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Novel Drug Delivery System

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Abstract: *The word "novel drug delivery system" (NDDS) refers to methods, formulations, technologies, and systems for safely delivering pharmaceutical compounds to their intended therapeutic effects within the body. Since the beginning of time, humans have used plants for sustenance and medicine because they are nature's cure-alls. Today thereare general efforts towards finding of herbal medicine in plants to get them in marketvia an appropriate drug delivery mechanism.*

Keywords: Novels drug delivery technique, Herbal excipients, Targeted drug transport system, novel herbal drug transport technique

I. INTRODUCTION

The word "novel drug delivery system" apply to methods, expression, technologies, and organisation for safely delivering pharmaceutical compounds to their intended therapeutic effect within the body. Sinc the beginning of time, humans have used plants for sustenance and medicine because they are nature's cure-alls. Today there are general efforts to the finding of herbal medicine in plants to get them in market via an appropriate drug transport mechanism for human being

Novel drug delivery technique have a various of benefit, including enhance therapy due to increased potncy and duration of drug activity, enhance patient compliance due to decreases dosing frequency and administration routes, and improve targeting for a specific site to lessen undesirable side effects. transporting both current and upcoming drug technique in a way that maximize the benefit to patients is a problem for both drug and drug transport firms. (1). Due to challenges with processing, standardisation, extraction, herbal medications traditionally could not compel scientists to modify novel drug delivery tecniques. The creation of herbal revolutionary drug transport systems is now possible thanks to technological advancement such as novel drug delivery systems (NDDS). Advanced approaches can be used to guard against toxicity, improve stability, increase the bioavailability of herbal formulations, and prevent physical and chemical deterioration. The necessity of new drug delivery methods has grown in order to obtain modified distribution of herbal medications by raising therapeutic value and lowering toxicity. The primary objective for creating such delivery methods are to reduce medication degradation and loss, avoid negative side effect, and boost bioavailability (2) Nanoparticle-based drug delivery tecnique) are currently undergoing extensive development for use in the treatment of various disorder like cardiovascular diseases, infectious disorder, diabetes, and cancer. These systems have physical and chemical properties .

The way a medicine is administered can significantly affect how effective it is. Some medicine have an ideal concentration range where the greatest benefit is obtained; dosages outsied or inside of this range can be hazardous or have no therapeutic effect at all. A multimodal approach to the transport of therapies to targets in tissues is becoming increasingly necessary, howevre, given the very modest improvement in the effictiveness of treating acute disorder.

This led to the development of fresh concepts for managing the pharmacokinetics, pharmacodynamics, nonspecific toxicity, immunogenicity, bio recognition, and efficacy of medications. These innovativ approaches—often referred to as drug delivery systems (DDS)—combine elemenst of polymer science, pharmaceutics, bioconjugate chemistry, and molecular biology.

The restiction of the conventional drug transport methods are addressed by the innovative drug transport tecnique, which is a novel method of medicine administration. By precisely locating the diseased location within a patient body and delivering treatment there, modern medicine may treat a specific ailment.

A drug delivery technique is a mechanism that supply the right amount of the drug to patient so that it precisely reached the "site of action" or gets to work right away.The shortcomings of traditional medication delivery systems are all addressed by novel drug deliverytechnologies. There are numerous methods for achieving innovative medication delivery.

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1.1 Advantage and disadvantages of NDDS

1. Decrese the quantity and frequency of dosages needed to prevent the therapeutic effect.
2. Reduce overall dosages of the medicine used duringthe course of drug treatment.
3. protections against digestion-related problem, and reduce availability with minimum dose.
4. improved medicine effectiveness and site-drugdelivery
5. reduce toxicity and side effects.
6. Preferable patient compliance(4).

Current challenges in upgrading and modernization of herbalformulations :

Only 5% of the global Ayurveda market is now occupied by India, and there is enormous room for growth from its current share of Rs. 4000 crore. But it is a sobering indictment that India missed out on chances in the global market while having the knowledge, talent, and resources.

