A Review on Self Nano Emulsifying Drug Delivery System

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ABSTRACT

A self-nano emulsifying drug delivery system (SNEDDS) is a scheme of drug delivery that utilizes a chemical rather than a mechanical method of Nano emulsion. That is, by an intrinsic property of the drug formulation. It utilizes the familiar ouzo impact shown by anethole in many anise-flavored liquors, rather than by unique blending and handling Nano emulsions have significant potential for use in the delivery of drugs, and SNEDDS (including so-called “U-type” nano emulsions) is the best of those systems to date identified. SNEDDS are of particular value in increasing the absorption of lipophilic drugs taken by mouth. For oral use, SNEDDS can be formulated as liquids or solids, as solids contained in capsules or tablets. Limited studies compared these reports that SNEDDS is superior to solid SNEDDS in terms of bioavailability, which are superior to conventional tablets. Liquid SNEDDS also displayed the value in injectable formulations (IV and urethral) and in a topical (oral) spray. The SNEDDS (Self-nano emulsifying drug delivery system) is a significant application for BCS Class II and Class IV drugs for water improvement Solubility of drugs that are water-soluble. Preventing interfacial tension and enhancing dissolution as well as drug molecule absorption rate is essential.

Keywords: Drug Delivery, Self nano emulsification, Drug

INTRODUCTION

Self-nano emulsifying drug delivery system (SNEDDS) is a novel drug delivery system for the enhancement of water solubility of poorly water-soluble drugs. It is an isotropic mixture of oil, surfactant, and co-surfactant molecules and also includes molecules of co-solvent. It is the thermodynamically and kinetically stable drug delivery system. Dilution of aqueous media such as GI fluid is accompanied by the drug delivery scheme under moderate agitation and it can result from stable O / W Nano emulsion. It is less than 200 nm
to have a majority of globules. The self-nano emulsifying drug delivery system (SNEDDS) is a significant application for enhancing water solubility of poorly water-soluble medicines on BCS Class II and Class IV drugs. Preventing interfacial tension and enhancing the dissolution as well as the rate of absorption of a drug molecule is essential. It is the novel drug delivery system for parenteral, ophthalmic, intranasal and cosmetic drug delivery. A vital feature of a successful SNEDDS formulation is its capability to hold the drug in solution, throughout the GIT, for sufficient time to allow for absorption [1]. Many badly water-soluble medications (PWSDs) have elevated solubility in SNEDDS formulations but may pose a risk of precipitation following aqueous dispersion or digestion in the intestine [2]. Formation of good dispersions and micellar suspensions to stop the drug compound from precipitating and recrystallizing. The capacity of certain lipid compounds and their metabolites to initiate gastrointestinal fluid modifications to promote enhanced drug intake. Inhibition of mechanisms of cellular efflux that prevent medicines from circulating.

Some lipid excipients are associated with selective uptake of drugs into the lymphatic transportation system, thus reducing the effect of the first-pass metabolism of drugs. Fig. 1 shows how the self-emulsification of drugs occurs after oral administration [3].

![Process of self nano emulsification](image)

**Figure 1:** Process of self nano emulsification [4].

**Advantages**

1. They can effectively incorporate drugs (hydrophobic or hydrophilic) within the oil surfactant mixture [5].
2. They can be used for liquid as well as solid dosage forms.
3. They require a lower dose of the drug with respect to conventional dosage forms.
4. Potential benefits of these systems include improved oral bioavailability, more stable temporal drug absorption profiles, targeted drug targeting in the GI tract to a limited absorption window, and drug protection from the hostile intestinal environment. Thus, for lipophilic drug compounds that display dissolution-limited absorption, these systems can provide an enhancement in absorption rate and magnitude, resulting in more reproducible blood time profiles.
5. Compared to other drug delivery systems such as strong dispersions,
liposomes, nanoparticles, etc., ease of production and scale-up is one of the most significant benefits that make SNEDDS unique. Because they involve very easy and economical production facilities such as an easy agitator mixer and large-scale liquid filling equipment.

Disadvantages
1. Traditional dissolution methods do not work, because these formulations potentially are dependent on digestion prior to the release of the drug.
2. Formulations containing several components become more challenging to validate.
3. High production costs.
4. Low drug incompatibility.
5. Drug leakage. So, it may allow less drug loading.
6. The disadvantage of self-nano emulsifying the drug delivery system is that Nano emulsion preparations (SNEDDS) are hard to prepare due to the high-pressure homogenizer as well as ultrasonic machinery that has been accessible in the last year and the preparation for Nano emulsion has been costly.

