In addition, traditional ethosomes outperformed traditional liposomes in terms of skin penetration and stability characteristics. Drugs captured in traditional ethosomes have molecular weights ranging from 130.077 Da to 24 kDa. [30,32,34,36]

**2. Binary ethosomes**

Zhou et al.11 introduced binary ethosomes. In essence, they were created by mixing a different form of alcohol with the traditional ethosomes. The two alcohols used in binary ethosomes the most frequently are propylene glycol (PG) and isopropyl alcohol (IPA). [35,37,22]

**3. Transethosomes**

Transethosomes are the new generation of ethosomal systems and were first reported by Song et al in 2012.[17] This ethosomal system includes a substance, such as a surfactant or a penetration enhancer, in addition to the fundamental elements of classical ethosomes. By combining the advantages of conventional ethosomes with deformable liposomes (transfersomes), these special vesicles were developed to construct transethosomes. Transethosomes are superior to regular ethosomes, according to several studies. Many edge activators and penetration enhancer types have been investigated to produce ethosomal systems with better properties. The comparison of the features of the classical ethosome, binary ethosome, and transethosome in their initial suspension state reveals that transethosomes have been reported to entrap medicines with

molecular weights ranging from 130.077 Da to 200-325 kDa.[38,39,40,41]

**ADVANTAGES OF ETHOSOMES:**

1. Ethosomes improve medication transport for dermal, transdermal, and intracellular use through skin.
2. Provide a variety of molecules, including peptides, proteins, and other macromolecules, as well as hydrophilic and lipophilic compounds.
3. The ethosomes' constituent parts have received approval for usage in pharmaceutical and cosmetic products, are non-toxic, and are generally recognised as safe (GRAS).
4. Low risk profile: Because the toxicological profiles of ethosome features are well documented in the scientific literature, there is no danger associated with the large-scale drug development of ethosome structures.
5. The ethosomal system may be immediately marketed because it is passive and non-intrusive.
6. The pharmaceutical, biotechnology, veterinary, cosmetic, and nutraceutical industries can all benefit from ethosomal drug delivery systems.
7. High patient compliance: The semi-solid gel or cream form in which the ethosomal medication is administered results in high patient compliance.
8. A straightforward drug delivery approach as opposed to sonophoresis, iontophoresis, and other complex procedures.
9. Ease of industrial scale-up: Ethosome production is quite straightforward and doesn't require expensive technical inputs. It is simple to prepare multiliter quantities for ethosomal formulation.
10. Ethosomes improve the efficient passage of medications across or through the skin, allowing the drug to reach the targeted area of the skin or the blood.
11. When compared to liposomes, drug entrapment efficiencies are higher.
12. There is very good stability over very long times.
13. Since alcohol in the ethosomes works as a natural preservative, no additional preservatives are required.
14. Ethosome production is really inexpensive.
15. Drug concentration is not a factor in how well they are absorbed via the skin.

**DISADVANTAGES OF ETHOSOMES:**

1. If a patient is allergic to ethanol or any of the ethosomal components, an allergic reaction can be detected.
2.Ethosomal carriers are relevant solely for transdermal application, in contrast to other carriers (solid lipid nanoparticles, polymeric nanoparticles, etc.) that can be employed for numerous routes.
3.Because ethanol is flammable, proper precautions should be used when applying, transporting, and storing it.
4. Extremely poor yield, possibly unprofitable
5. Product loss when switching from organic to water media.
6. It is only allowed for powerful compounds that need a lengthy or short daily dose.
7. Ethosomal administration normally aims to offer constant, continuous drug delivery rather than obtaining quick drug input in the form of a bolus.
8.Sufficient drug solubility to achieve cutaneous microcirculation and gain access to circulation in both lipophilic and aqueous circumstances.
9. The drug's molecular size should be suitable for percutaneous absorption.
10. Not all varieties of skin will adhere to adhesive properly.
11. Dermatitis or skin rashes brought on by excipients and penetration boosters in medication delivery systems.
12. Ethosomes can agglomerate and disperse in water if shell locking is inadequate.

