A Review on Phytosome and Transferosome as Novel Drug Release System

Amruta Menkudale[1], Vishal Galave[2]
[1,2] *Navasahyadri Institute of Pharmacy, Nasarapur, Pune*

***Abstract*- Development of an accessible drug molecule from a predictable form to a novel release system can radically progress its performance in terms of patient observance, protection and usefulness. In the variety of a Novel Drug release System an accessible drug molecule can obtain a original life. In this review mainly discuss phytosomes and transferosomes in detail main focus on method of preparation and herbal formulation. Phytosomes are enclosed when the standardized extract and active ingredients of a herb are apparent to the phospholipids on a molecular level. Transferosomes is a carrying body for embattled transdermal drug delivery system. This system also takes benefit of phospholipids vesicles as transdermal drug transporter. In this review mainly focus on method of preparation**

***Index terms*- Phytosomes, Transferosomes, method of preparation, transdermal**

INTRODUCTION

The process by which a drug is deliver can have a important effect on its usefulness several drugs have an a large amount profitable concentration range within which maximum maintain is derived, and concentrations exceeding or below this range can be toxic or turn out no of assistance benefit at all. On the other hand, the very slow progress in the effectiveness of the treatment of severe diseases, has optional a growing need for a multidisciplinary approach to the delivery of therapeutics to targets in tissues.[1] The drug- delivery system should transport drug at a rate manage by the necessarily of the body over a particular term of treatment.

These idealized objective switches to the two aspect most essential to drug release are as follows,

1. Spatial Drug release:

Targeting a drug to a specific limb or tissue

2.Temporal Drug release:

The drug delivery rate to the target tissue is prohibited. [2]

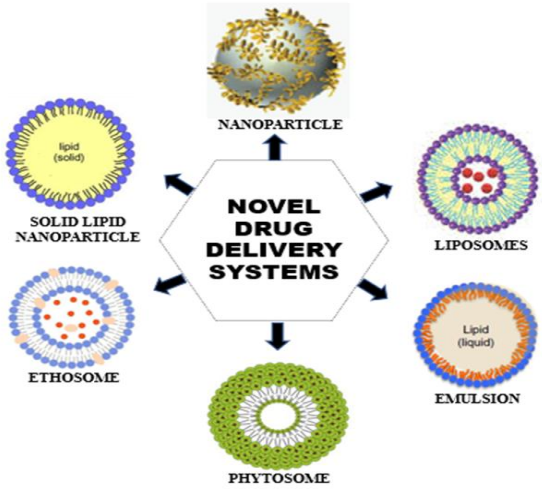
The main areas of research and improvement for NDDS are follows:

1. Liposomes
2. Niosomes
3. Nanoparticles
4. Transdermal drug delivery
5. Implants
6. Oral system
7. Micro encapsulation / Microcapsules
8. Polymer in drug delivery.

Advantages of novel drug release system -

1. Safety from physical and chemical degradation.
2. Persistent delivery.
3. Better tissue macrophages distribution.
4. Development of stability.
5. Development of pharmacological activity.
6. Safety from toxicity.
7. Increased bioavailability.
8. development of solubility.[3]

TYPES OF NOVEL HERBAL DRUG DELIVERY SYSTEM



1-PHYTOSOMES-

The majority of the biologically dynamic constituent of plants are polar or water soluble but due to the problem in absorption restrict the consumption of these type of compounds which eventually decreases the bioavailability. Novel drug delivery such as targeted drug delivery which directly channels the active unit on the site of action and such delivery system could offer targeted and sustained release of drug so that pharmacological effect. [4]

PROPERTIES

1. It is liophilic substances
2. Freely soluble in non-polar solvent
3. Insoluble in water
4. Morderatly soluble in lipids.
5. Insoluble in water.[5]

