Available online on 15.02.2024 at http://ajprd.com

Asian Journal of Pharmaceutical Research and Development

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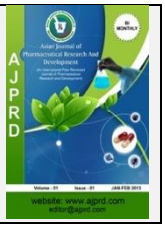

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Review Article

Self Nanoemulsifying Drug Delivery System: A Comrhensive Review

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A B S T R A C T

SNEDDS is also important to create a wide interface for distributing the hydrophobic drug between the oil and aqueous phase, increasing the overall bioavailability of the drug.This process can be stabilized using emulsifiers that reduce interfacial tension.Self-nanoemulsified dosage forms can improve the oral bioavailability of biopharmaceutical class II and IV drugs, The potential mechanism by which SNEDDS increases oral bioavailability.Oral administration of peptides due to proteins is a very difficult task due to poor water quality, poor permeability and tolerance of intestinal environmental stability. Many strategies are being investigated to increase the oral absorption of protein. Recently, evaluated the ability of SNEDDS to improve the oral bioavailability of β-lactamase, a model protein. SNEDDS to the solid state can reduce chemical degradation, but in many cases does not eliminate it. Therefore, it is important to identify microenvironment modification strategies to improve the stability of pH-sensitive drugs.

Keywords: Interface, Model protein, Tolerance,

A R T I C L E I N F O: Received 19 Nov. 2023; Review Complete 10 Jan 2024; Accepted 02 Feb.2024; Available online 15 Feb. 2024

Cite this article as:

Anuja G G , Sandip AC, Rupali SP, Vrunda R J, Subhod UA, Self Nanoemulsifying Drug Delivery System: A Comrhensive Review, Asian Journal of Pharmaceutical Research and Development. 2024; 12(1):77-86. DOI: http://dx.doi.org/10.22270/ajprd.v12i1.1354

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INTRODUCTION

Nanoemulsions are emulsions formed from nanoscale droplets with diameters below 300 nm, usually in the range of 20-200 nm. Transparent, the difference between the two liquids is thermodynamically unequal. They are kinetically stable systems, with destabilization kinetics being very slow, almost lasting up to several months. Their ability to increase bioavailability was discovered about 4 years ago. Nanoemulsions are sometimes referred to as "nearly thermodynamically stable" because the droplets are very resistant to emulsification or solution, agglomeration, and coalescence due to Brownian motion, reduced gravity, and deformation of the droplets.[2] A drug delivery method for self-nanoemulsification was developed using neutral triglyceride and nonionic surfactants required for oral drug delivery. Self-nanoemulsifying drug delivery systems (SNEDDS) are isotropic compositions of active drug ingredients in a mixture of natural or synthetic lipids/oils, surfactants, and water-soluble cosolvents or cosurfactants[4] This mixture of liquids is often called pre-concentrate. When gently mixed in the gastrointestinal tract, the preliminary water phase forms drug-encapsulated ultrafine water-in-oil (o/w) nanoemulsions or in situ nanoemulsions, similar to the luminal content of the gastrointestinal tract, Particle size is 200 nm. or less.[21] This emulsion forms spontaneously in the intestinal tract, allowing the drug to dissolve. SNEDDS is also important to create a wide interface for distributing the hydrophobic drug between the oil and aqueous phase, increasing the overall bioavailability of the drug.

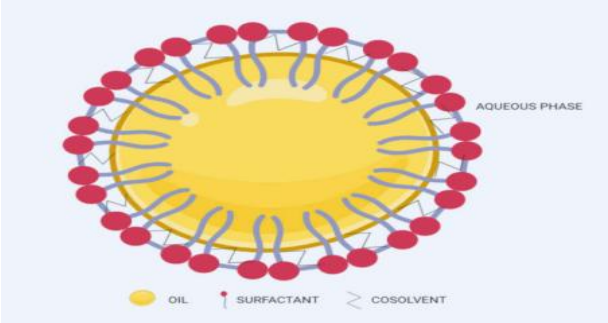


Figure 1: Typical structure of SNEDDS[10]