TYPES OF NANO EMULSION (SNEDDS)
1. W/O Nano emulsion
2. O/W Nano emulsion
3. Bi-continuous Nano emulsion
   Water in oil (W/O) Nano emulsion in which Water Droplet in Continuous Phase Oil was dispersed. Oil in water (O / W) Nano emulsion in which, oil droplet was dispersed in continuous phase water. Bi-continuous Nano emulsion in which the surfactant was soluble in both oil and water stage and droplet was distributed both in the oil and water stage.

COMPONENTS
In self-Nano emulsifying system is consist of the following are
1. Oil
2. Surfactant
3. Co-surfactant

Oil
Triglycerides contain in long-chain fatty acids are the self-nano emulsifying drug delivery system (SNEDDS), in which Specific oily phase selection is a very important parameter for the selection of ingredients in Nano emulsion, nature as well as synthetically occurring oils and fat mixture. Triglycerides are categorized as short-chain triglycerides (12 carbons) to reduce the degree of unsaturation and to prevent oxidative degradation is essential. Fats like olive oil, palm oil, maize oil, oleic acid, sesame oil, soybean oil, hydrogenated oil to improve solubility.

<table>
<thead>
<tr>
<th>General Class</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed Oils</td>
<td>Castor oil, Soya bean oil, Sunflower oil, Olive oil.</td>
</tr>
<tr>
<td>Medium Chain Triglycerides</td>
<td>Miglyol 810, Labrafac CC, Capex 300.</td>
</tr>
<tr>
<td>Medium Chain mono-and di-glycerides</td>
<td>Campus MCM, Akoline MCM, Inwitor 742.</td>
</tr>
<tr>
<td>Long Chain mono-glycerides</td>
<td>Petrol, Capmul GMO</td>
</tr>
<tr>
<td>Monolinoleate Glyceryl</td>
<td>Maine -35</td>
</tr>
<tr>
<td>PEG fatty acid esters</td>
<td>Capryol 90, Capmul PG-8</td>
</tr>
<tr>
<td>Fatty acid esters</td>
<td>Ethyl olate, Isopropyl myristate</td>
</tr>
<tr>
<td>Fatty acids</td>
<td>Oleic acid, Caprylic acid</td>
</tr>
<tr>
<td>Vitamins</td>
<td>Vitamin E</td>
</tr>
</tbody>
</table>

Table 1: Commonly used oily phases general class examples.

Usually, surfactants are categorized as anionic, cationic and non-ionic. Non-ionic with high HLB values are used in the formulation of SNEDDS. Compared to ionic,
non-ionic surfactants are less toxic. Tween, labral, cremophor, etc., are examples.

**Selection of Surfactant**

Normally a range of 30% to 60% w/w of surfactant strength is required to acquire a stable SNEDDS formulation. Surfactants are amphiphilic in nature and can solve comparatively large quantities of hydrophobic drug compounds. This can prevent precipitation of the drug in the GI tract and may suitable for the prolonged existence of drug molecules. Example – Tween 80, Tween 20, Labrasol, Cremophor RH 40.

**Co-surfactants**

Co-surfactants are used to improve the emulsification of the surfactant. They are also screened by mixing various co-surfactants with selected surfactant and oily phase under warming conditions and then diluted with water to form isotropic mixtures. This will enable equilibrium to be measured along with transmittance proportion, droplet size, and polydispersity index. The most important application of co-surfactant in the self-Nano emulsifying Drug Delivery system (SNEDDS) is to prevent interfacial tension between oil and water interface. Co-surfactants are like Ethanol, Methanol, Pentanol, Glycol, and Propylene Glycol.

**Screening of Surfactants for the Emulsifying Ability**

The capacity to emulsify different surfactants was tested. Briefly, the selected oily step added 300 mg of surfactant to 300 mg. To homogenize the materials, the mixture was gently heated at 45–600°C. The 50 mg isotropic mixture was precisely weighed and diluted to produce a fine emulsion with double distilled water to 50 ml. The ease of formation of emulsions was monitored by noting the number of volumetric flask inversions required to give uniform emulsion. For comparative turbidity, the resulting emulsions were noted visually. The emulsions were allowed to stand for 2h and UV-160A double beam spectrophotometer (Shimadzu, Japan) evaluated their transmission at 638.2 nm using double distilled water as blank [6, 7].