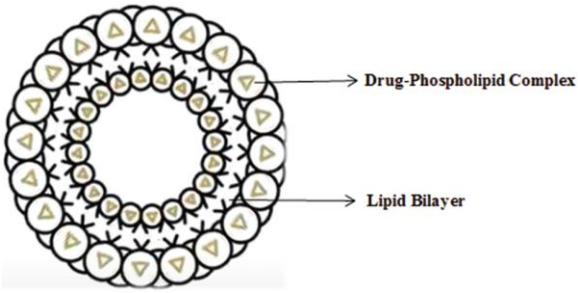
ADVANTAGES

1. It improve the absorption of lipid insoluble polar phyto constituents from side to side oral as well as topical route piece superior bioavailability, hence extensively greater therapeutic benefit
2. Appreciable drug entrapment.
3. The absorption of active constituent(s) is enhanced, its dose requirement is also cheap.
4. Prepartion of phytosome phosphatidylcholine mainly produce effect they are follows

1-hepatoprotective,
2-Synergistic effect

5. Chemical bonds are formed connecting phosphatidylcholine molecule and phytoconstituent, so the phytosomes show superior stability report
6. Application of phytoconstituents in form of phytosome improves their percutaneous absorption and act as functional cosmetics.[6]

STRUCTURE



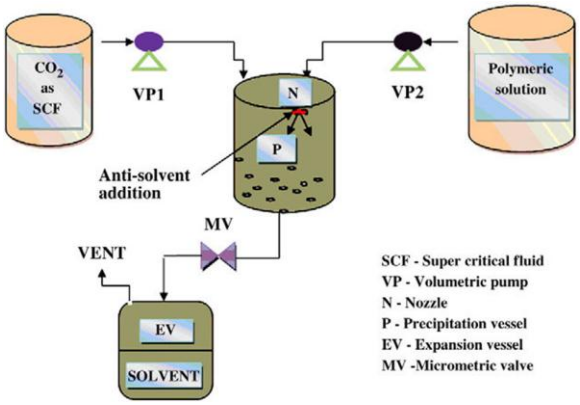
Phytosomes containing hydrophilic bioactive phytoconstituents of herbs surrounded and bound by phospholipids (phosphatidylcholine).It consist of lipid bilayer.[7]

METHOD OF PREPARTION

Phospholipid (Dissolve in organic solvent containing drug/extract)
↓
Solution of phospholipids in organic solvents with drug/extract
↓
Drying
↓
Formation of thin film
↓
Hydration
↓
Formation of phytosomal suspension [8]

1-Anti-solvent precipitation process-

- Specific amount of herbal extract and phospholipids is refluxed with 20 ml of organic solvents such as acetone at specific experimental conditions below 50°C for 2-3 h.
- The reaction mixture is concentrated to minimum volume up to 10 ml and then on addition of solvent with low polarity such as n-hexane with stirring, precipitates are obtained.
- Filtered precipitates are stored in desiccators. The dried precipitates are pulverized and powdered complex are stored in dark amber colored glass bottle at room temperature. [9]

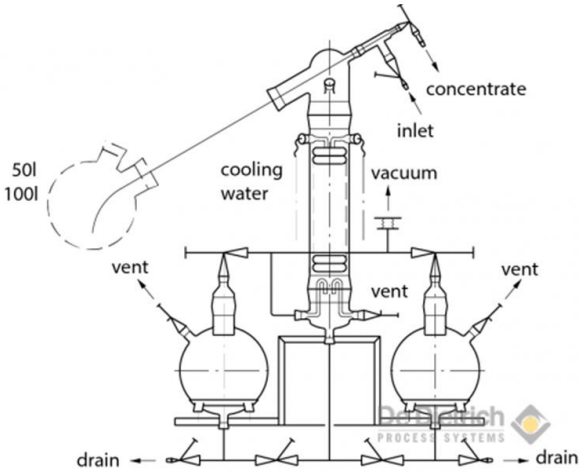


2-Rotary evaporation process-:. –

- The particular quantity of drug, polymer and phospholipids can be dissolved in specific solvent in a rotary spherical bottom flask

followed by stirring for 3 hours at a temperature not exceeding 40oC.

