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A REVIEW - SELF NANOEMULSIFYING DRUG DELIVERY SYSTEM (SNEDDS)

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ABSTRACT

The Self Nanoemulsifying Drug Delivery System (SNEDDS) is a Novel Drug Delivery System for Enhancement of water solubility of poorly water soluble drugs. It is isotropic mixture of oil, surfactant, co-surfactant molecules and it also containing co-solvent molecule. It is Drug delivery system is thermodynamically and kinetically stable. The drug delivery system under mild agitation is followed by dilution of aqueous media such as GI fluid and it can from stable O/W Nanoemulsion. Having size of Globules is less than 100nm. It is important type of Drug delivery system to maintain the chemical stability as well as solubility of drug product. The Self Nanoemulsifying Drug Delivery System (SNEDDS) is important application on BCS Class II and Class IV Drugs for improving water Solubility of poorly water soluble drugs. It is important to prevent the interfacial tension and improving the dissolution as well as absorption rate of drug molecule. It is Novel Drug Delivery System is Applicable for parenteral, Ophthalmic, intranasal and cosmetic drug delivery system. And the present review describes Preparation, components, mechanism, of self Nanoemulsification, biopharmaceutical aspects, characterization methods and applications of self Nanoemulsifying drug delivery system (SNEDDS) For Enhancement of oral Bioavailability of poorly water soluble drugs.

KEY WORDS

Nanoemulsion, Miniemulsion, Submicron emulsion, Surfactant, Self-emulsifying system and Psedoternary Phase.

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INTRODUCTION

Self-nanoemulsifying Drug Delivery system (SNEDDS) is isotropic mixture of natural or synthetic oil, surfactants and co-surfactants that have a unique ability of forming fine oil-in-water (O/W) nano-emulsions under mild Agitation followed aqueous media[1]. Self-Nano emulsifying Drug Delivery System having size range of globules is less than 100nm under dispersion of water[2]. Recent

years Self-Nano emulsifying Drug Delivery System (SNEDDS), self-microemulsifying Drug Delivery System (SMEDDS) and self-emulsifying drug delivery systems (SEDDS) is used to improve the aqueous solubility of poorly water-soluble drugs[2]. The Formulation of self-nano-emulsifying Drug Delivery system was formulated by using medium chain tri glycerides oils and non-ionic surfactant, is important for oral ingestion[3]. The Drug was subjected to the Dissolution rate limiting absorption, the drug was under SNEDDS is important for enhancement of rate as well as Drug absorption and reproducibility of plasma profile of drug concentration[4]. The SNEDDS is one of the Stable Nano emulsion is important to provide a large interfacial area for partitioning of drug between oil and aqueous phase. Having better rate of drug dissolution and increases bioavailability of drug formulation[5]. The Self Nanoemulsifying drug delivery system is thermodynamically Stable and Transparent or Translucent Non-ionized Dispersion of (o/w) and (w/o) Nano emulsion was stabilized by addition of Surfactant and Co-surfactant Molecule[6]. The Self Nanoemulsifying Drug Delivery System is also known as Nanoemulsion, Miniemulsion, ultrafine emulsion, Submicron emulsion[6].

The o/w nanoemulsion of Self Nanoemulsifying drug delivery system (SNEDDS) under mild agitation followed by aqueous media to form stable o/w nanoemulsion is shown in Figure No.1[6].

Comparision between Self-Emulsifying Drug Delivery System (SEDDS) and Self-Micro Emulsifying Drug Delivery System (SMEDDS)

For better understanding of the concept of self-emulsification (SEDDS) and Self Microemulsification (SMEDDS) was clearly differentiates and the differentiation was reported in Table No.1[7, 8].

Comparision of Self Nanoemulsifying Drug Delivery System (SNEDDS) and Self Microemulsifying Drug Delivery System (Smedds)

The Comparision between Nanoemulsion (SNEDDS) and microemulsion (SMEDDS) is shown in Figure No.2 having the A is Indicate as Nanoemulsion and B is Indicate as Microemulsion according to their Transparency is shown in Figure No.2[9].

The Comparision between Self-microemulsifying drug delivery system (SMEDDS) and Self Nanoemulsifying drug delivery system (SNEDDS) was reported in Table No.2[10-15].

Appropriate Drug Candidate for SNEDDS

The Self Nanoemulsifying Drug Delivery (SNEDDS) System is a Novel Approach for Enhancement of oral Bioavailability of Poorly Water Soluble Drugs. In Biopharmaceutical classification system (BCS) can Classify Four Classes, In Class II and Class IV Drugs Having Less Water Solubility as Compared to Class I and Class III drug. The Class II and Class IV Drugs under Self Nanoemulsifying Drug Delivery System (SNEDDS). They can able to Increases Water Solubility and Increases Oral Bioavailability. The Self Nanoemulsifying Drug Delivery System (SNEDDS) is Important to Prevent Problem of Enzymatic Degradation Associated to Class I and Class III drug and Improved Solubility and Bioavailability[16].