**Methods**

**Figure 2:** Various methods for Nano emulsion fabrication.
High-Energy Emulsification Methods

Nano emulsions are structures of non-equilibrium that are not spontaneously formable. For this reason, it is necessary to form mechanical or chemical energy inputs. Generally, Nano emulsion s are prepared using high-energy techniques in which high-pressure homogenizers, high-shear stirring, and ultrasonic generators apply mechanical energy input [8]. These mechanical devices provide strong forces that disrupt oil and water phases to form Nano emulsion s. In high energy methods, input energy density is about 108−1010 W kg⁻¹. The necessary energy is supplied in the shortest time to the system in order to obtain homogeneous lesser sized particles. High-pressure homogenizers are the most commonly used equipment for the preparation of Nano emulsion s [9]. In addition, the production of ultrasound emulsions is a cost-effective method that essentially requires less use of surfactants [10]. Therefore, considering conventional mechanical processes more homogeneous batches are achieved.

High-Shear Stirring

In this method, high-energy mixers and rotor-stator systems are used for the preparation of Nano emulsion s. Droplet sizes of the internal phase can be significantly decreased by increasing the mixing intensity of these devices. However, obtaining emulsions with the average droplet size less than 200-300 nm is rather difficult [11].

Ultrasonic Emulsification

Two processes are involved in ultrasonic emulsification. Firstly, the acoustic field creates interfacial waves that make the oil phase disperse in the continuous phase as droplets. Second, ultrasound causes acoustic cavitation that causes micro bubbles to form and collapse owing to pressure changes in a single sound wave, respectively. In this way, enormous levels of highly localized turbulence are generated and this causes micro implosions that disrupt large droplets into sub-micron size [12]. In this method, the premixed macro emulsion is agitated by vibrating solid surface at 29 kHz or larger frequencies. High-power ultrasonic devices such as focusing horns and pointed tips cause extreme shear and cavitation that result in breaking up of droplets. It was noted that the sound field emitted in most ultrasonic devices is inhomogeneous. For this purpose, recirculation of the emulsion through the high-power region must be given in order to have all droplets experiencing the greatest shear rate. Moreover, by doing this type of recirculation many times it is possible to obtain emulsions with uniform droplet size at dilute concentrations [13]. The most critical parameters affecting homogenization effectiveness are the sort of emulsifier, the quantity emulsifier and the viscosity of stages. Thus, the optimization of these parameters is necessary to prepare Nano emulsion s having fine droplets. There are, however, concerns about techniques of sonication because they can cause protein denaturation, polysaccharide depolymerization and lipid oxidation [14, 15].

Low-Energy Emulsification Methods

As the name suggests, low-energy emulsification methods require low energy for the fabrication of Nano emulsion s. These techniques are primarily based on modulating interfacial phenomenon/phase transitions and the surfactants’ inherent physicochemical characteristics, co-emulsifiers/co-surfactants, and oil to produce emulsion droplets of nano-size. The most commonly used low-energy emulsification methods are given below.

Solvent Displacement Method

The method of solvent displacement for spontaneous manufacturing of Nano emulsion was adopted using the method of
nanoprecipitation used for polymeric nanoparticles. The oily phase in water-mixable organic solvents such as acetone, ethanol and ethyl methyl ketone is dissolved in this method. Through rapid diffusion of organic solvent, the organic material is poured into an aqueous phase that includes a surfactant to create spontaneous Nano emulsion. The organic solvent is separated from the Nano emulsion by any appropriate means, as observed by vacuum evaporation.

Various factors that influence the fabrication of Nano emulsion by the solvent displacement method. Interestingly, spontaneous Nano emulsification has also been reported when a solution of organic solvents containing a small percentage of oil is poured into the aqueous phase without any surfactant. This phenomenon is known as the ‘Ouzo effect’. This phenomenon has mainly used for fabricating polymeric nanoparticles or nanocapsules using Nano emulsion as a template.