- Thin film of the sample can be obtained to which n-hexane is added and continuously stirred using a magnetic stirrer.
- The precipitate phytosomes loaded obtained can be collected, placed in amber colored glass bottle and stored at room temperature.[11]



EVALUTION PARAMETER

1. Scanning Electron Microscopy (SEM)
   Scanning electron microscopy study can be done to determine the surface morphology, size and shape
2. Measurement of particle size (PS)
   Phytosomes can be measured by particle size analyzer (Microtrac)
3. Measurement of Zeta potential (ZP)

- Zeta potential is the mainly important parameter for physical stability of phytosomes.
- The higher the electrostatic repulsion between the particles the greater is the stability.

4. Determination of % yield-

Determination of % yield of phytosome complex can be calculated by %) Yield = (Practical yield) × 100/(Theoretical yield)

5. Determination of drug content-

- Drug substance of phytosome complex can be calculated by dissolving accurately weigh 10 mg of compound in 10 ml methanol.
- After suitable dilution absorbance should be determined by UV –Spectrophotometer.[13]

PHYTOSOMAL HERBAL FORMULATION

Different physomal herbal formulations are available containing plant constituents as curcumin, Embelin, Ginkgo biloba etc. [14]

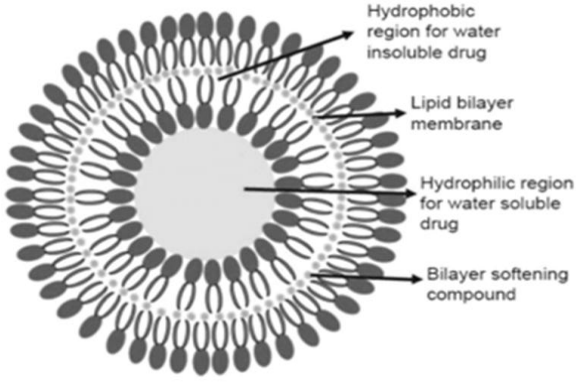
2-TRANSFEROSOME-

The name means "carrying bodies'. Transfersomes word is resultant from the latin word 'transferee' which means
'to pass transversely' and the "soma ' greek word which is used for a organization. [15]

Advantages of transfersomes

1. Transfersomes have ability to deform and pass through narrow pores (from 5 to 10 times less than their diameter) without measurable loss. This function gives better penetration of intact vesicles.
2. They generally have high entrapment efficiency, as in case of lipophilic drug (approximately 90%).
3. They serve as a carrier for both low as well as high molecular weight drugs, e.g., sex hormone insulin analgesic, anesthetic, corticosteroids, anticancer, gap junction protein, and albumin.
4. Transfersomes hold an transportation consisting of hydrophobic and hydrophilic parts together and as a result, can hold drug molecules with wide range of solubility. [16]

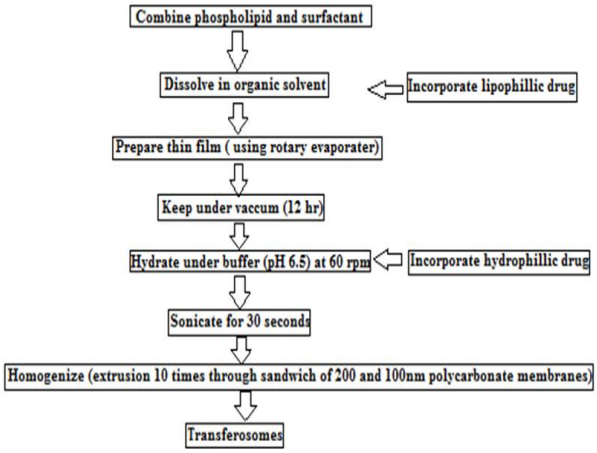
STRUCTURE



- Transfersomes mainly possess structures consisting of hydrophobic and hydrophilic groups together and as a result can contain drug molecules with spacious range of solubility.

