Review Article

NOVEL HERBAL DRUG DELIVERY SYSTEM: A REVIEW

Ifrah Shaikh1, Kaveri Dahiwal2, Gururaj Bhogaonkar3, Pramod M. Bhosale4, Vitthal G. Kuchake5.
1, 2,3Students, Ojas College of Pharmacy, Jalna-431203, Maharashtra.
4Guide & Assistance Professor, Ojas College of Pharmacy, Jalna-431203, Maharashtra.
5Principal, Ojas College of Pharmacy, Jalna-431203, Maharashtra.

Abstract:
A Novel Drug Delivery System [NDDS] can be defined as new approach that combines innovative development, formulations, novel methodologies for delivering pharmaceutical compounds in the body as needed to safety achieve its desired pharmacological effects. Drug delivery is the method or process of administering pharmaceutical compound to achieve a therapeutic effect in humans or animals. Most common methods of delivery include the preferred non-invasive peroral (through the mouth), topical (skin), transmucosal (nasal, buccal, sublingual, vaginal, ocular and rectal) and inhalation routes. Many medications such as peptide and protein, antibody, vaccine and gene-based drugs, in general may not be administered using these routes because they might be susceptible to enzymatic degradation or cannot be absorbed into the systemic circulation efficiently due to molecular size and charge issues to be therapeutically effective. NDDS is advanced drug delivery system which improves drug potency, control drug release to give a sustained therapeutic effect, provide greater safety; finally, it is to target a drug specifically to a desired tissue. NDDS is a system for delivery of drug other than conventional drug delivery system. NDDS is a combination of advance technique and new dosage forms which are far better than conventional dosage forms.

Keywords: Drug delivery system, liposomes, noisome, herbal excipients, applications.

Introduction:
A Novel Drug Delivery System [NDDS] can be defined as new approach that combines innovative development, formulations, novel methodologies for delivering pharmaceutical compounds in the body as needed to safety achieve its desired pharmacological effects. drug delivery system is advanced drug delivery system rather than the conventional drug delivery system. A novel drug delivery system [NDDS] is an expression mainly associated with the formulation of new pharmaceutical forms, which have as smaller particle size, high permeability parameters, and selective site targeting permeability parameters.

Need of study:
95% of all experimental drugs have low pharmacokinetic and biopharmaceutical properties at present. Consequently, suitable medication distribution schemes must only be established at the site without harming healthy bodies and tissues, which will disperse the therapeutically activated drug molecules, lower the efficacy doses as well as improve therapeutic indices and safety profiles in new therapists. Various explanations are,

1) Pharmaceutical
   - Confusion in traditional dosing
   – Solubility
2) Biotechnology
   - Poor uptake.
   - High diaphragm borders
   - Instability of the organism
3) Pharmaceuticals/pharmacodynamic
   - Short half of a lifespan
   - Wide distribution volumes
   - Limited pace
4) Clinical Clinical
   - Poor Index of Therapy

Objective:
In order to achieve site specific action at the therapeutically optimized rate and dosage scheme, the main goals when developing the nano parts as an input device are to monitor particle size, surface properties or release of pharmacologically active agents. The medication is therefore explicitly engineered with minimum side effects & enhanced therapeutic index to achieve a desired pharmacological response in a selected site without adverse interactions in other sites.
Ex: replacement therapy with cancer chemotherapy and enzyme

Recent developments in novel drug delivery system of herbals
- ✓ Liposome
- ✓ Nanoparticles
- ✓ Emulsions
- ✓ Microsphere
- ✓ Ethosome
- ✓ Solid lipid nanoparticle
- ✓ Controlled Drug Delivery System
- ✓ Other novel vesicular herbal formulations

- ✓ Proprietary novel drug delivery system of plant actives and extracts
- ✓ Noisome
- ✓ Proniosomes
- ✓ Transdermal Drug Delivery System
- ✓ Dendrimers
- ✓ Liquid Crystals
- ✓ Hydrogels
- ✓ Phytosome

- **ADVANTAGES OF NOVEL DRUG DELIVERY**

1. Maintenance of drug levels within a desired range.
2. Less dosing and increased patient compliance.

- **DISADVANTAGES OF NOVEL DURG DELIVER SYSTEM:**

1. Poor in-vivo and in-vitro correlations.
2. Difficult to optimize the accurate dose and dosing interval.

Liposomes:

The name liposome is derived from two Greek words: Lipos "fat" and Soma ="body". Liposomes are simply vesicles or 'bags in which an aqueous volume is entirely encloses by a membrane composed of lipid (fat) molecules, usually natural or synthetic phospholipids. It is used as vehicle for administration of nutrients as well as pharmaceutical drugs. It shows both characteristics-