**COMPOSITION OF ETHOSOMES:**

The hydroalcoholic or hydro/alcoholic/glycolic phospholipid that makes up the ethosomes is a

vesicular carrier with a relatively high concentration of alcohols or their combination. Typically, ethosomes may contain phospholipids with a variety of chemical structures, including hydrogenated phosphatidylcholine, phosphatidic acid ,phosphatidylserine, phosphatidylethanolamine,phosphatidylglycerol (PPG), phosphatidylinositol (PI), hydrogenated phosphatidylcholine, alcohol (ethanol or isopropy (or other glycols). Through the skin, a high concentration of active substances can be delivered by such a formulation. Altered alcohol:water or alcohol-polyol:water ratios can control drug delivery. Soya phospholipids like Phospholipon 90 are some of the most desired phospholipids (PL-90). It is often used in a range of 0.5-10% weight per weight. cholesterol inAdditionally, quantities in the range of 0.1% to 1.0% may be added to the mixture. Ethanol and isopropyl alcohol are two examples of alcohols that can be employed. Propylene glycol and Transcutol are the two most often utilised glycols. The phospholipids in these preparations may also be mixed with non-ionic surfactants (PEG-alkyl ethers). You can also include cationic lipids like cetrimide, cocoamide, POE alkyl amines, dodecylamine, etc. Between 20 and 50 percent of alcohol may be present in the finished product. The alcohol and glycol mixture's non-aqueous phase content can range from 22 to 70%.

**Table 1: Different additives employed in formulation of Ethosomes.**

| Class of polymer | Example | Uses |
|---|---|---|
| Phospholipid | Soya phosphatidyl choline<br>Egg phosphatidyl choline<br>Dipalmityl phosphatidyl choline<br>Distearyl phosphatidyl choline | Vesicles forming component |
| Polyglycol | Propyleneglycol transcutol RTM | As a skin penetration enhancer |
| Alcohol | Ethanol,isopropyl alcohol | For providing the softness for vesicle membrane as a penetration enhancer |
| Cholesterol | Cholesterol | For providing the stability to vesicle membrane |
| Dye | Rhodamine -123<br>Rhodamine red<br>Fluorence (FITC)<br>6-Carboxy fluorescence | For characterization study |
| Vehicle | Carbopol 934 | Gel forming agent |

**Table 2: Various Ethosomes based products available in the market.**

| Sr. No. | Name of product | Manufacturer | Uses |
|---|---|---|---|
| 1 | Supravir Cream | Trima , Israel | For the treatment of herpes virus , formulation of acyclovir drughas a long shelf life with no stability problems , stable for 3yrs at 25Skin permeation experiments showed that the cream retained its initial penetration enhancing properties even after 3 years. |

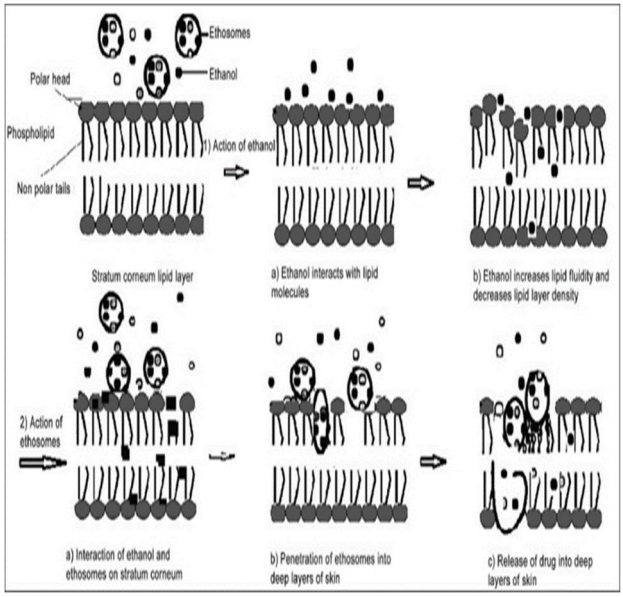
| | | | |
|---|---|---|---|
| 2 | Noicellex | Novel Therapeutic Technologies, Israel | Topical anti-cellulite cream |
| 3 | Cellutight EF | Hampden Health, USA | Topical cellulite cream, contains a powerful combination of ingredients to increase metabolism and break down fat. |
| 4 | Nanominox | Sinere, Germany | Minoxidil 4% containing product, for hair growth |
| 5 | Decorin cream | Genome Cosmetics, Pennsylvania, US | Anti-ageing cream that reduces the visible ageing signs of skin which includes wrinkle lines, sagging, age spots, hyper pigmentation. |

**Mechanism of Action of the Ethosomal Drug Delivery System**:

The main advantage of ethosomes over liposomes is the increased drug penetration. The process by which medicines are absorbed from ethosomes is unknown. Most likely, medication absorption involves the following two steps:

1. The impact of ethanol through the skin, ethanol enhances permeation. Its penetration-enhancing effect has a well-known mechanism. Ethanol permeates intercellular lipids, increasing their fluidity and decreasing the density of the cell membrane's multilayer of lipids.