**Phase Inversion Composition**

In this method, the composition is changed at a constant temperature. Through continuously adding water or oil to the oil-surfactant or water-surfactant mixture, Nano emulsions are obtained. The PIC method is more suited for manufacturing on a large scale than the PIT method since it is easier to add one part to an emulsion than to produce sudden temperature changes. The volume of water increases by adding water to the system, resulting in a transition composition. In other words, the hydration level of the surfactant’s polyoxyethylene chains increases and therefore the surfactant’s spontaneous curvature changes from negative to zero. As with the HLB temperature, a balance is obtained for the hydrophilic-lipophilic properties of the surfactant in the transition composition. When this transition composition is exceeded, small-sized metastable oil in water droplet is composed due to the separation of the structures that have zero curvature [16]. Solvent displacement methods at room temperature can yield Nano emulsion s and require simple manufacturing stirring. This method is therefore used by scientists in the pharmaceutical sciences to manufacturing Nano emulsion s primarily for parenteral use. However, the main drawback of this technique is the use of organic solvents, such as acetone, which require additional inputs to remove Nano emulsion. In addition, to achieve a desired droplet size Nano emulsion, an elevated solvent-to-oil ratio is required. Pseudo-ternary phase diagrams of oil, Surfactant with co-surfactant mix and water were constructed using aqueous titration method. Ratios are chosen to increase co-surfactant concentration in the range 1:1, 2:1, 3:1 and 4:1. Phase diagram boundaries defined the three components of the system; one axis representing the second aqueous phase for the gas, and the third representing the surfactant with co-surfactant mixing liquid, water. [17].

**Construction of Ternary Phase Diagrams**

This is the first step before starting the formulation. It is useful to identify the best emulsification region of oil, surfactant and co-surfactant combinations. Ternary phase diagram of surfactant, co-surfactant, and oil will plot; each of them, representing an apex of the triangle.

![Figure 3: Ternary phase diagram.](image)
The techniques used to plot ternary stage diagrams are the dilution technique, and Fig. 3 shows the Water Titration technique [18].

**Dilution Method**

Ternary mixtures were prepared with different surfactant, co-surfactant and oil compositions. The ratio of surfactant, co-surfactant and petroleum was decided on the basis of the demands. Compositions are assessed for Nano emulsion formation by diluting the appropriate amount of mixtures with adequate double distilled water. Spectroscopy was used to determine the globular size of the resulting dispersions. For the respective process in which Nano emulsions of desire globule size are collected, the region of Nano emulsion formation in the Ternary phase diagram (as shown in Fig. 4) was defined.

**Water Titration Method**

The pseudo-ternary phase diagrams were also designed by titration of homogeneous fluid oil, surfactant and water co-surfactant mixtures at room temperature (as shown in Fig. 5). The oil phase, surfactant and co-surfactant were prepared at Km values 1.5 and 1 (surfactant: co-surfactant ratio), oily mixtures of oil, surfactant and co-surfactant varied from 9:1 to 1:9 and were weighed and vortexed in the same screw-cap glass tubes. The growing mixture was then gradually titrated with distilled water aliquots and stirred to reach equilibrium at room temperature. For clarity, the mixture was analyzed visually. The mixtures were further titrated with distilled water aliquots after equilibrium was reached until they showed the turbidity. Within the Nano emulsion region, clear and isotropic samples were considered. There were no efforts to fully define the other phase diagram areas. Based on the results, an appropriate percentage of oil, surfactant, and co-surfactant was selected, correlated in the phase diagram and were used for the preparation of SNEDDS.

**Compatibility Studies**

Compatibility between the drug and the excipients should be studied using differential scanning calorimetry and Fourier Transforms Infra-red spectroscopy.
**Preparation**

It was possible to determine the concentration of oil and surfactant/co-surfactant from the pseudo-ternary phase diagrams and then to prepare the formulations [19].

Solid SNEDDS can be prepared with a mini-spray dryer type Buchi 190. Carriers are used by 100ml of solvent to prepare solid SNEDDS. Hydrophobic carriers can be suspended in 100ml of ethanol and 100ml of water can be suspended in hydrophilic carriers. In order to obtain good emulsions, the liquid SNEDDS is added to these solutions with continuous mixing at room temperature (Fig. 7). Using a peristaltic pump, the product can be produced at a flow rate of 5ml/min through the nozzle (0.7 mm diameter) and spray dried at an inlet temperature of 100 and 60°C and an outlet temperature of 80 and 40°C respectively. The airflow direction and the spray product direction should be the same. Examples of strong carriers include hydrophobic silicon dioxide and magnesium stearate, polyvinyl alcohol (PVA), hydrophilic hydroxy-β-cyclodextrantrin (HP-β-CD) sodium carboxymethylcellulose (Na-CMC). Silicon dioxide is the most widely used strong carrier that effectively increases the drug’s dissolution and oral bioavailability [20].