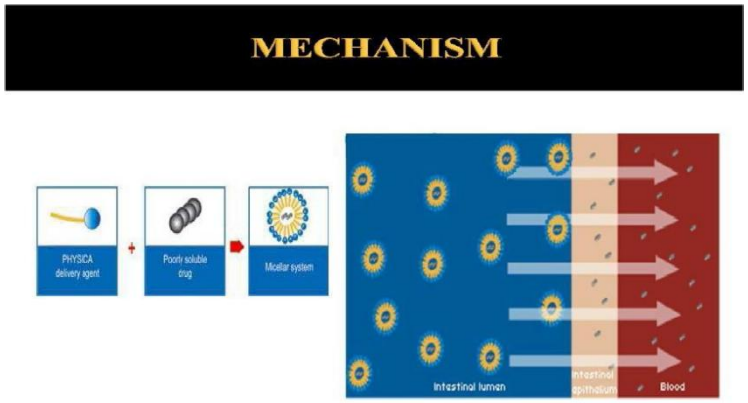
Nanoemulsion Types [35]

Nanoemulsions are divided into three groups according to their composition.

1. Nanoemulsion oil and water
2. Water and oil nano emulsion
3. O/W/O and W/O/W Nano Emulsion.

Mechanism of SNEDDS [12]

Self-emulsification is a phenomenon that occurs during the formation SEDDS.This occurs when the entropy change favoring dispersion exceeds the energy required to form an emulsion surface. The free energy of an emulsion is considered a direct function of the energy required to form new surfaces between two immiscible phases. The two immiscible phases of an emulsion tend to separate, thus reducing the interfacial area and thus the free energy of the system. This process can be stabilized using emulsifiers that reduce interfacial tension. Therefore, SEDDS needs to choose emulsifiers and cosolvents that can reduce surface tension. This reduces the free energy of SEDDS to allow the self-emulsification process to occur when in contact with the aquatic environment in the GIT.



Selection criteria for drug candidates: [36]

Self-nanoemulsified dosage forms can improve the oral bioavailability of biopharmaceutical class II and IV drugs, the log p value should be greater than 4, the melting point should be lower, the oil droplet size should be smaller. 100nm, It should be optically transparent after dispersion and HLBvalueshould be higher than 12[10-11].

Class I High solubility High permeability Marketed 35%	**Class II** Low solubility High permeability Marketed 30% SEDDS – Solubility enhancement → Improved bioavailability
Class III High solubility Low permeability Marketed 25%	**Class IV** Low solubility Low permeability Marketed 10% SEDDS – Solubility and permeation enhancement→ Improved bioavailability

Table 1: Biopharmaceutical Classification

Limitations

- High doses should not be used until the drug reaches acceptable solubility in at least part of the SNEDDS.
- Try to preserve the solubility of the drug as it should not be 12 . Increase the bioavailability of absorbed compounds by fascinating intracellular and extracellular absorption thanks to the presence of SNEDDS bioenhancers

Components of Nanoemulsion [35]

Nanoemulsion has three main components:

1. ***Oil*** (such as Catex 200, Captex 355, Captex 8000, IPM, Myritol 318, Witepsol,
2. ***Surfactants/co-surfactants*** (e.g. Gelucire 44/14, 50/13, Capryol 90, Cremophor RH 40, Lauroroglycol 90, PEG MW> 4000, Poloxamers 124 and 188, Softigen 708P, Transigen 708, glycerin , propylene glycol, ethanol, propanol, etc.)
3. **Aqueous phase** (Figure 2).