**Figure 3: MOA of Ethosomal Drug Delivery System:**




2.The ethosome impact The ethanol of ethosomes increases the fluidity of cell membrane lipids, which increases skin permeability. As a result, the ethosomes easily penetrate the deep skin layers, where they fuse with skin lipids and release the medicines.

**METHOD OF PREPARATION OF ETHOSOME:**

Ethosomes can be prepared by following two methods.

1. Hot method
2. Cold method

1. **Hot method:**

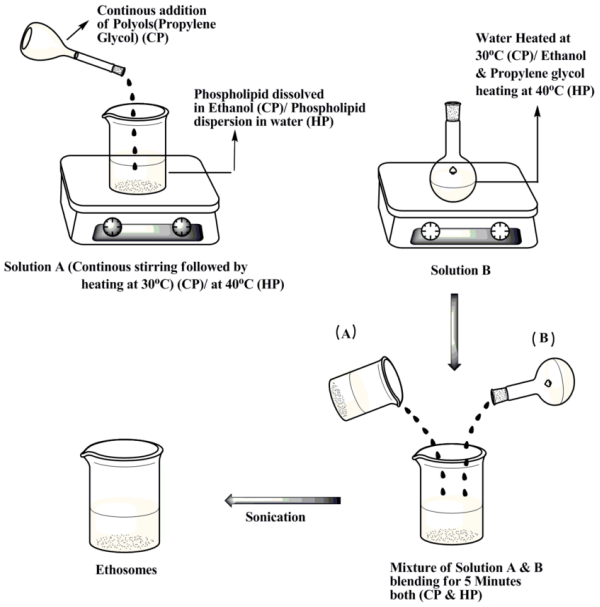
Involves heating phospholipid in a water bath at 40°C until a colloidal solution is produced. Propylene glycol and ethanol should be thoroughly combined in a separate vessel and heated to 40 °C. Into the aqueous phase, add the organic phase. Depending on the drug's solubility, dissolve it in ethanol or water. The ethosomal formulation's vesicle size can be decreased to the desired level using the probe sonication or extrusion method.

2. **Cold Method:**

For the ethosomal preparation, this is the most popular and commonly used method. Phospholipids, drugs, and other lipid compounds should be thoroughly mixed with ethanol in a covered vessel at room temperature to dissolve them. While stirring, add propylene glycol or another polyglycolIn a water bath, bring the mixture up to 30 °C.

a) In a covered pot, whisk the mixture for 5 minutes after adding the water that has been heated in a different vessel to 30°C.
b) The ethosome impact The ethanol of ethosomes increases the fluidity of cell membrane lipids, which increases skin permeability. As a result, the ethosomes easily penetrate the deep skin layers, where they fuse with skin lipids and release the medicines.

**Figure 4: Method of preparation of ethosomes by cold method.**




## EVALUATION PARAMETERS OF ETHOSOMES:

1. **Vesicle morphology:**
The morphology of the ethosomal system is studied using transmission electron microscopy (TEM) and scanning electron microscopy (SEM), which stain the samples negatively with an aqueous solution. A small carbon-coated grid was used to stain the ethosome solution. To get rid of the surplus solution, blotting is utilised. The vesicles are then observed using TEM or SEM once it has dried. [18,19].

2. **Vesicle size and size distribution:**
Photon correlation spectroscopy (PCS), a computerised technique, and dynamic light scattering (DLS) are frequently used to assess vesicles in the ethosome formulation[18,20]. The components of the formulation affect the size range between microns and nanometers. [21,22,23,24].