![Figure 7: Preparation of SNEDDS dosage forms of self emulsifying drug delivery system.](image_url)

**Self-Emulsifying Capsules**

When administered, they spontaneously form fine droplets of Nano emulsion s. These nano-emulsions are dispersed in the gastrointestinal tract and improve intestinal absorption. In this form of dosage, irrefutable limitations that cause a decrease in drug absorption are the irreversible phase separation of the nano-emulsion that can occur. In cases where this may occur, the anionic surfactant, sodium dodecyl sulfate is added to the self-nanoemulsifying formulations to improve absorption. In the formulation, a small amount of polymer is used to formulate super-saturable SNEDDS to
prevent drug precipitation ensuring that a super-saturated state is produced and maintained in vivo. Such formulations have a reduced quantity of surfactant, thereby minimizing the side effects of the gastrointestinal tract. In addition to filling in liquid formulations in tubes, by mixing the liquid with a solid container, the liquid self-nano emulsifying formulations can also be filled in the solid or semi-solid state. Oral SNEDDS capsules have been found to be more patient-compliant than Low Molecular Weight Heparin (LMWH) injections, typically delivered via the parenteral path. The LMWH was merged and placed in hard capsule shells with solid carrier absorbents. Gentamicin, which is usually given in the topical or parenteral route, has also been added to this form. Self-nano emulsifying gentamicin capsules have been developed.

**Self-Nano Emulsifying Sustained-Release Tablets**
The self-nano emulsifying tablets have been successfully formulated. The aim was to create self-nano emulsifying tablets that would not require a large number of solid excipients, and for this, a gelling agent called colloidal silicon dioxide was introduced. The gelling agent helped to minimize the number of solid excipients required for the formulations of self-nano emulsifying tablets and also to cause a slow or sustained release of the drug, hence the name. Indomethacin is a hydrophobic non-steroidal anti-inflammatory drug (NSAID). Application of Indomethacin self-nano emulsifying tablets could increase permeability through gastrointestinal mucosa to avoid bleeding. New technology is introduced in self-nano emulsifying tablets involving the use of osmotic pump as carriers [21].

**Dry Nano emulsions**
Dry Nano emulsion s are oil-in-water emulsions that use techniques like spray drying, rotatory evaporation freeze-drying or solid carrier adsorption to get converted into actual powders. They are solid dosage forms. Before use, these powders may be re-dispersed into water. Dry emulsions are in vivo self-nano emulsifying powders or when they come into contact with the aqueous solution. Mineral oils and saccharose are used in the rotator evaporation technique to obtain glass emulsions in the form of dry foams. This technique does not involve surfactants. The technique of spray-drying is mostly used in dry emulsion formulations. Currently, dry emulsions were prepared by spreading liquid self-nano emulsifying formulations on a glass plate and left to dry and further mixed to powders [22]. This dry emulsion process neglects the use of harmful organic solvents and avoids all the stability issues associated with a conventional emulsion such as creaming, phase separation, contamination of microorganisms during processing. Medium-chain triglycerides (MCT) are used for the oil process of the dry emulsion formulations. To further formulate tablets and pills, dry emulsions can be used.

**Self-Nano Emulsifying Solid Dispersion**
While stability is the main interest in the manufacturing process, it is used to increase the dissolution rate as well as the bioavailability of drugs that are poorly water-soluble. Hot-melt granulation is a method widely used to prepare self-nano emulsifying solid dispersion. Self-nano emulsifying solid dispersions in molten form can be filled in capsules [23].

**Evaluation**

**Thermodynamic Stability Studies**
SNEDDS underwent thermodynamic stability research to achieve any phase separation and stability of the prepared formulation [24, 25].

**Centrifugation Study**
The formula was centrifuged for 30min at 18000 rpm. The resulting formulations were then inspected for any issue of instability, such as separation of phases, creaming or cracking. The SNEDDS formulations were subjected to six heating-
cooling cycles, between 4°C and 40°C, for 48h. For any physical instability such as precipitation and phase separation, the resulting formulations were evaluated.