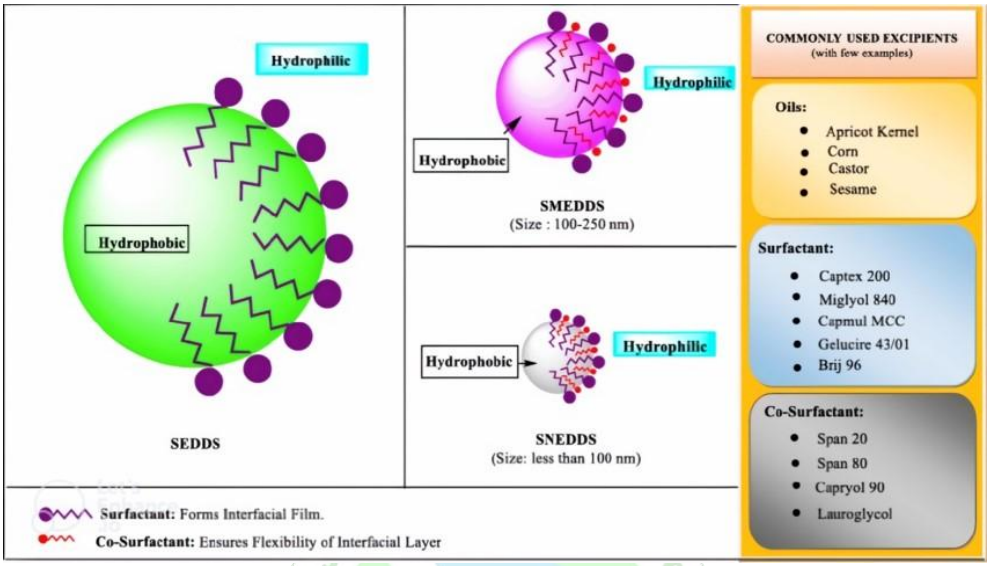


Figure 2: Commonly used Excipients

Drug Delivery System with Self-Nanoemulsifying Composition

Oil

The selection of the appropriate lipid moiety is important because it determines the selection of other nanoemulsion components, especially in oil-in-water nanoemulsions. Generally, the oil with the highest solubility is used as the oil phase in nanoemulsion formulations. This helps in achieving maximum drug concentration in nanoemulsions. Triglycerides are naturally occurring fatty acids found in oils and fats, varying in length and degree of unsaturation. . The ability to dissolve drugs is also an important factor in the selection and simplicity of the oil phase from which nanoemulsions with suitable properties can be produced. Digestible or non-digestible oils instead of vegetable oil and solid oils such as palm oil, olive oil, sesame oil, peanut oil, corn oil, Captex 355, Myritol 318, IPM and beeswax are examples of acceptable gas levels.[5]

Surfactants

Surfactants should be able to microemulsify lipid products and have high solubility properties for non-aqueous solutions. The use of surfactants in nanoemulsion formulations is important. Surfactants with low HLB values (such as sorbitan monoester) are hydrophobic and can form water-in-oil nanoemulsions, whereas those with HLB values (>10) are hydrophobic. It loves water and forms oil-in-water nanoemulsions . The hydrophobic core increases drug solubility by increasing drug capture. When the oil concentration is high, surfactants join the oil/water boundary, forming an emulsion in which the drug can dissolve in the lipid portion. However, when the oil level decreases, nanoemulsions with small oil-embedded surfactant globules are formed. Ionic or non-ionic surfactants can be used to prepare nanoemulsions, Surfactants such as copolymer, lecithin and polysorbate 80 are frequently used. Excessive surfactant concentration can cause stomach upset, so finding the right one is crucial. There is a relationship between the size of the droplets and the amount of surfactant used.[1]

Co-surfactant

The use of co-surfactants alone is generally insufficient to reduce the oil-in-water interfacial strength to form nanoemulsions, so it is necessary to add co-surfactants to reduce the tension. Close to zero. When the surfactant film is too tight, the co-surfactant

enters the monolayer, increasing the flow of the film and preventing the formation of the liquid crystal phase . HLB cosurfactants are often used in conjunction with high HLB surfactants to modify the total HLB of a system. Unlike surfactants, co-surfactants themselves do not form sticky structures such as micelles. Hydrophilic cosurfactants such as hexanol, pentanol, and octanol have been shown to reduce oil/water contact and promote nanoemulsion formation.[24]

Co-solvents

Surfactants should be present in small amounts (usually more than 30% w/w) to produce the best nanoemulsions. Natural carriers such as ethanol, propylene glycol, glycerol and polyethylene glycol 1 (PEG) are suitable for delivery as they allow more hydrophilic surfactant or drug to dissolve in the lipid matrix due to the solvent and cause environmental degradation. It provides a more hydrophobic environment by reducing the dielectric constant of water. [22]

Aqueous phase

The pH value and ion concentration of the aqueous phase should be taken into account when preparing nanoemulsions. The body's pH ranges from 1.2 (in the stomach) to 7.4 or higher (in the blood and intestines). It is known that properties of nanoemulsions such as sphere size and stability are affected by the electrolyte. Therefore, it is a good idea to test nanoemulsions and their products in the aqueous phase with different pH values and electrolyte concentrations (depending on the type of application). Ringer's solution, simulated gastric fluid (pH 1.2),, phosphate-buffered saline, and plain water can be used to evaluate spontaneous nanoemulsification.[23]