3. **Percent entrapment efficiency:**
The entrapment efficiency, which needs to be measured[25], is what gives the ethosome its properties of sustained release. The entrapment efficiency is commonly determined using the following techniques:

a) Ultracentrifugation
b) Dialysis

**a) Ultracentrifugation**
It is separated into two segments, the first of which contains the pure drug and is used to calculate the entrapment efficiency using the formula below. This is done using methods like HPLC. The first segment's preparation of the vesicle is exposed to ultracentrifugation at the specified rpm and time after being set aside overnight. [18]
EE = entrapment efficiency
$D_t$ = drug quantity added theoretically
$D_s$ = drug quantity present in the supernatant

**b) Dialysis:**
To prepare the dialysis bag, cellulose acetate and other polymers are used. The bag is then submerged for one hour in a saline solution to completely saturate the membrane. The predetermined number of drug-loaded vesicles are first put in the bag, and then they are moved to a 500ml PBS solution with a pH of 7.0. Using a magnetic stirrer, the media are stirred, and the sink condition is maintained by periodically removing identical-sized aliquots from the medium receiving and adding an equivalent volume of PBS solution. HPLC is used to identify the drug content of a sample. [18,28]. The entrapment efficiency is then calculated using the above formua[27,28,29,30]

4. **Zeta potential:**
The formation of charge at the boundary between a liquid medium and its solid surface is known as the zeta potential. The zeta potential is assessed using a zeta metre or zeta sizer. The Zeta potential unit is denoted by the unit milli Volts. [31,28,29].

5. **Permeation distinctiveness:**
It has long been known that ethanol can permeate. Two effects show that the penetration enhanced by ethosomes is significantly superior to the penetration enhanced by ethanol alone. These effects are attributed to the penetration properties of which are enhanced by the creation of flexible ethosomal characteristics and are provided by the synergistic interaction between the lipids in skin, vesicles, and ethanol. The following are the two results.

a) Push effect: Increase in thermodynamic activity brought on by ethanol vaporisation.
b) Pull effect: Ethanol lowers the skin's natural barriers, which increases the amount of medication permeation[18].

6. **Measuring surface tension:**
The Du Novy ring tensiometer is a ring-based device for determining a drug's surface tension[20].

7. **Physical stability:**
Cholesterol is essential for the distribution of ethosomes throughout the body after their creation; in the absence of cholesterol, aggregation takes place. It has been discovered that when ethosomes are retained in the gel form, cholesterol is stabilised in the bilayer due to the high level of ethanol in ethosomal formulation and the sensible amount of cholesterol that assures its quality.It also ensures the ethosomal vesicles' adaptability. Ethosomal suspension is kept stable for a long period of storage using the freeze-drying process. [31,27].
The transition temperature is eight.
The ethosomal system's transition temperature is determined using differential scanning calorimetry [20].

9. **The skin - vesicle interaction study:**
Using fluorescence microscopy, scanning electron microscopy, or transmission electron microscopy, one can examine the interaction between the skin and vesicle. The identical methodology used for SEM and TEM is also used for fluorescence microscopy [21,23]

## APPLICATIONS OF ETHOSOMES:

### Microbial and viral activity of ethosomes for infection in skin:

Ethosomes antibiotic properties are particularly effective at treating skin infections. Animal models for the treatment of skin infections are used to study the effectiveness of antibiotics. Staphylococcus aureus-infected mice were used in a comparison study between erythromycin-loaded ethosomes and erythromycin hydroethanolic solution for the treatment of cutaneous infections. It was found that ethosomal erythromycin treated infections more effectively than hydroethanolic erythromycin solution without promoting the growth of any bacteria. Bacitracin and (FITC-Bac), or ethosomes laden with fluorescently labelled bacitracin, were used in a study to better understand the in vitro and in vivo mechanisms underlying skin permeability. The results were computed using confocal laser scanning microscopy (CLSM) and fluorescent-activated cell sorting (FACS) investigations. The computed outcomes reached [46,47].

### Ethosomes used for infections caused by fungi and virus:

It also increases the permeation through percutaneous delivery of ACV into the outer layer of skin where viral replication occurs for treating herpes labialis alongside ethosome loaded ACV (Acyclovir) side effects such as low absorption in the intestine (15-30%), side

effects related to dose have decreased[48]. A comparison between the 5% Acyclovir cream that is sold on the market and the 5% ethosome-loaded acyclovir formulation was conducted[49]. The study on herpes infection confirmed the effectiveness of ethosomes, and it also provided a novel technique for the local delivery of a hydrophilic medicine, like Supra-Vir cream, that is ethosome.