Research and documentation are necessary to meet international standards in order to improve manufacturing and product quality. This could be addressed by referring to worldwide pharmacopoeia and global standards such Herbal B.P., China, Japanese Herbal, Ayurvedic Formulary of India, and WHO Guidelines on Herbal Medicines.

The government should think about helpings the business set up a discoveredthe body that will work toward standardisation of medications for fulfil international

Different type of novel herbal formulations

II. INTRODUCTION OF PHYSICAL AND CHEMICAL PROPERTIES

2.1 Liposome

Introduction:

Liposomes are small, spherical artificial agent that can be made from cholesterol and safe, naturalphospholipids. The hydrophobic and hydrophilic properties of liposomes, make them ideal drug delivery platform

Method of preparation Liposome

General preparation techniques

There are four fundamental steps in all liposome preparation techniques

1. Dehydration of fat using an organic solvent.
2. Lipid dispersion in watery medium.
3. Cleaning up the final liposome.
4. Examining the finished item.

2.2 Phytosome

Introduction

Flavonoids make up the majority of phytomedicines' bioactive components, although they have a low oral bioavailability. Phytosomes are lipid-compatible molecular aggregates made from water-soluble phytoconstituent molecules, primarily polyphenoles. Due to their improved efficiency to pass lipid-rich biomembranes and ultimately reach into the blood, phytosomes are more accessible than basic herbal extracts. Phytoconstituents are converted to lipid-compatible phytoconstituents using phospholipids from soy, primarily phosphatidylcholine.

Benefit and Negative Aspect

1. As the absorption of active constituent(s) is increased, so its dose requirement is reduced.
2. Phosphatidylcholine used in preparation of phytosomes, besides acting as a carrier also acts as a hepatoprotective.
3. Use of phytoconstituents in form of phytosome enhance their percutaneous absorption and it act as functional cosmetics.
4. Phytosomes' phytoconstituents quickly removed.

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Method of Preparation

Making of a phytosome In order to create phytosomes, a precise amount ofphospholipid, such as soy lecithin, is usually added to plant extracts in an aprotic solvent. Phosphatidylcholine, the primary component of soy lecithin, serves a dual purpose. Choline and phosphatidyl part are both lipophilic by nature

a portion has a hydrophilic character. In contrast to the phosphatidyl component, which is a lipid-soluble substance, the choline component is coupled with hydrophilic chef active components. It causes lipid complexes to form that are more stable and bioavailable. A synthetic or naturally occured phospholipid is combined with the standardised plant extract at a ratio range from 0.52.0 to create phytosomes in a different manner. However, a 1:1 ratio is typically preferred.

A new complex can be separated from the reaction from precipitation with a non solvent, typically an aliphatic hydrocarbon ,by lyophilization. The reaction is performed by alone or in the natural mixture in a aprotic solution such as dioxane, methylene chloride, . By refluxing stoichiometric ratio combination for a predetermined amount of time in the aprotic solvent the complex formation is occasionally accomplished. By using a thinlayer rotary evaporator under vacuum, phytosome vesicles were produced. In a250 ml round bottom flask, the phytosomal complex was combined with anhydrous ethanol. A rotary evaporator has the flask attached to it. At a temperature of roughly 60 °C, the solvent will evaporate, forming a thin layer coating around the flask

Phosphate buffer, which has a pH of 7.4, hydrates the film, and the lipid layer willpeal off in the buffer, creating vesicle suspension. The phytosomal suspension was exposed to 60% amplitude probe sonication. Before being characterised, phytosomal suspension will be kept in the fridge for 24 hours. The reflux approach can be used to make phytosomes. In a 100 mL round bottom flasks, phospholipid and polyphenolic extract were combined, and they were refluxed in DCM for one hour at a temperature below 40°C. A precipitate was produced after adding 15 mL of n-hexane and evaporating the clear solution. A desiccator was used to store the precipitate. [10] Weight the phospholipid and cholesterol accurately, dissolve it in 10 mL of chloroform, and then sonicate the mixture using a bath sonicator for 10 minutes. By placing it under decreased pressure into a rotating evaporating device (40°C), organic solvents can be removed. In a rotary evaporator, a thin layer is created after the solvent has been completely removed and is hydrated with the drug's polyphenolic extract. For heat dissipation, a phospholipids mixture was sonicate in an ice bath. An amber-colored bottle was used to keep the prepared phytosome.

