IJPPR
INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH
An official Publication of Human Journals
ISSN 2349-7203
HUMAN

Human Journals
Review Article
March 2018 Vol.:11, Issue:4

Niosomes: Advanced Drug Delivery System

IJPPR
INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH
An official Publication of Human Journals
ISSN 2349-7203
HUMAN

Mahesh Wakshe*, Tanya Pawar, Shubhangi Thorat, P. P. Honmane, P. S. Kore

Rajarambapu college of Pharmacy, Kasegaon Taluka-Walwa, Dist-Sangli 415404

Submission: 21 February 2018
Accepted: 28 February 2018
Published: 31 March 2018

Keywords: Niosomes, Diagnostic, Anti-cancer, Anti-infective, vaccine adjuvant

ABSTRACT

Niosomes is one of the advanced drug delivery systems. It is the formation of vesicles by a hydrating mixture of cholesterol and non-ionic surfactants. Various types of drug delivery systems are available to include liposome, microsphere, nanotechnology, micro-emulsion, antibody loaded drug delivery, magnetic microcapsules, implantable pumps, and niosomes. Niosomes and liposomes are equiactive in drug delivery system. Niosomes and liposomes are an equal concept. It increases the efficacy of the drug as compared to free drugs. Niosomes are chemically stable and economy drug delivery system, hence they are most preferred. It gives several advantages in cosmetics and therapeutic uses. It increases the duration of action of a drug. It protects drug from biological environment and affects on target cells. It is well-preferred drug delivery system over liposomes. It has great drug delivery potential for targeted delivery of an anti-cancer and anti-infective agent. It can be enhanced by novel concepts like proniosomes, incomes and aspmoes. Niosomes play an increasingly important role in drug delivery as they can reduce toxicity and modify pharmacokinetic and bio-availability Niosomes (non-ionic surfactant vesicles) are microscopic lamellar structures obtained on an admixture of non-ionic surfactant of the alkyl or dialkyl polyglycerol ether class and cholesterol (CHO) with subsequent hydration in aqueous media.

INTRODUCTION

It is formation vesicle by a hydrating mixture of cholesterol and non-ionic surfactants. Various types of drug delivery system are available to include liposomes, microsphere, nanotechnology, micro-emulsion, antibody loaded drug delivery, magnetic microcapsule, implantable pumps, and niosomes.

Niosomes used as the carrier of amphiphilic drugs it utilizes the number of carriers includes serum proteins, synthetic polymer etc. It increases efficacy as compared to free drug. Niosomes and liposomes are same but niosomes are most preferred because it is chemically stable and economical. Niosomes are biodegradable and biocompatible. It increases the bioavailability of drug than free form. Niosomes are microscopic in size and their size lies in the nanometric scale.

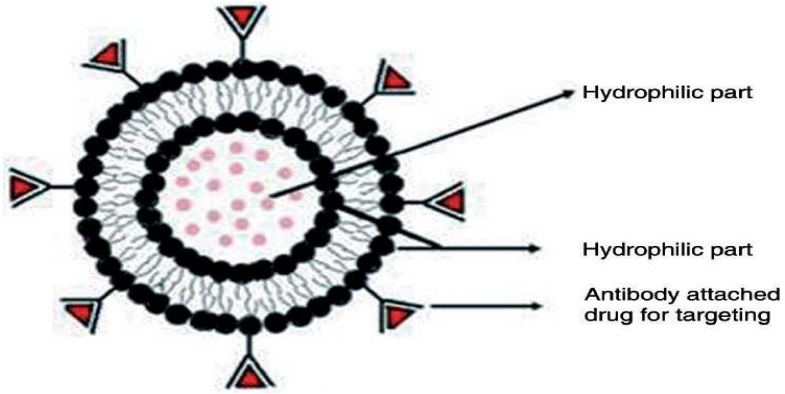

Figure 1: Niosome Structure

It is formation vesicle by a hydrating mixture of cholesterol and non-ionic surfactants. Various types of drug delivery system are available to include liposomes, microsphere, nanotechnology, micro-emulsion, antibody loaded drug delivery, magnetic microcapsule, implantable pumps, and niosomes.

Niosomes used as the carrier of amphiphilic drugs it utilizes the number of carriers include serum proteins, synthetic polymer etc. It increases efficacy as compared to free drug. Niosomes and liposomes are same but niosomes are most preferred because it is chemically stable and economical. Niosomes are biodegradable and biocompatible. It increases the bioavailability of drug than free form.

Advantages: 1) Increases duration of action and protect the drug from the biological environment.