**Freeze-Thaw Cycles**

Four freeze-thaw periods between 21°C and 21°C are subjected to the SNEDDS formulations. The formulations were initially exposed in a 24-hour deep-freezer at 21°C. The formulations were subsequently thawed at 21°C for 24h and stored again for the next period in deep-freezer. For any physical changes such as phase separation and creaming, the formulations were then examined.

**Dispersibility Test**

Grade: In less than 30s, Nano emulsion formation is clear and transparent, high spreadability. Capryol 90, Capmul PG-8.

Grade B: Rapidly developing, emulsion slightly less visible, bluish-white. Grade C: Fine milky emulsion forming within 2 minutes.

Grade D: A slightly oily, greyish-white emulsion that is sluggish to emulsify (longer than 2 min).

Grade E: Formulation with low or partial emulsification on the surface of large oil globules.

Grade A and grade B formulation will stay as Nano emulsion when dispersed in GIT. SNEDDS formulation may be suggested for formulation falling in grade C. Formulation stability declines from Nano emulsion to emulgel provided in Table 2.

### Table 2: Grades of Nano emulsions based on visual appearance.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Observation</th>
<th>Visual Aspect</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>In less than 30s, Nano emulsion formation is clear and transparent, high spreadability.</td>
<td>Bluish tinge</td>
<td>A</td>
</tr>
<tr>
<td>2.</td>
<td>Nano emulsion formation is less than 1 min slightly less transparent, less clear</td>
<td>Bluish white tinge</td>
<td>B</td>
</tr>
<tr>
<td>3.</td>
<td>Nano emulsion turbid in nature formed in less than 2 min.</td>
<td>Milky white tinge</td>
<td>C</td>
</tr>
<tr>
<td>4.</td>
<td>Nano emulsion in 4-5 min with non-uniform distribution of oil droplets without or minimal emulsification.</td>
<td>Dull white tinge</td>
<td>D</td>
</tr>
</tbody>
</table>

**Drug Content**

The drug is obtained from pre-weighted SNEDDS by dissolving into an appropriate solvent. The proper analytical method analyzes the drug content of the solvent extract [26].

**Liquefaction Time**

This experiment is performed to determine the time it takes for strong SNEDDS to melt in vitro in the lack of agitation in gastric fluid simulated [27]. The formulation is packed into a transparent film of polyethylene and attached to a thermometer bulb. Then the thermometer is put in a round bottom flask where simulated gastric fluid without pepsin is filled. Through the heating mantle, the temperature is retained at 37±0.5°C.

**Refractive Index and Percent Transmittance**

Refractive Index and transmission percentage is determined to verify the formulation transparency. The formulation refractive index is evaluated by refractometer by putting a drop of solution on the slide and then compared to water (R.I = 1.333). Using a UV spectrophotometer, the percentage transmittance of the formulation is evaluated at a specific wavelength using distilled water as blank. If the formulation's R.I. is comparable to that of water and formulation with a percentage of transmittance higher than 99 per cent, then in nature the concrete is transparent.
CONCLUSION

Compared to other novel drug delivery technologies, such as strong dispersions, liposomes, and nanoparticles, ease of production and scale-up is one of the most significant benefits that make SNEDDS unique. SNEDDS needs very easy and economical production facilities, such as an easy mixer for large-scale manufacturing with agitator and volumetric liquid filling equipment. These SNEDDS are the best formulations for poorly soluble drugs. This provides excellent absorption profiles and thus provides elevated bioavailability when administered orally for such drugs [28]. This can, therefore, be used in the near future and will fix issues associated with bad drug solubility. The nanoscale is generally thought to offer better transportation characteristics and is a significant driving factor for increased drug therapeutic efficacy. However, in the case of Nano emulsion s, the function of nanoscale in enhancing a drug's transmission across biological membranes and therapeutic effectiveness is debatable. The convenience of turning SNEDDS into strong self-nano emulsifying devices allows a strong dosage form to be developed. The strong self-nano emulsifying system can, therefore, serve as a platform technology for providing drugs that are poorly soluble. Although, there are a lot of studies going on in this region, other elements need to be established, such as in vitro / in vivo correlation.

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