Properties SNEDDS[l]:

- They are capable of rapid self-emulsification in juices and can form good water/water emulsions under the influence of slight agitation caused by intestinal peristalsis and other movements.
- Both hydrophobic and hydrophilic substances can be successfully incorporated into the surfactant mixture.
- They require smaller doses than prescription drugs.
- They are available in both liquid and food forms .[1]

Advantages:

- Improve oral bioavailability.
- Safe delivery of peptides that are broken down by enzyme hydrolysis in the digestive system.
- SNEDDS supports potential drugs.
- Resumption of drug use.
- Simple scale-up (pilot plant) process.
- It does not affect lipid digestion [3].

Disadvantages:

- High production costs
- Problems with identifying different products.
- Related drug problems.
- Reduce chemical carry over due to water leakage.
- Normal removal methods do not work.
- High surfactant content in the formulation will cause gastrointestinal irritation.
- The volatile co-solvent of SNEDDS moves towards the capsule shell, causing the precipitation of hydrophobic substances.[4]

Preparation of SNEDDS

Following are the preparation methods for self-nanoemulsifying drug delivery system (SNEDDS):

Method of preparation:

High pressure homogenizer: It is one of the necessary equipment for the preparation and detection of nanoemulsion. The process involves applying pressure to a system containing an oil phase, an aqueous phase, and a surfactant or co-surfactant. Use a homogenizer to apply pressure. During this process, various factors such as hydraulic shear, heavy turbulence and cavitation come together to form nanoemulsions with small droplet sizes. Due to the high speed of the mixture, the homogenization valve produces a high pressure equal to the medium diameter (MDD), which provides the main force to the liquid. As the droplets leave the vortex, their size decreases. Some problems with homogenizers include low productivity and product damage from overheating. These machines are used only for the preparation of liquids with an oil level below 20%. Oil-in-water (O/W) nanoemulsions cannot be produced.[1]

Microfluidization:

"MICROFLUIDIZER" is a device used in microfluidization. Using a high-pressure pump (500-2000 PSI), the material is forced into an interconnected chamber with tiny channels called microchannels. As the material flows through the microchannels and hits the impact zone, it produces small particles in the

submicron range. An online homogenizer is used to mix two solutions (aqueous phase and oil phase)and convert them into a coarse emulsion. The crude emulsion is fed to the microfluidizer for further processing to produce stable nanoemulsions. The coarse emulsion was passed through the interaction chamber microfluidizer several times until the desired size was reached. Uniform, transparent, and stable nanoemulsions can be produced by filtering the bulk emulsion under nitrogen to remove large droplets.[8]

Ultrasonic treatment method:

Ultrasonic treatment uses ultrasonic treatment mechanism to reduce small air emulsions or microemulsion droplets. Only small particles of nanoemulsions can be prepared with this method, which helps determine the size of the droplets but is not suitable for large particles.[9]

Phase inversion method:

For nanoemulsion and microemulsion production, phase inversionmethod is very important. The process is based on temperature response. The chemical energy produced by the phase change that occurs during emulsification is used to create good separation. Constantly changing the composition of the temperature or changing the temperature of the composition will cause the appropriate phase to change. These techniques work by modifying spontaneous emulsion formation.[15]

Progress of SNEDDS [10]

SNEDDS products

Although liquid SNEDDS has many advantages, there are also problems such as precipitation of chemicals/materials during storage, interaction between the filler and the capsule shell. and negative. is a problem they face, such as formulation stability during pre-storage. The main strategy to overcome these problems is to convert liquid SNEDDS into the SNEDDS formula. It is believed that switching from liquid SNEDDS to solid SNEDDS could provide lower production costs, better formulation, ease of use, precise dosing, and thus improved patient follow-up. In general, techniques used to produce SNEDDS products include adsorption onto inert supports spray drying, melt granulation, and extrusion spheroidization , as discussed behind this.