2) Increase stability of an entrapped drug.

3) Handling and storage of surfactant require no special conditions.

4) It increases the bioavailability of the poorly absorbed drug.

5) Provide advantages of usage through various routes viz. oral, parenteral, topical etc.

METHODS OF PREPARATION:

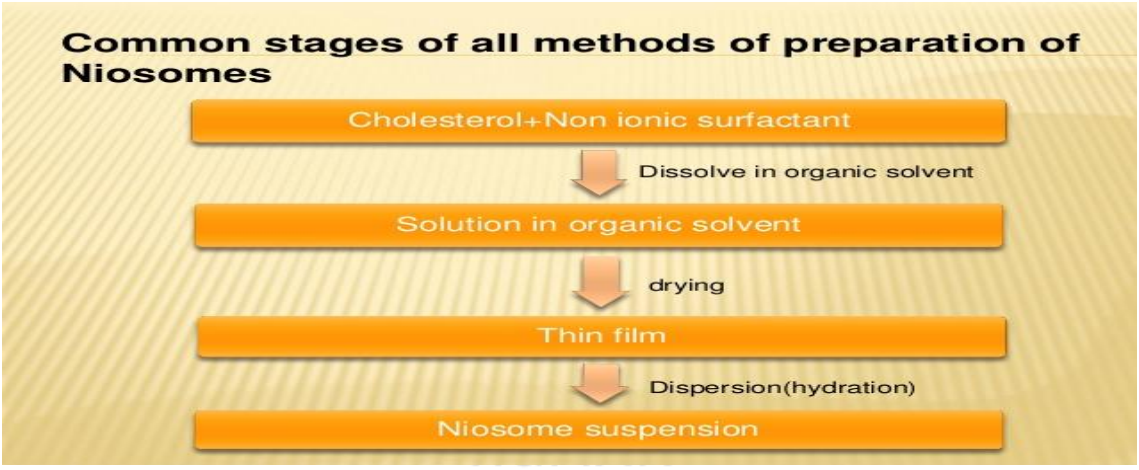

Figure 2: Common stages of preparation of niosomes

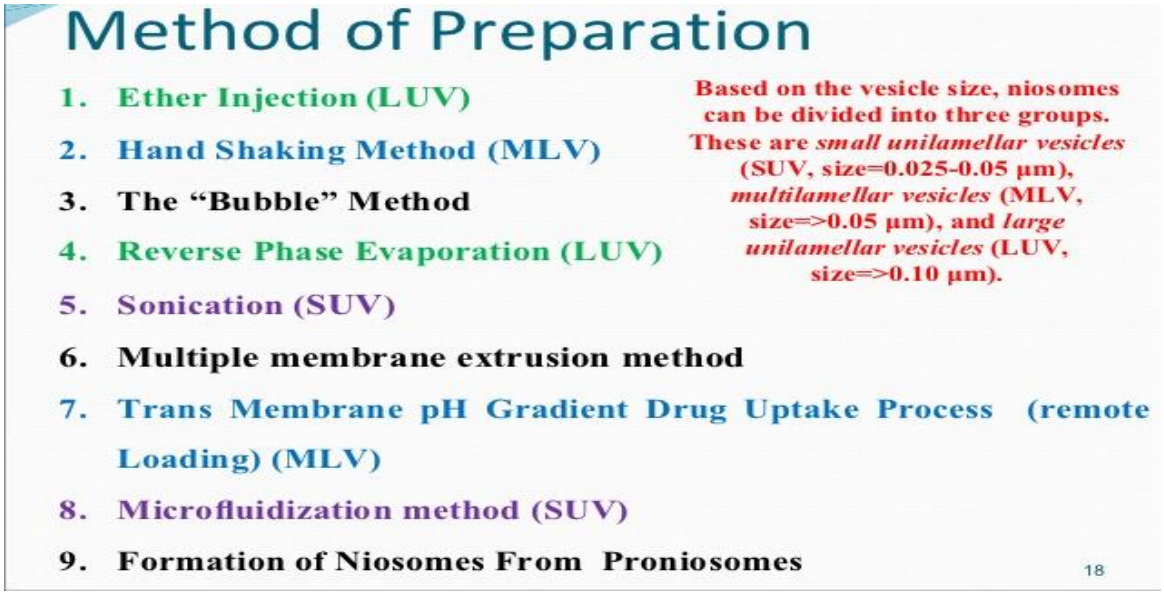

Figure 3: Methods of preparation of niosomes

1) Handshaking method (Thin film hydration technique):

The mixture of vesicles forming ingredients like surfactant and cholesterol are dissolved in the volatile organic solvent (diethyl ether, chloroform or methanol) in round bottom flask. The organic solvent is removed at room temperature 200C using rotary evaporator leaving a thin layer of solid mixture deposited on the wall of the flask. The dried surfactant film can be rehydrated with an aqueous phase at 0-600c with gentle agitation. The process from typical multilamellar niosomes.