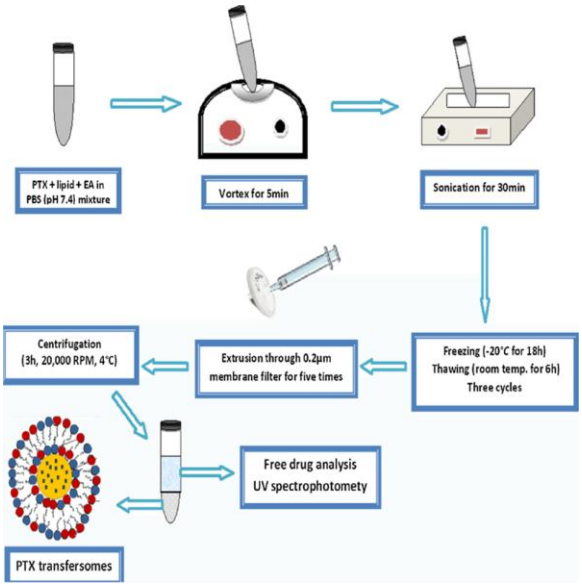
- They can act as a carrier for low as well as high molecular weight drugs for example, analgesic[18]

METHOD OF PREPARATION



A.Thin film hydration technique is employed for the preparation of transfersomes which comprised of three steps: In 3 step also sub point can take place.

1. In the first step also consist following 3 step
   A thin film is arranged from the mixture of vesicles forming ingredients that is phospholipids and surfactant by dissolving in volatile organic solvent (chloroform, methanol).
   Organic solvent is then evaporated above the lipid conversion temperature (room temp. for pure PC vesicles, or 50°C for dipalmitoyl phosphatidyl choline) using rotary evaporator.
   Final traces of solvent were distant under vacuum for overnight.
2. Step 2 consist following two step
   A prepared thin film is hydrated with buffer (pH 6.5) by revolution at 60 rpm for 1 hr at the related temperature.
   The resulting vesicles were swollen for 2 hr at room temperature.
3. Step 3 consist of following 2 step
   To prepare small vesicles, resultant vesicles should be sonicated at room temperature or 50°C for 30 min using a bath sonicator or vortex shaker or check out sonicated at 4°C for 30 min.
   The sonicated vesicles should be homogenized by manual extrusion 10 times through a sandwich of 200 and 100 nm polycarbonatemembranes.



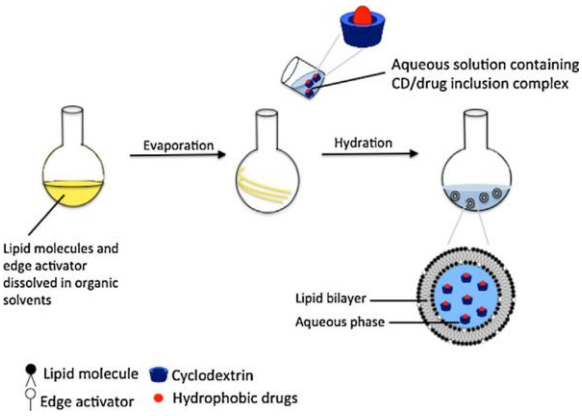
B. Modified hand shaking, lipid film hydration technique is also founded for the preparation of transfersomes which comprised mainly following 2 steps:

1. In the first step consist of 2 step

First step-preparation, lecithin (PC) and edge activator should be dissolve in ethanol: chloroform (1:1) combination. Organic solvent should be seperated by evaporation while hand shaking above lipid transition temperature (43°C).

Second step-A thin lipid layer will produce inside the flask wall with rotation. The thin film will set aside during the night for complete evaporation of solvent.

2. The film should be then hydrated with phosphate buffer (pH 7.4) with gentle shaking for 15 minute at subsequent temperature. The transfersome suspension added hydrated up to 1 hour at 2-8°C.



EVALUTION PARAMETER

1. Homogeneity

It is important parameter for patient agreement to calculate the homogeneity of semisolid dosage forms which are useful topically on the skin.

This should be done by burning small quantity of gels the consistency should be determined as homogeneous or not [22].

2. Spreadability

The spreadability is calculated by pressing 0.5 g of each involving two transparent circular glass slides utmost spreading was allowed by leaving them for 5 min.

The diameter of the formed circle was calculated to fast the spreadability.