Solid-state characterization of SNEDDS products

In addition to the characterization process used for liquid SNEDDS, solid-state SNEDDS must also display state properties. The physical structure of the powder is usually characterized by thermal analysis and X-ray diffraction, while the interaction between different components is studied by Fourier transform infrared spectroscopy (FTIR).

Curing technology to convert liquid or semi-solid SEDDS into S-SEDDS:.

The advantage of this technology is ease of production; Suitable for low doses of active ingredients and high chemical concentrations up to 50% W/W. Free-flowing powder can be obtained from liquid SEDDS by adsorption onto support material. The adsorption process is as simple as mixing the liquid formulation in a mixer and adding it to the carrier. The resulting powder can be filled directly into capsules or mixed with appropriate ingredients before being compressed into tablets. The main advantage of adsorption technology is its similar content. SEDDS can be adsorbed to suitable supports at levels up to 70% W/W. The loading material can be microporous inorganic material, high surface area of colloidal inorganic adsorbent drug, cross-linked polymers such as silica, silicate, magnesium trisilicate, magnesium hydroxide, talc, crospovidone, croscarmellose Sodium cellulose. Cross-linked polymers create a good surface that controls the solubility of the drug. Nanoparticle adsorbents include mesoporous silica, carbon nanotubes, and carbon nanohorns.[16]

Spray drying:[33]

In this technology, primarily oil, surfactant, drug, carrier, etc. The SEDDS formulation containing the product is sprayed into the dryer through a nozzle. The carrier does not change before, leaving small objects behind. These granules are then packaged into capsules or compressed into tablets.

Advantages:

- Spray drying process is very fast.
- High precision control of particle size, mass density, crystallinity, organic volatile impurities and residual solvents.
- The powder remains fixed throughout the dryer.
- Cylinders of almost any size can be produced.

Disadvantages:

- Lare equipment and supporting equipment are expensive.
- Low overall thermal efficiency.

Supercritical fluid based methods:[33]

Lipids can be used to coat chemicals or create explosives in the supercritical fluid process. The coating process then gradually reduces the pressure and temperature, leading to a decrease in the solubility of the coating material in the supercritical fluid, allowing it to slowly enter the solution used to form the layers. Process in which drugs and lipid excipients are dissolved in an organic solvent (such as methanol) and then in a supercritical fluid, followed by lowering the temperature to obtain the product. Important considerations for this process. Solubility of the formulation components in the supercritical fluid. Integrity or safety of the material used in the system process.

Melt Granulation:

Melt Granulation is the process of obtaining powder agglomeration by adding a binder that melts or softens at high temperatures. As a one-step process, melt granulation has many advantages over wet granulation as it eliminates the additional liquid and post-drying step. Many solid and semisolid lipids can be used as meltable binders. These are Gelucire, PEG, Lecithin Polysorbate 7.[33]

Extrusion spermonization:

Extrusion is a solvent-free process with up to 60% loading capacity and uniform content. Extrusion is a process in which plastic material is transformed from a mold into a smooth and dense material under conditions of temperature, flow and pressure. The size of the extruder orifice determines the approximate size of the resulting spheres. The extrusion-speronization process is frequently used in the pharmaceutical industry to produce uniform products. Diazepam SE pellets and bilayer adhesive SE pellets were prepared using the extrusion-speronization method.[33]

SNEDDS (s-SNEDDS) formulations:[33]

- Self-emulsifying continuous-tso microspheres
- Self-emulsifying microbeads
- Self-emulsifying solid dispersion
- Self-emulsifying sustained-release/controlled-release Tso pellets
- Self-emulsifying sustained/controlled-release tablets
- Dry emulsions
- Self-emulsifying capsule
- Self-emulsifying nanoparticles
- Self-emulsifying suppositories
- Self-emulsifying implants

SNEDDS for controlled-release distribution:

Drugs with poor water quality may be distributed through SNEDDS under controlled-release distribution. There are many ways to control SNEDDS release, such as polymer coating, controlled-release osmotic pump, microencapsulation, and sustained-release pellets. A variety of polymers are used in the controlled-release SNEDDS formulation, including hydroxypropyl methylcellulose (HPMC), polylactic glycolic acid (PLGA), microcrystalline cellulose, and Gelucire. SNEDDS, a crystal-based product of Coenzyme Q10 prepared using tablet technology using Avicel PH-112, Glucidex 12 and Kollidon VA64 polymers.[31]

