© 2020 IJRTI | Volume 5, Issue 8 | ISSN: 2456-3315

A REVIEW ON *ACALYPHA FRUTICOSA*

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***Abstract*: Aims: The aim is to formulate topical as well as ethosomal gel of ethonolic extract of *Acalypha fruticosa* by using modified cold method. Which is preferably used for better patient compliance. The material used for the preparation of ethosomal gel are Ethanolic extract of *Acalypha fruticosa*, cholestol , lecithin, PEG 4000, ethanol and sodium benzoate and the evaluation are *in-vitro* diffusion studies, pH determination, viscosity, spreadability, entrapment efficiency, zeta potential and SEM.**

***Keywords*: Ethosomal gel, *Acalypha fruticosa,* cold method.**

1. INTRODUCTION

Ethosomes can be defined as noninvasive delivery carriers that enable drugs to reach deep into the skin layers and/or the systemic circulation. These are soft, malleable vesicles tailored for enhanced delivery of active agents. The vesicles have been well known for their importance in cellular communication and particle transportation for many years. Vesicles would also allow controlling the release rate of drug over an extended time, keeping the drug shielded from immune response or other removal systems and thus be able to release just the right amount of drug and keep that concentration constant for longer periods of time. One of the major advances in vesicle research was the finding of a vesicle derivative, known as an Ethosomes.

Ethosomes are the slight modification of well established drug carrier liposome. Ethosomes are lipid vesicles containing phospholipids, alcohol (ethanol and isopropyl alcohol) in relatively high concentration and water. Ethosomes are soft vesicles made of phospholipids and ethanol (in higher quantity) and water. The size range of ethosomes may vary from tens of nanometers (nm) to microns (μ) ethosomes permeate through the skin layers more rapidly and possess significantly higher transdermal flux.

Ethosomes are composed mainly of phospholipids, (phosphatidylcholine, phosph-atidylserine, phosphatitidic acid), high concentration of ethanol and water. The nonaqueous phase range between 22 % to 70 %. The alcohol may be ethanol or isopropyl alcohol. The high concentration of ethanol makes the ethosomes unique, as ethanol is known for its disturbance of skin lipid bilayer organization; therefore, when integrated into a vesicle membrane, it gives that vesicle the ability to penetrate the stratum corneum.

Also, because of their high ethanol concentration, the lipid membrane is packed less tightly than conventional vesicles but has equivalent stability, allowing a more malleable structure and improves drug distribution ability in stratum corneum lipids.

To overcome problems of poor skin permeability Cevc et al., and Touitou et al., recently introduced new vesicular carrier system ethosomes, for non-invasive delivery of drugs into or across the skin. Ethosomes incorporated penetration enhancers (alcohols and polyols), to influence the properties of vesicles and stratum corneum. The vesicles have been well known for their importance in cellular communication and particle transportation for many years.

Researchers have understood the properties of vesicles structure for use in better drug delivery within their cavities, which would to tag the vesicle for cell specificity. One of the major advances in vesicle research was the development of vesicle derivatives, known as an ethosomes.

The oral drug delivery system has overcome a number of limitations such as degradation of drug, GI irritation and first pass metabolism effect. Due to the above reason the transdermal route is most prefer by the patient there for research the ethosome carrier moiety for the transdermal drug delivery system. Ethosomal vesicles used for delivery of drugs to reach the deep skin layers and/ or the systemic circulation and are the advanced forms of liposomes that are high in ethanol content. They can incorporate hydrophilic and hydrophobic drugs to enhance the accumulation of drug. [2] Ethosomal drug is administered in semisolid form (gel or cream) hence producing high patient compliance. The most widely used gel- forming agents used in ethosomal systems are carbopol and hydroxypropyl methycellulose. These polymers have been shown to be compatible with ethosomal systems, providing the required viscosity and bioadhesive properties.

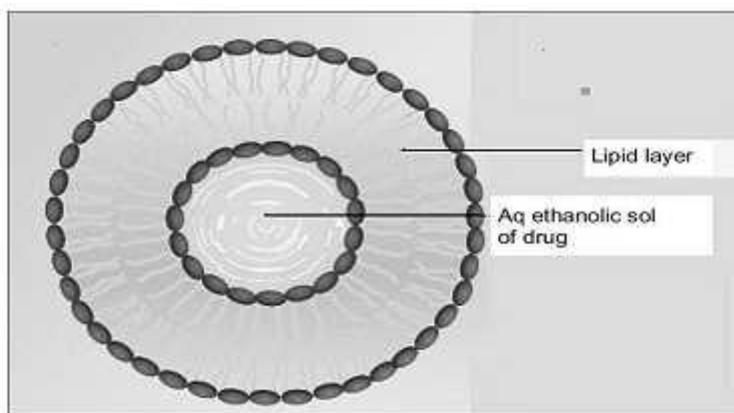

Fig No:1 Structure Of Ethosomes

2. MATERIAL AND METHODS:

2.1 MATERIALS:

Ethonolic extract of *Acalypha fruticosa* was taken as a gift sample from Himalaya drug company, Bangalore, Karnataka. Lecithin and cholesterol from S.D Fine chemical Mumbai. Polyethylene glycol and Sodium benzoate from Fischer Scientific, Mumbai, INDIA. Carbopol 934 LR from Research lab fine chem. industries, Mumbai, INDIA and Ethanol from Sigma-Aldrich Corporation.