3. pH Measurement

The measurement was performed three times and the mean±SD was calculated by using digital Ph meter. [23]

TRANSFEROSOMES HERBAL FORMULATION

Many herbal transferosome formulations are prepared by using vincristine, Capsaicin, Colchicine etc.[24]

CONCLUSION

Novel drug release system has been predictable for its palpable beneficial distinctive potential of as long as physical stability, sustained and site-specific drug delivery for a scheduled period of time. It incorporating the drug carrier system or by changing the drug structure at molecular level. In this review detail study of phytosome and transferosomes is done.

REFERENCES

[1] Bhagwat R.R, Vaidhya L.S. Novel drug delivery systems: an overview. International journal of pharmaceutical sciences and research, vol. 4(3) pp970-982,2013.

[2] https://shodhgangotri.inflibnet.ac.in/bitstream/123456789/1493/2/02_introduction.pdf.

[3] Patil S, Mhaiskar A. A review on novel drug delivery system: a recent. International journal of current pharmaceutical & clinical research .vol 6 (2) pp89-93,2016.

[4] https://innovareacademics.in/journals/index.php/ijap/article/view/26081/15151

[5] Kumar.A, Kumar.B, A review on phytosomes: novel approach for herbal phytochemicals. Asian j pharm clin res, vol 10, issue 10, pp41-47. Jully2017.

[6] https://www.slideshare.net/yogitarayate/phytosomes-ppt.

[7] Sindhumol P.G, Thomas M :An Novel dosage form for enhancement of bioavailability of botanicals and neutraceuticals; International journal of pharmacy and pharmaceutical science;vol2, issue4, pp:10¬-14, july2010

[8] https://link.springer.com/chapter/10.1007/978-3-030-41838-0

[9] https://www.researchgate.net/figure/Common-stage-for-preparation-of-phytosome-18 Mechanism-of-phytophospholipid-Complex_fig1_230577529.

[10] Kumar.S; Baldi.A; Phytosomes: A Modernistic Approach for Novel Herbal Drug Delivery - Enhancing Bioavailability and Revealing Endless; Journal of Developing Drugs; Research Article1J Develop Drugs, Vol. 8 Iss. 1 ,page no: 193-195

[11] https://www.researchgate.net/figure/Supercritical-antisolvent-precipitation-method-modified-from-Ref-26_fig2_276315657.

[12] Singh P, Gangadharappa H.V; Phytosome loaded novel herbal drug delivery system: a revier; international research journal of pharmacy; 7 (6); pp-15-20, 2016.

[13] https://www.dedietrich.com/en/solutions-and-products/distillation/rotary-evaporator.

[14] Sachin.K; Adlin Jino Nesalin; Preparation and Evaluation of Curcumin Phytosomes by Rotary Evaporation Method; International Journal of Pharmacy and Biomedical Engineering (SSRG-IJPBE)-Volume6;pp 30-33, April 2019.

[15] https://www.researchgate.net/figure/Herbal-Formulations-Based-on-Phytosomal-Drug-Delivery-Systems_tbl6_267763088

[16] Pawar.A, Jsdhav.K. Transfersome: A Novel Technique Which Improves Transdermal Permeability; Asian Journal of Pharmaceutics; 10 (4), pp- S425-S436, Dec 2016.

[17] https://www.researchgate.net/figure/Fig-1-Structure-of-transfersome_fig1_259696643

[18] Salome Amarachi Chime* and Ikechukwu V. Onyishi; Lipid-based drug delivery systems (LDDS): Recent advances and applications of

lipids in drug delivery; African journel pharmcology; vol. 7(48); pp-3035-3059, Dec 2013.
[19] https://www.researchgate.net/figure/Method-of-preparation-of transferosomes_fig1_328995149.
[20] https://www.researchgate.net/figure/Preparation-procedure-of-transfersomes-formulations_fig2_268813530.
[21] https://www.researchgate.net/figure/Preparation-of-deformable-liposomes-by-thin-film-hydration-method_fig3_276486730.
[22] https://www.pharmatutor.org/articles/transdermal-drug-delivery-carriers-transfersomes?page=1%2C0.
[23] file:///C:/Users/HPWorld/AppData/Local/Temp/pharmaceutics-10-00026-v2-2.pdf
[24] http://www.amhsjournal.org/viewimage.asp?img=ArchMedHealthSci_2018_6_1_171_234116_t8.jpg.