Self-Dual Nanoemulsified Drug Delivery System (SDNEDDS):

Hydrophilic macromolecules and proteins in the form of SNEDDS are difficult to deliver orally. Therefore SDNDEDS is a good solution to this problem. SDNEDDS is a spontaneous emulsion (w/o/w) containing hydrophilic surfactants and w/o emulsion. Emulsions formed spontaneously when diluted with water and gently mixed. SDNEDDS can be used for many macromolecule drugs, such as nattokinase and insulin, as well as proteins and peptides. These macromolecules protect the GIT from enzyme degradation with the help of SNDEDS and increase drug absorption.[29]

Supersaturated SNEDDS:

Precipitation occurs due to the decrease in the lipid content of SNEDDS and the in vivo dissolution ability of SNEDDS weakens. The drug has higher solubility in surfactants compared to the lipid phase and therefore there is a risk of precipitation. For this reason, SNEDDS often contains drugs of non inferiority. This problem or limitation is solved by supersaturated SNEDDS containing precipitation inhibitors that are hydrophilic in nature. These inhibitors reduce chemical nucleation and precipitation in the intestine by creating a metastable state of supersaturation.[23]

The characterization of SNEDDS

It was chosen to evaluate the ability of the premixed material to emulsify itself into SNEDDS;

Two important parameters were tested: emulsification rate and resulting pellet size

Emulsification rate

Cost of the preparation processSNEDDS only needs a few glasses of water to produce a consistent emulsion. The emulsification rate is rapid within seconds, with no significant differences between formulations measured precisely.[6]

Determination of the effect of dilution on pellet size

Selection of SNEDDS

According to the ability of the pre-concentrated mixture to self-emulsify into SNEDDS, two things are tested: the emulsification rate and the resulting pellet size [20] .

- Emulsification cost of the preparation processSNEDDS requires only a few glasses of water to produce the emulsion.
- Emulsification occurs quickly within seconds with no significant difference between samples for accurate measurement[6]

Morphological analysis

It is very important as it tells us about the characteristics of the sample such as color, smell, consistency, density and shape. Self-nanoemulsifying drug delivery system (SNEDDS) was used to examine the product in transmission electron microscopy (TEM). Analysis of Properties in Self-Nanoemulsified Drug Delivery Systems (SNEDDS) Using Transmission Electron Microscopy.[37]

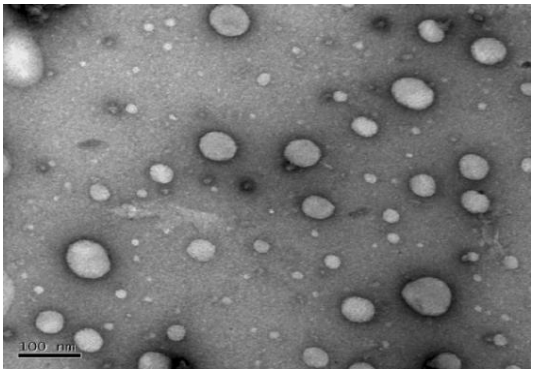


Figure 3: Tem Micrographs.

Dispersibility Test:

Test the self-emulsifying performance of oral nano- or microemulsions using the standard USP XXII Dissolution Apparatus II. Add 1 ml of each form to 900 ml of distilled water at 37.5 °C. The standard stainless steel unwinding paddle moves at 50 rpm, providing gentle pressure. The in vitro performance of the formulations was rated using the following scale.[37]

Nephelometric analysis:

Nephelometric analysis is used to monitor the development of the emulsification process. After mixing an amount of the self-emulsifying system with a fixed amount of a suitable medium (0.1 N HCL), the increase in turbidity is measured using a turbidimeter at the end with stirring (50 rpm) on a magnetic plate at ambient temperature. When the total time required to complete emulsification is too short, the amount of change in turbidity cannot be assessed.[23]

Transmission percentage:

The body's transmission percentage is calculated by UV spectrophotometer at a specific wavelength and using the relevant solvent blank. If the formula is transparent, the light transmittance will be more than 99%. Triplicate analyzes were performed for each sample.[17]