Advantages:

1) Increases duration of action and protect the drug from the biological environment

2) Increase stability of an entrapped drug

3) Handling and storage of surfactant require no special conditions.

4) It increases the bioavailability of a poorly absorbed drug.

5) Provide advantages of usage through various routes viz. oral, parenteral, topical etc

6) Niosomes are osmotically active.

7) Chemically stable and stable and have long storage time compared to liposomes.

8) Their surface formation and modification is very easy because of the functional groups on their hydrophilic heads.

9) They have high compatibility with biological systems and low toxicity because of their non-ionic nature.

10) They are biodegradable and non-immunogenic.

11) They can entrap lipophilic drugs into vesicular bilayer membranes and hydrophilic drugs in aqueous compartments

12) They can improve the therapeutic performance of the drug molecules by protecting the drug from the biological environment, resulting in better availability and controlled drug delivery by restricting the drug effects to target cells in targeted carriers and delaying

clearance from the circulation in sustained drug delivery.

TOXICITY OF NIOSOMES:

In niosomes non-ionic surfactant are used. They are more biocompatible and less toxic as than there anionic, amphoteric and cationic counterparts. The surfactant in form of vesicular system .these properties strongly decreases. These type of surfactant used in the liposomal formulation to human kerotenosides and demonstrated that ester types of surfactant are less toxic than ether type due to enzymatic degradation of bond in the ester.

STRUCTURE:

1. Hydrophilic drug located in aqueous region encapsulated.

2. Polar heads facing hydrophilic region.

3. Hydrophobic drugs localized in the hydrophobic lamellae.

4. Non-ionic surfactant stabilized by addition of Cholesterol and the small amount of anionic surfactant such as direct phosphate.

5. The bilayer of niosomes is made up of the non-ionic surface active agent rather than a phospholipid.

APPLICATIONS:

1. Niosomes as the carrier for hemoglobin -

It can be a carrier for hemoglobin. Vesicles are permeable to oxygen and hemoglobin dissociation curve can be modified similarly to non encapsulated hemoglobin.

2. Immunological application of niosomes-

Niosomes has been used for nature of the immune response. The noisome potent adjuvant in terms of immunological selectivity and low toxicity and stability.

3. Transdermal delivery of drugs-

As compared to other drug delivery system its penetrate rate is high so that it is used for transdermal delivery of the drug.

4. Ophthalmic drug delivery-

It is used for reduction of pressure as compared to marketed formulation with less chance of cardiovascular side effect.

5. Diagnostic imaging with niosomes-

It is used as the Diagnostic agent. PEG 4400 and both PEG and NPG exhibits significantly improved the tumor targeting of an encapsulated paramagnetic agent assessed with MR imaging.

MARKETED PRODUCTS:

Lancome has come out with a variety of anti-aging product.

CONCLUSION

Niosomes is one of the great drug delivery systems which increases the duration of action and efficacy of the drug, Hence it is well-preferred drug delivery system. Niosomes have better application in anti-cancer, anti-infective, vaccine adjuvant diagnostic imaging.

ACKNOWLEDGMENT

We are very thankful to our Principal Dr. C. S. Magdum and Vice-Principal Dr. S. K. Mohite for guiding us for publication of review article.

REFERENCES

1) www.google.com
2) Naresh RAR. Kinetics and tissue distribution of niosomal bleomycin tumor-bearing mice. Ind. J. Pharm SCI 1996: 230.
3) Khandare J. N. Madhavi G and Tamhankar BM. Niosomes Novel drug delivery system. The eastern pharmacist. 1994:37:61-64.
4) http//en.wikipedia.org/wiki/niosomses, structure of niosomes.
5) Raja Naresh R.A., Chandrashekar G., Pillai G.K, Udupa N., Anti-inflammatory activity of niosomes encapsulated diclofenac sodium with tween- 85 in arthritic rats. Ind.J.Pharamacol.1994, 26:46-48.
6) Theresa MA. Drugs published by Adis international Ltd. 1998;56(5):747-756.
7) Khandare JN, Madhavi G, and Tamhankar BM. Niosomes Novel Drug Delivery System. The Eastern Pharmacist. 1994;37:61-64.