Advantage of Phytosome

1. Phytosome enlarged the absorption of active material, so its dose size is needed.
2. In Phytosome, chemical bonds are form between phosphatidylcholineparticle, so it shows better stability
3. Phytosome enhance the percutaneous absorption of herbalphytoconstituents .

Disadvantages of phytosome

1. The molecular size of the drug should be reasonable that it should be absorbedby cutaneous layer
2. May not adhere well to all types of skin
3. May not be profitable
4. Poor output.
5. Skin irritation due to excipients and enhancers of drug delivery tecnique

2.3 Niosome

Introduction

By hydrating a mixture of nonionic surfactants and cholesterol, niosomes, which arenon-ionic surfactant vesicles, are produced. It can be utilised to transport drugs that are both amphiphilic and lipophilic. The drug is enclosed in a vesicle when it is delivered by niosomes. Niosomes are flexible in their structural characterisation, biocompatible, non-immunogenic, and degradable

Benefits of the niosomes

1. The vesicle's features, like its size and lamellarity,it can be changed depend on the situation.
2. The vesicles may serve as a collect, allowing for a controlled release of the drug over time.

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3. The noisome can be employed for a range of medications since its structure allows room for hydrophilic, lipophilic, and amphiphilic chemical moieties.
4. They are stable and osmotically active.
5. They make the medication that is entrapped more stable.

Niosome Disadvantages

1. Fusion
2. Aggregation of medicine
3. Leakinging of entrapped drug
4. Physically instable

Method of Preparation:

Ether injection Technique

The Ether injection tecnique is essentially depend on slowly introducing a solution of surfactant dissolved in diethyl ether into warm water maintained at 60°C. The surfactant mixture of component in ether is injected through 14gauge needle in an aqueous solution of material. Vaporization of ether give to formation of single layered vesicles. The particle size of the noisome depend on the conditions used the diameter of the vesicle range from 50 to 1000 nm .

Hand shaking Technique

In this procedure, the cholesterol and surfactant are dissolved into a circular motion in a explosive organic solution (such as diethyl either, chloroform).

Using a rotary evaporator, the organic solvent is evaporated at room temperature (20°C), leaving a thin film of the solid mixture deposited on the flask wall. Rehydrating the dried surfactant film with aqueous phase at a temperature of 060 °C while gently stirring will result in multilamellar noisome

2.4 Ethosome

Introduction

Due to recent developments in patch technology, ethosomal patches, which contain drugs inside ethosomes, have been created. Water, ethanol, and soy phosphatidylcholine make up ethosomal systems. They have a great capacity for entrapping molecules of different lipophilicities and are capable of forming multilamellar vesicles. a variety of tiny compounds, peptides, and vaccine, the elastic agent and transferosomes have also been employed as drug carriers. “Ethosomal are ethanolic liposomes”. Ethosomal can defined as noninvasive delivery carriers that not able to drugs reach deeply into the skin layers and the systemic circulation. These are soft, vesicles tailored for increase delivery toactiveagent

Method of Preparations

Ethosomal can be made using two extremely straightforward and practical processes, namely;

- Cold approach
- Hot technique

Cold Approach

The most popular approach for creating ethosomal formulations is the cold procedure. This approach involves vigorously swirling with the use of a mixer to dissolve phospholipid, drug, and other lipid components in ethanol in a covered vessel at room temperature. While stirring, propylene glycol or another polyol is added. In a water bath, this combination is heated to 300C. The mixture is then agitated for 5 minutes in a covered vessel while the water heated to 300C in a another pot is added to it. Using the sonication or extrusion process, the ethosomalformulation's vesicle size can be reduced to the desired extent. Finally, the formulation is stored under refrigeration

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Hot Technique

This hot approach involves heating phospholipid in a water bath to 400C till a colloidal solution is produced. Ethanol and propylene glycol are combined and heated to 400C in a different tank. The organic phase is introduced to the aqueous phase once both solutions have reached 400C. Depending on whether the medication is hydrophilic or hydrophobic, it dissolves in either water or ethanol. Using the probesonication or extrusion approach, the vesicle size of the ethosomal formulation canbe reduced to the desired extent.