Contents of the drug:

The nanoemulsion containing a dose equal to 10 mg of the drug was dissolved in methanol and different concentrations of the drug were measured using a UV spectrophotometer.[27]

Dilution Stability:

Dilution was evaluated by diluting 50 mg of SNEDDS to 50 ml using different dissolution media such as water and phosphate buffer (pH 1.2, 6.8 and 7.4). Store the diluted solution and monitor for signs of phase separation or precipitation after 12 hours.[37]

Percent Drug Loading

Blend a pre-weighted nanoemulsion with 25 ml of appropriate carrier to separate the nanoemulsion and compare the extract to the drug using spectrophotometric/HPLC. Determination of Chemical Substances Using Reverse Phase HPLC Methods Using Chromatography Columns with Different Porosity.[35]

In vitro drug release

In vitro release studies of nanoemulsions include drugs that can be studied in separate containers using semi-permeable materials. Place a cylindrical glass tube (diameter 2.5 cm, length 6 cm) at the location of the basket and seal tightly with a semi-permeable membrane. The cylindrical tube is filled with drug-loaded nanoemulsion and covered with the surface of the semi-permeable membrane. The cylindrical tube should be placed in 100 ml of buffer while controlling the pH to form water and ensure a constant dispersion. Published studies can be performed at 32°C for 24 hours. The mixing shaft should reach one hundred revolutions per minute. To uniformize the volume, use a milliliter aliquot of the release medium, dilute, filter, and replace it with an equal amount of the opposite of determination (1, 2,). > 4, 6, 8, 12, 20, 24 hours). The absorbance of the data obtained can be determined using a UV spectrophotometer.[35]

Effects of Precipitation Inhibitors

Many gastrointestinal drugs can inhibit effective absorption. Therefore, precipitation must be minimized and the drug must remain dissolved in the absorption zone for a sufficiently long time. Oral nanoemulsions are diluted with gastrointestinal fluid and the surfactant is slowly desorbed.[20]

Nanoemulsion Applications

Nanoemulsions containing active pharmaceutical ingredients are used in domestic formulations. Nanoemulsion samples can be added to the mixture. Ampoules, especially sterile medicines and infusions; Solutions such as eye drops, nasal drops and oral liquids, which may contain various substances as well as nanoemulsions; Aerosols are not measured and chemical aerosols have the capacity to encapsulate propellants. and stabilizers, including nanoemulsions; hydrophilic and hydrophobic gels and ointments containing nanoemulsions; oil in water and water in oil.[18]

Nasal administration of medications according to SNEDDS

Nasal delivery has attracted much attention because it saves more money on healthcare management and especially avoids pressure. Nanoemulsions increase absorption by dissolving the drug in the internal phase of the emulsion and increasing the contact time of the emulsion droplets with the nasal mucosa. Insulin and testosterone are two drugs that can be administered through the nose.[18]

Ocular Delivery as SNEDDS

However, to improve the release of lipid ointment from the eye, O/W emulsions have been used. Lipophilic drug oil-in-water ophthalmic emulsions such as pilocarpine, indomethacin, piroxicam, and cyclosporine A may improve ocular bioavailability and patient comfort after topical application.

Antibacterial self-nanoemulsifying drug delivery system

Oil droplets in water with a diameter of 200 to 600 nanometers form antibacterial nanoemulsions. Thermodynamic fusion of lipid-containing organisms with nanoemulsion particles has been completed. When a certain number of nanoparticles bind to the virus, some of the energy of the emulsion is released. Active ingredients and released energy destabilize the lipid membrane, causing cell death and disintegration. Bacteria, (HIV, herpes simplex), enveloped viruses (Candida,dermatophytes), fungi and spores are contagious those that are not emulsions (such as anthrax) .