**Treatment of Parkinsonism by using Ethosomes:**

Trihexphenidyl (THP), a cationic anti-MI muscarinic medication, is used to treat Parkinson's disease. The percentage of elderly adults with Parkinsonism is increasing. THP is given orally three to four times per day with a half life of about 3 hours. Parkinsonism causes motor instabilities and neurological symptoms, thus older individuals should not take their medications orally because they may have trouble swallowing them. The topical method of drug delivery for THP is a great way to get around the issues associated with oral drug delivery. The stratum corneum is a barrier that is restricted to ionic molecules and has affinity for lipidsTo ensure the effective and successful topical distribution of THP, ethosomes are introduced. The particle was determined to be tiny, measuring 109 2 nm, and the entrapment effectiveness was significantly greater (75 0.5%) during analysis of THP including ethosomes. The skin of a nude mouse was used to compare the percutaneous delivery of ethosomal THP with the liposomal THP delivery, and the results showed that ethosomal THP delivered approximately 51 times more THP than liposomes. The amount of medication that had accumulated in the skin after the 18-hour experiment was significantly higher in ethosomes. Ethosomal THP was stable for at least two years. [50].

**Hairloss treatment using Ethosomes loaded with Minoxidil:**

In the current situation, a large portion of the population suffers from hair issues like seborrhea and alopecia. Therefore, treating pilosebaceous illnesses requires focusing on the specific hair follicles. When treating alopecia, minoxidil, a medication with a higher affinity for lipids, is frequently given locally to the scalp. The activity of ethosome-loaded minoxidil in the sebaceous gland was investigated in vivo in hairless rats. It was discovered that when ethosome was utilised as a carrier, there was a greater distribution of minoxidil in the pilosebaceous unit that displayed localisation. [51].

**Ethosomes for Anti-arthritis and Anti-inflammatory activity:**

Ammonium glycyrrhizinate (AG)-loaded ethosomes were tested for their ability to reduce inflammation in volunteers who had erythema brought on by methyl-nicotinate. To comprehend the effects of ethosomes on erythema, a comparison between the hydroethanolic medication solution and the anti-inflammatory activity of ethosomes loaded ammonium glycyrrhizinate was made. The Erythema index was determined using a reflectance visible spectrophotometer. The ethosomes loaded significantly better than hydroethanolic solution Ammonium glycyrrhizinate showed a decrease in the intensity and duration of erythema. Cannabidiol (CBD), a medication for rheumatoid arthritis, has a strong affinity for lipid. This medication's adverse effects are extensive and include poor BA because to hepatic metabolism, unstable gastric pH, and limited aqueous solubility. Ethosomal CBD was produced, and in vivo permeation tests were used to evaluate its skin permeability. The medication was discovered to have collected in the tissues under the skin. [52], [53].

**Vaginal delivery using ethosomes:**

Metronidazole ethosomes that respond to pH were created, and their efficacy in vaginal

delivery was evaluated. On a Franz diffusion cell, an in vitro skin permeation research was carried out using a phosphate buffer medium with a pH of 5.5 and a cellulose semipermeable membrane. The outcomes demonstrated that the metronidazole loaded with ethosomes displayed a maximum flow of 143.672.73 g/cm2/h, indicating a sustained administration of the produced metronidazole ethosomes. [58].

**Ethosomes with analgesic and antipyretic activity:**

In vivo tests on animals are used to test the analgesic and antipyretic effectiveness of ibuprofen-loaded ethosomes for percutaneous delivery[54]. According to the study, rats with fever had a drop in body temperature after using the ibuprofen-loaded ethosomal gel, which returned to normal body temperature in 3 hours. The body temperature of the rats who ingested ibuprofen orally showed a fall in temperature after 1 hour, but it only remained low for 7 hours before rising to 380.4°C after that. For 12 hours, the rats' body temperatures remained at 370.2°C. By using a tail flick test to compare the analgesic effects of ethosomal gel and oral ibuprofen on mice, it was found that the ethosomal ibuprofen showed greater analgesic efficacy than the oral ibuprofen. It was discovered that ethosomal ibuprofen was more effective for percutaneous distribution, ignoring the GI bleeding and ulceration caused by oral ibuprofen.