2.5 Microsphere

Introduction

Microspheres are discrete spherical particles ranging in average particlesize from 1 to 50microns.Micro particulate drug delivery systems are considered and accepted as a reliable one to deliver the drug to the target site with specificity, to maintain the desired concentration at the site of interest without untoward effects. Micro encapsulation is a useful method which prolongs the duration of drug effect significantly and improves patient compliance. Eventually the total dose and few adverse reactions may be reduced since a steady plasma concentration is maintained

Benefit of Microsphere

1. Dose and risk reduced.
2. Polymer based drug packaging helps drugs avoid enzymatic cleavage while making it appropriate for a drug delivery system.
3. A shorter dose interval results in greater patience compliance
4. Aid in defending the gastrointestinal tract against opoid irritant
5. Convert liquid into solid and eliminate the odour

Negative Aspect of Microsphere

1. The modified formulation releases.
2. The rate at which the controlled dosage is released which varies depending on a number of factor like diet and level of transfer through the gut.
3. Difference in the rate of discharge between doses

III. INTRODUCTION OF HERBAL EXCIPIENTS

The term "excipients" refers to a material that is utilised to deliver a medicine. simple polysaccharide compound are specifically utilized in pharmaceutical observation to support or protect stability, bioavailability, or patient acceptability during manufacturing, support product identification, or improve any various aspect of the overall safety, effectiveness, or delivery of the drug during storage or use. Starch, agar, alginates, , guar gum, xanthan gum, gelatin, pectin, acacia, tragacanth, and cellulose are just a few examples of the plant-based pharmaceutical excipients that are used in the pharmaceutical industry as binding vehicle, disintegrants, sustaining vehicle, protective, colloids, thickening vehicle, gelling agents, depend in suppositorie, stabiliser, and coating AsPlants are a renewabl resource that can harvested or grown sustainably,ensuring a steady supply of basic materials. Waste from the food sector can be used as the starting point for the extraction of herbal excipients. These are additional factors contributing to the rise in demand for herbal materials as excipients. Plant-based drugs do, however, also come with a number of potential drawbacks, such as the need to synthesis them in small amounts from structurally complicated mixes that can vary depending on the location of the plants as well as other component like the time of year. As a result, the separation and purification process could be time-consuming and costly. The importance of intellectual property rights is another issue that has grown. The manufacturing of solid monolithic matrix tecnique, implants, films, beads, microparticles, nanoparticles, inhalable and injectable systems, as well as viscous liquid formulations, are only a few of the specialised use of plant-derived polymers in pharmaceutical preparation. Natural polymers became a focal point in the majority of pharmacological research studies because of their versatility in producing a variety of materials based on their characteristics and molecular weight. Excipients are typically utilised in conventional dosage like tablet and capsule as diluent, binders, disintegrates, adhesives, glidants, and sweeteners.