- ✓ Hydrophilic head
- ✓ Lipophilic tail

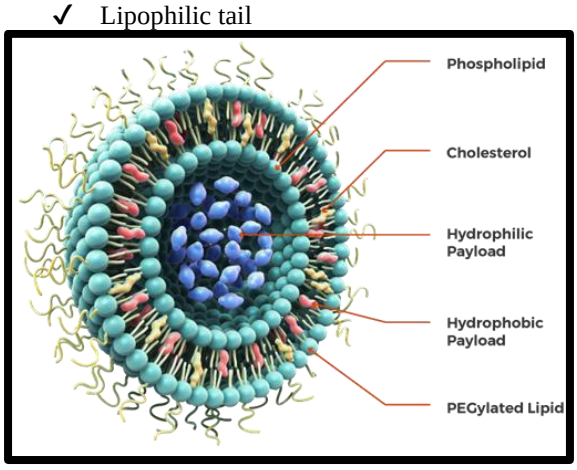

Figure 01: structure of liposome

Mechanism of liposome formation:

The liposomes are formed by hydrated phospholipids. So, the physicochemical properties of phospholipids play a significant role in the liposome formation. Phospholipids are amphiphilic molecules (having affinity for both aqueous and polar moieties) as they have a hydrophobic tail is composed of two fatty acids containing 10-24 carbon atoms and 0-6 double bonds in each chain. In aqueous medium the phospholipids molecules are oriented in such a way that the polar portion of the molecule remains in contact with the polar environment and at the same shields the non- polar part.

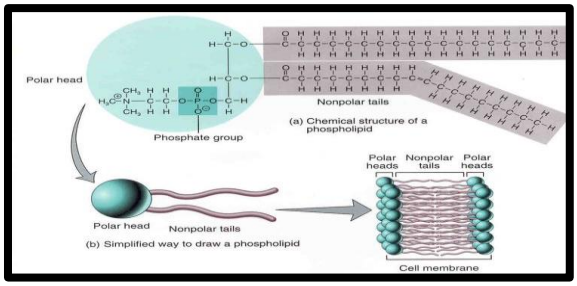

Figure 02: Structure of phospholipids

Types of liposomes:

Vesicle type	Diameter Size	No. of Lipid Layer
Multi lamellar large vesicles (MLV)	More than 0.5 µm	5-25 Oligo
lamellar vesicles (OLV)	0.1-1.0 µm	Approx 0.5
Uni lamellar vesicles (UV)	All size ranges	1
Small Uni lamellar vesicles (SUV)	20-100 nm	1
Medium sized uni lamellar vesicles (MUV	More than 100nm	1
Large Uni lamellar vesicles (LUV)	More than 100nm	1
Giant Uni lamellar vesicles (GUV)	More than 1.0 µm	1
Multi Vesicular vesicles (MVV	More than 1.0 µm	1

Table 01: types of liposomes

Marketed production of liposome:

Sl. NO	PRODUCT NAME	DRUG	COMPANY
1	Ambisome	Amphotericin B	NeXstar pharmaceuticals

2	Abelcet	Amphotericin B	The Liposome company N.J
3	Amphocil	Amphotericin B	Sequus pharmaceuticals
4	Doxil	Doxorubicin	Sequus pharmaceuticals
5	DaunoXome	Daunorubicin	NeXstar pharmaceuticals
6	Mikasome	Amikacin	NeXstar pharmaceuticals
7	DC99	Doxorubicin	Liposome CO.,NJ,USA
8	Epaxel	Hepatitis A vaccine	Swiss Serum Institue,Switzerland
9	ELA	Lidocaine	Biozone Labs,CA,USA

Table 02 : Marketed production of liposome

NIOSOMES:

Noisome are a novel drug delivery system, which entrapped the hydrophilic drug in the core cavity and hydrophobic drugs in the non-polar region present within the bilayer hence both hydrophilic and hydrophobic drugs can be incorporated into noisome.

Salient features of noisome:

• Niosome can entrap solutes.
• Niosome are osmotically active and stable

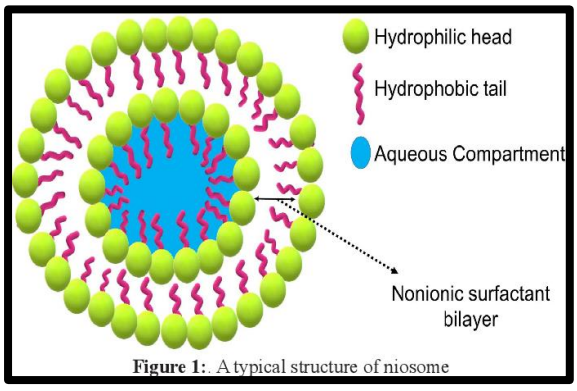

Figure 03: Structure of niosome

COMPOSITION OF NIOSOMES:

There are various components used for the preparation of niosomes they are as follows.