**Treatment of skin diseases using ethosome as carrier:**

The tretinoin-containing ethosomes and various other nanolipid carriers were used in the mouse tail model to test the anti-psoriatic efficacy. Ethosomes were discovered to be useless for superficial skin conditions including psoriasis. Using naked mice, the anticancer activity of two skin cancer models—intradermal injection of ES2 cells and TE.354.T cells—was estimated. Both models demonstrated tumour development inhibition as compared to a commercial medication. The photodynamic treatment of skin malignancies other than melanomas was associated with the activity of 5-aminolevulinic acid loaded with ethosomes and liposomes. It was shown that ethosomes had greater ability to penetrate than liposomes. [55,56]

**Ethosomes for hypertension:**

Anti-hypertensive oral medication valsartan has limited GI absorption, which in turn results in lower BA due to first pass metabolism. The drawbacks associated with oral valsartan delivery will be outweighed by those associated with transdermal valsartan delivery. By inducing the hypertension-related drug methyl prednisolone acetate, Wistar rats were utilised to test the anti-hypertensive action. Transdermal distribution of valsartan produced an increased and long-lasting effect when compared to oral suspension and topical treatment. Valsartan was optimised using the Box-Behnken design, and a nanoethosomal gel was created utilising a cautious thin layer evaporation technique. Valsartan's PD (pharmacodynamic) effects in vivo were evaluated in hypertensive rats.The ethosomes containing Valsartan showed a 34.11% fall in blood pressure, which led researchers to believe they were effective. [57].

**Table 3: MARKETED PRODUCTS BASED ON ETHOSOMAL FORMULATION:**

| Product | Narrative | Mechanism |
|---|---|---|
| Body Shape CARE) (Maccabi- | Gel Executive solidification Cellulite reduc- tion, stretching the skin flexible and based on a technology called Ethosome | Deeper diffusion into the skin |
| Noicellex (NTT, Israel) | Topical anti-cellulite creams | Deeper diffusion into the skin |
| Osmotics Lipoduction Cellulite Cream (Osmotics, Israel) | Ethosomal cream is designed to help reduce cellulite and burn fat when applied to the skin. | Deeper penetration into the skin |
| SkinGenuity (Physonics, Nottingham, UK) | Using a unique blend of active anti-cellulite in- gredients with the ingenious Ethosomes™ De- livery System to ensure good penetration, Skin Genuity drastically reduces those dimples. It also firms and softens your skin with natural antioxidants and moisturising agents to give you the peachy thighs and dimple-free derrière | High penetration into deep layers of the skin. |
| Decorin Cream | | Antiagingcream,treating,repairing and delaying the visible aging signs of the skin of the skin including wrinkle lines. |
| Supravir cream (Trima, Israel) | For the treatment of herpes virus, formulation of acyclovir drug has a long shelf life. | Lipid Perturbation |
| Cellutight EF (Hampden Health, USA) | Topical cellulite cream, contains a powerful combination of ingredient to increase metabolism and breakdown fats | Deeper penetration into the skin |
| Nanominox (Sinere, Germany) | Nanominox composed of 4% Minoxidil, Ad- enosine, Sophora Flavescens extract, Creatine Ethyl Ester, Cepharanthine, B12, Ethanol, dis- tilled water, and uses ethosomes as the vehicle to deliver the active ingredients. Nanominox absorb for 10 minutes prior to washing your hair when other Minoxidil so-lutions, including those with nanosomes and/ or liposomes, suggest 2-4 hr for adequate ab-sorption. | Pilosebaceous Targeting and High penetration into deep layers of the skin. |
| Anthranol cream | | Used for skin infection |

## CONCLUSION:

It is clear that ethosomes can penetrate the skin more effectively than liposomes. Ethosomes have more benefits than cutaneous and transdermal distribution. They are the non-invasive drug delivery mechanisms that allow medications to pass through the deep layers of the skin and eventually reach the systemic circulation. It transports big molecules like protein and peptide molecules. Ethosomes can be customised for improved skin penetration of active medicines and are distinguished by ease of manufacture, safety, and efficacy. Ethosomes can significantly reduce the epidermal barrier, which is the principal obstacle to transdermal medication delivery.Ethosomal carrier creates new difficulties and possibilities for the creation of innovative, improved treatments. Additionally, this research will enable more effective therapy through improved control of drug release in vivo and long-term safety data.

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