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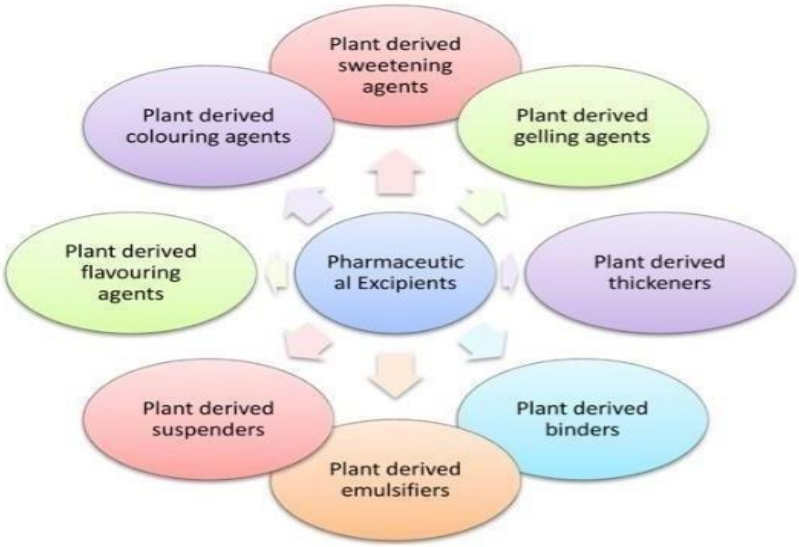
3.1 Pharmaceutical Excipient

Pharmaceutical excipients can be defined as nonactive ingredients that are mixed with therapeutically active compound(s) to form medicines. The ingredient which is not an active compound is regarded as an excipients. Excipients affect the behavior and effectiveness of the drug product more and more functionality and significantly. The variability of active compounds, excipients and process are obvious components for the product variability

3.2 Classification of Excipient

On the basis of different role as pharmaceutical aids, herbs have been divided into several categories as shown in Fig.



A. Plant Based Thickners

Thickener made from plants Various thickener can be found in nature or are made from natural thickeners. These components are polymers that swell and become viscous as they absorb water. Derivatives of polyose are frequently used in shampoos and body cleansers. Another example of a thickening obtained from nature is gum. Others choose gelatin, xanthan gum, and algarroba bean gum. In practical applications, plants and other gums are generally used to thicken or gel binary chemical tecnique and to control water. They will also serve as foam stabiliser, adhesives, and impartcertain particular qualities.

B. Binders Derived From Plant

Binders are the substances used to give the granules cohesion or adherence. The creation of granules with derived hardness and size ensures that the pill stays intact when squeezed in addition to the flow properties. It possesses compressional qualities since the genus Dioscorearotundata is used as a binderand disintegration in pill manufacture

C. Planted-Derived Emulsicification

Water-associated substances that are soluble in each fat make it possible for the fatty to be dispersed uniformly in the water as an emulsion. These serve as the foundation for foods including ghee, margarine, dish dressings, and frozen dessert. on these emulsions as a foundation. Emulsions remain a stable kind because to stabilisers. Emulsifying agents include powdered henna leaves. Additionally used in roast to help the integration of fat into the dough and maintain the softness of the mixture. The dried gluey exudate thatis extracted from an African nation Willdenow and other related family of acacia trees is known as gum Arabic or gum acacia (Family Leguminous).

D. Plant-Derived Supports

Gums have suspending properties. Through surface assimilation and the insulating preparation of a precipitation coating of high tolerance that resists union of droplets, they successfully stabilise the mixer.

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Gum is the dried, glue-like exudate that Astragalus gummier and other Astragalus species produce. The gum accumulates in the pith and medullary rays when the stem sustains damage. Generally speaking, water absorption causes many gums to expand and leak inside the wound. The majority of gums contain Calcium, metal, and bassoric acid salts, . According to reports, the majority of themserve as suspending agents for insoluble powder.

E. Plant-Derived Gelling Agents

The most popular ones include xanthan gum, tree, gum, and tragacanth. Certain gelling agents are more soluble in cold water than in warm water. Clay, gelatin, and sodium cellulose are more soluble in plight than in cold water, although methylcellulose and poloxamers are more soluble there.

F. Plant-Derived Flavorer Agents

Flavoring ingredients come from a variety of sources, although they are typically derived from plants, such as flower, leaves, stem. The components are often removed from the raw material to create an isolate that is only the flavours, which is then used in food products. Consequently, they are also known as "masking agents" or "bitter blockers".