SNEDDS: Potentiation

The ability of SNEDDS to improve the oral health of various medical workers (different clinical classes) was determined by various in vitro and/or in vivo methods. The potential mechanism by which SNEDDS increases oral bioavailability is shown in Figure. Most of the studies described to date have evaluated the pharmacokinetics of drug combinations in SNEDDS, and some studies have shown good pharmacodynamics.[25] Although pharmacokinetic studies are sufficient to establish proof of concept for SNEDDS, the results of pharmacokinetic studies need to be confirmed by pharmacodynamic studies. This is particularly important for drugs with poor pharmacokinetic-pharmacodynamic relationships (e.g. simvastatin, atorvastatin and ezetimibe). Oral administration of peptides due to proteins is a very difficult task due to poor water quality, poor permeability and tolerance of intestinal environmental stability. Many strategies are being investigated to increase the oral absorption of protein. Recently, evaluated the ability of SNEDDS to improve the oral bioavailability of β-lactamase, a model protein. To

load hydrophilic proteins into SNEDDS, the researchers adsorbed the proteins onto hydrogenated phospholipids. Phospholipid-adsorbed proteins were incorporated into SNEDDS to evaluate the ability of SNEDDS to improve Caco-2 cell permeability and oral bioavailability. Interestingly, peptide-loaded SNEDDS can increase permeability.

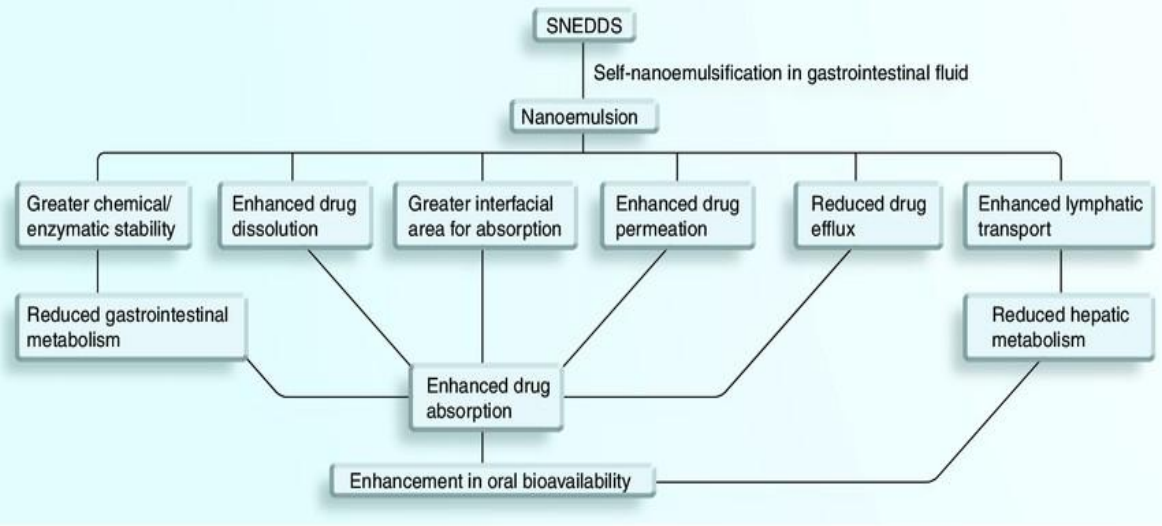


Figure 4: Potential mechanisms of Improvement of Oral Bioavailability[34]

Future Perspective[34]

Research on SNEDDS technology has accelerated in the last 5 years and many reports have appeared in the literature. SNEDDS is mainly used to increase the bioavailability of oral drug delivery. The need to measure pH-catalyzed and solution degradation of drugs in SNEDDS. Conversion of SNEDDS to the solid state can reduce chemical degradation, but in many cases does not eliminate it. Therefore, it is important to identify microenvironment modification strategies to improve the stability of pH-sensitive drugs. Extensive research has been done to convert liquid SNEDDS into bulk materials such as tablets and pills. However, there is a need to find a suitable heavy load that can convert liquid SNEDDS into a fine powder with or without volume.

CONCLUSION:

SNEDDS is a convention for BCS class II or IV compounds and compounds with poor water solubility. A method for lipophilic drugs where the emulsification phenomenon provides nanoemulsions as they are limited due to their instability. The type and concentration of surfactants and co-surfactants, the type of oil phase, the method used, the processing method and the addition of additives at the interface of nanoemulsion formulations will help improve the stability of the formulation provides a deeper understanding of the effectiveness of drug delivery .The type and concentration of surfactants and cosurfactants, the type of oil phase, the process used, the processing process, and the addition of additives at the interface of nanoemulsion formulations will help increase the stability of the formulation.

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