1. Cholesterol
2 Non-ionic surface acting agents

Formulation of Niosome:

Ingredient	Role/Use
Non-ionic surfactant	Form the basic structure of noisome, Provide stability
Cholesterol	Enhances rigidity and stability of noisome membrane
Phospholipids	Aids in membrane formation, contributes to drug encapsulation
Drug	Active pharmaceutical ingredient to be delivered

Table 03: formulation of noisome

TYPES OF NIOSOME:

Parameter	Multi lamellar vesicle	Small Unilamelar vesicle	Large unilamrelar vesicle
Vehicle size	Greater than 0.05micro meter	0.025-0.05micro meter	Greater than 0.10micro meter
Method of preparation	Hand shaking method	Sonication Extrusion method,Solvent evaporation method	Reserve phase evaporation method

Table 04: Type of Niosome

METHOD OF PREPARATION:

- ❖ Hand Shaking Method
- ❖ Ether Injection Method
- ❖ Sonication Method:
- ❖ Reverse Phase Evaporation Method

Evaluation parameter of niosome:

1. Size and vesicle charge
2. Zeta potential
3. Measurement of angle of repose
4. Entrapment efficiency
5. Invitro release study

MARKETED FORMULATION OF NIOSOMES:

Sr.no	Brand	Name of the product
1	Lancôme foundation and complexation	Flash Retouch Brush on Concealer
2	Britney Spears-Curious	Curious Coffret: Edp Spray 100ml +Dualended Parfum & Pink Lip-gloss + Body soufflé 100 ml
3	Loris Azzaro-Chrome	Chrome Eau De Toilette Spray 200 ml
4	Orlane –Lip color and Lipsticks	Lip Gloss

Table 05: Marketed formulation of noisome

HERBAL EXCIPIENTS:

The word Excipient was coming from Latin word, "excipients" which mean to receive, to gather and to take out. The standard of any formulation depends on active pharmaceutical ingredient (API), manufacturing processes and the excipients used. Excipient plays a great role in performance of the API and to support the safety & efficacy.

Classification of Excipients:

Sr. No	TYPES OF EXCIPIENTS	HERBAL EXCIPIENTS
01	Fillers	Plant cellulose, gelatin, lactose, sucrose
02	Binder	Acacia,AlginateAcid,Corn Starch
03	Lubricants	Castor Oil, Mineral Oil, Paraffin Oil
04	Glidants	Vitamin D, Talc
05	Disintegrants	Silicon, Allen gum, Agar
06	Preservatives	Clove Oil, Neem Oil, Cumin Seed

Table06: Herbal Excipient

Application of herbal excipient:

1. Binder: Herbal excipients can act as binders, helping to hold the ingredients of a tablet or capsule together
2. Coating Agent: They can be employed in coating tablets or capsules, providing a protective layer or modifying the release characteristics of the active ingredient.
3. Flavoring Agent: Herbal excipients can contribute to the taste and overall palatability of pharmaceutical formulations

Targeted Drug Delivery for cancer:

➤Targeted drug delivery system is achieved with the advantage of morphology and physiological differences between normal cells and tumor cells.

➤An ideal anticancer drug delivery system should fulfill the following requirements:-

• Effectively kill tumor cells.
• Be non-toxic for healthy organs, tissues and cells.
• Not induce multidrug resistance.

➤Drug targeting to tumor is based on:-

• EPR effect (Enhanced Permeability and Retention).
• Nanoparticle properties and design.

Approaches to Tumor Targeting:

1. Passive Targeting
2. Active Targeting
3. Triggered drug delivery

PASSIVE TARGETING:

Passive targeting is based upon the drug accumulation in the areas around the tumors with leaky vasculature, commonly referred to Enhanced Permeation and Retention (EPR) effect.

Passive tartegeting involves therapeutic exploitation of the natural distribution pattern of a drug-carrier construct in-vivo. Active targeting is used to describe specific interactions between drug/drug-carrier and the target cells, usually through specific ligand-receptor interactions.

CONCLUSION:

Novel drug delivery is novel approach to drug delivery that addresses the limitation of the traditional drug delivery System. NDDS is to provide a therapeutic amount of dreg to the appropriate site in the body. They have various types of Drug delivery system like targeted Release DDS, Controlled release DDS, Trans- dermal release DDS etc. It aids in enhancing therapeutic benefit, increases bioavailability and reducing medication toxicity. NDDS have new approaches like. Liposome, phytosome, Niosome, Ethosome Nano technology. They have less side and use in treatment & diagnosis of various diseases.

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