2.2 METHODS OF PREPARATION :

2.3 COLD METHOD :

A gift sample of ethanolic extract of the Plant *Acalypha fruticosa* was given by Himalaya Drug Company, Bangalore, and Karnataka. Ethosomal gels containing Ethanolic Extract of *Acalypha fruticosa* were prepared by using the cold method. The ethosomal formulation of Ethanolic extract of *Acalypha fruticosa* was formulated using different compositions of 2-3% phospholipid, 10-20% ethanol, 5% of polyethylene glycol (PEG) and 5g of cholesterol.
The ethanolic extract of *Acalypha fruticosa* was dissolved separately in a covered vessel at room temperature by vigorous stirring and polyethylene glycol was added slowly to this mixture and heated to 300C at 800 rpm. Lecithin and cholesterol dissolved in ethanol and added to the above mixture. Double distilled water was added slowly as a fine stream with constant mixing at 800 rpm. Mixing was continued for additional 5 minutes. The size of the ethosomes vesicles can be decreased using sonication or extrusion method. Ethosomes formulation was stored under refrigeration.
Ethosomal vesicles suspension were incorporated into carbopol gel (1%, 1.5%, 2% and 2.5% w/w). the specified amount of carbopol 934 powder was slowly added to ultrapure water and kept at 100^{0}C for 20min. tri ethanolamine was added to it drop wise. Appropriate amount of formulation of ethosomes containing Ethanolic extract of *Acalypha fruticosa* was then incorporated into gel-base and was subjected to continuous stirring until homogenous formulation were achieved.

2.4 HOT METHOD:

In the hot method the aqueous phase i.e phospholipids is dispersed into water at 40C and the organic phase i.e ethanol and propylene glycol at 40C. Then the organic phase is mixed with the aqueous phase and the drug is dissolved into suitable solvent i.e ethanol or water depending on the solubility.

3. CHARACTRIZATION OF ETHOSOMAL GEL

3.1 Vesicular shape determination

The shape and size of topical and ethosomal gels of *Acalypha fruticosa* was determined by using Scanning electron microscopy (SEM).

3.2 Zeta potential measurement

Zeta potential is used to measure the magnitude of the electrostatic or charge repulsion or attraction between particles and known to affect stability. Its measurement brings detailed insight into the causes of dispersion, aggregation or flocculation and can be applied to improve formulation of ethosomes. Almost all particulate or macroscopic materials in contact with a liquid acquire an electronic charge on their surfaces. In general, particles could be dispersed stable when the absolute value of zeta potential is above 30mV. Moreover, the zeta potential below 20mV is of limited stability and that below 5mV show rapid aggregation.

3.3 Drug content

A specific quantity of developed gels was taken and dissolved in 100ml of P^{H} 6.8 Phosphate buffer. The volumetric flask containing gel solution was shaken for 2hr on a mechanical shaker in order to get complete solubility of the drug. This solution was filtered.

After suitable dilution drug absorbance was recorder by using UV-Visible spectrophotometer at λ max 208 nm for *Acalypha fruticosa* by using P^H 6.8 Phosphate buffer as blank.

3.4 *IN-VITRO* RELEASE STUDIES

DRUG RELEASE STUDY FROM HI-MEDIA 110 DIALYSIS MEMBRANE USING FRANZ DIFFUSION APPARATUS

In-vitro absorption studies are generally carried out in vertical franz diffusion cell.
According to Food and Drug Administration (FDA) regulations, it is an ideal tool for quality control of topical preparations. It has a receptor and a donor chamber, which is filled with phosphate buffer medium
It consists of a water jacket through which temperature controlled water is re-circulated in order to perform the experiments at a desired temperature. The dialysis membrane is sandwiched between the two chambers and is clamped in place tightly.
The donor chamber is filled with a known volume of solute through the membrane is monitored by periodic sampling of the solution from the receptor chamber.
The jacketed cell embodied is stirred throughout the study at 30-40rpm employing a magnetic stirrer.
% Drug Release of Topical and Ethosomal gel containing ethanolic extract of *Acalypha fruticosa* in P^H 6.8 Phosphate buffer was calculated.

3.5 ENTRAPMENT EFFIENCY:

Aliquots of ethosomal formulation were subjected to centrifugation using cool centrifuge (Remi) at 12000rpm . the clear supernatant was washed off carefully to separate the untrapped extract. Sediments were treated with 1 ml of 0.1% of Triton ×100 to lyses the vesicles and then dilute with phosphate buffer (6.8).The EE is determined in term of percentage content of sediment

The percentage entrapment was calculated using formula
% Entrapment Effiency=(amount of sediment /amount of extract added to ethosomes)* 100.

4. CONCLUSION

Ethosomal system is highly effective drug delivery system. Thus it provide good design for loading a macromolecular protein peptide drug to achieve transdermal drug administration that promotes precutaneous absorption of drug. Ethosomes are effective carrier for herbal extract and increases the bioavaibility and penetration when compared to non ethosomal gel

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