G. Plant-Derived Colorants

There are more than 450 plants that can produce dyes in India. Some of these plants not only have the ability to produce dye but also have medical benefit. Natural goods have been used for therapeutic purposes since the dawn of human progress, and a very long time, items from plants, animals, and minerals served as the primary sources of medicines.

H. Plant-Derived Sweetening Agent

Stevia leaves contain a variety of very sweet diterpene glycosides known as steviol glycosides. Mogrosides are a collection of cucurbitane-type triterpenoid glycosides that are isolated from monkfruit

3.3 Benefits of Herbal Excipient

1. Ecological
2. Biometric and non-toxic
3. Profitable
4. Safe and determine of side effects
5. Easy availability

3.4 Negative Aspect of Herbal Excipient

1. Microbial pollute
2. Variatio
3. Slow Process
4. Microbial contaminatio

3.5 Use Of Herbal Excipient

1. Natural excipient are used in different of sector to express biological active material that have been inhibit by synthetic component
2. Natural excipients have the benefit of beings non-toxic, less available.
3. The qualitys of the prepare product is related to the functions of the excipient
4. Excipients are chemicals that are not medically actived but are inner in nature

3.6 Application of Novel Drug Delivery System

Cardiovascular

Successful CVD prevention and treatment depend on early ,rapid and accurate detection .in recent year, increasing focus has been made to the use of molecular imaging in the detection of cardiovascular disease. The development of

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new contrasts agent is necessary for real time, quick, high sensitivity, and high purpose diagnostics,in adding to the ongoing advancement of many image method.

The following benefits of nano contrast agent over conventional contrast agent are expected to be realized; in vivo stabilization, regulate distubution ,and prolongation of the half life of contrast agent

Control Physical and Chemical Properties

Hepatoprotective

For both doctors and researchers, understanding the hepatoprotective effects of Medicinally significant plants is crucial. The primary benefits of using herbal medicine

Over the conventional medication are its lower cost, higher level of safty and decrese side

Effect the current review focuses on the composition, pharmacology, and outcomes of experimental trials of a few medicinal plant ,including silybum marianum gaertn, glycyrrhiza glabra, phyllanthus amaras schumach and thonn.

Diabetes

Due to the difficulties with pharmacology therapy and the advantages of nanoparticles In drug transport and imaging,researchers have focused on nanoparticles. There is growing interest In using nano carriers to treat and manage diabetes mellitus. Liposome,polymer based nanoparticles And inorganic nanoparticles are the main component of drug delivery system.various polymer based nanoparticles, such as nanosphere, nanocapsules, micelles and dendrites ,are among them and have been Developed as appropriate drug carriers .many drug documented in vivo effect of the many type of nano Carriers that are used to load insulin and other antidiabetes medication.these nanocarries have been found To have numerious potentials benefits, including preventing medication from being degraded by enzyme Increasing their stability ,breaking down various cellular barriers in vivo.

Targeted Herbal Drug Delivery System

Importance and approaches in Targeted herbal drug delivery system specially for cancer

The bulk of cancer treatment plans in use today focus primarily on surgicalexcision of tumor masses. Chemochemical and radiotherapies ,amongother chemical and physical therapies ,have significantaly slowed the spread of malignant cell additionally ,these stratergis are frequently coupled to improve treatment indices. It is well known that medical procedure like surgery,chemo,and radiotherapy also regular cell growth.a bad quality of life is also result of the severe side effecte and high toxicity of various therapeutics technique .this review include cutting edge methods for administrating chemotherapy more successfully with the goal of improving prognosis. A lot of progess is currently being made in the creation of novel cancer treatment statergigs in the very dynamics field of cancer treatment.

IV. CONCLUSION

System for delivery novel drug(NDDS) is a combine of edge methodology and new dosage form outperform traditional dose form. The benefits of novel drug delivery technique include ;optimal dosage form at proper time and place; efficient use of pricey medication; excipient saving and lower production cost ,additionally, patient benefits from develop thrrapy, incrased comfort, and an all higher standard of living targated drug delivery technique, and other basic type of new drug delivery system.

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