A schematic Representation about Biopharmaceutical Classification System (BCS) having four classes of system is based on solubility and permeability analysis is shown in Figure No.3[16].

TYPES OF NANOEMULSION (SNEDDS)

Water in oil (W/O) Nanoemulsion

In Which Droplet of Water was dispersed in Continuous Phase oil[17].

Oil in water (O/W) Nanoemulsion

In Which Oil droplet was dispersed in Continuous Phase Water[17].

Bi-continuous Nanoemulsion

In which Surfactant was Soluble in Both Oil as well as water Phase, and droplet was dispersed in both Oil as well as water phase[18].

ADVANTAGES OF SELF NANO EMULSIFYING DRUG DELIVERY SYSTEM (SNEDDS)

Nanoemulsion (SNEDDS) have a much large

surface area and free Energy than micro emulsions (SMEDDS)[19].

The self Nanoemulsifying drug delivery system is important to improve the Bioavailability[20].

The ability of nanoemulsion (SNEDDS) to dissolve large quantities of lipophilic Drug, along with their ability to protect the drugs from hydrolysis and enzymatic degradation make them ideal vehicles for the purpose of parenteral transport[21].

The SNEDDS is important to provide ultra-low interfacial tension and provide a large o/w interfacial areas[22].

Nanoemulsion (SNEDDS) was formulated in a variety of formulations Such as liquids, sprays, foams, creams, ointments and gels and it is Used as Nanoemulsion in pharmaceutical field as well as used in drug delivery system such as oral, topical and parenteral nutrition[23].

In Self Nanoemulsifying Drug Delivery System (SNEDDS) is Essential For oils and their main components have the number of applications in medicine, food, beverages, preservation, cosmetics and it is also used for the fragrance and pharmaceutical industries[24].

It is used as Ayurvedic system and unnani system[25].

The Self Nanoemulsifying drug Delivery System (SNEDDS) having site specific as well as targeted drug delivery system[26].

DIS ADVANTAGES OF SELF NANO EMULSIFYING DRUG DELIVERY SYSTEM (SNEDDS)

The preparations of Nanoemulsion (SNEDDS) are difficult to prepare because the high pressure homogenizer as well as ultrasonic equipment was available in recent year and the nanoemulsion preparation was expensive[27].

The Stability of Self Nanoemulsifying drug delivery system was affected by Temperature and Ph[28].

COMPONENTS

In self Nanoemulsifying system is consist

Oil
Surfactant
Co-surfactant
Co-solvents
Oil

The self Nanoemulsifying drug delivery system (SNEDDS) in which Selection of Specific oily phase is very important parameter for selection of ingredients in Nanoemulsion, it is mainly associated with O/W nanoemulsion. The oil is important for maximum solubilizing ability for selected drug candidate is important for selection of oily phase for Nanoemulsion Formulation. This is most important approach having the high drug loading ability. The naturally as well as synthetically occurring the mixture of oils and fats are triglycerides contain in long chain fatty acids. The Triglycerides are classified as short chain Triglycerides (<5 carbons), medium chain Triglycerides (6-12 carbons atoms), or long chain Triglyceride (>12 carbons) is important to decrease the degree of unsaturation and is important to prevent oxidative degradation. The choice of oily phase is depends on the ability of the solubilized drugs and it is important to from nanoemulsion of desired characteristics. The oil is important to increases friction to transport of drug into intracellular compartment is important to increases water solubility of less water soluble drug. For example, the mixture of fixed oil and medium chain triglycerides is important to maintain appropriate balance between loading capacity of drug and emulsification or Nanoemulsification. The long chain and medium chain triglyceride oils under different degrees of saturation is important to use in designing of SMEDDS. Triglycerides are highly lipophilic oily molecules and the solvent capacity of drugs is common function of effective concentration in ester groups, the medium chain triglycerides (MCT) molecules having higher solvent capacity and ability for resistance to oxidation as compare to long chain triglycerides molecules. Now days, the MCT have been replaced by novel semi-synthetic MCT is important to influencing water solubility of poorly soluble drugs and oil phases are modified by vegetable oils, digestible or non-digestible oils and fats such as olive oil, palm oil, corn oil, oleic acid, sesame oil, soybean oil, hydrogenated oil for better solubility[29].

Surfactant

Surfactant are define as molecules and ions are adsorbed at interface i.e. surfactant. It is having ability to prevent the interfacial tension and provide interfacial area. It is major component for preparation of nanoemulsion. It is act has self Nanoemulsifying, self-emulsifying and self Microemulsifying agent is ability to solubilized poorly water soluble drug. Most of the compounds can existing the properties of surfactants for designing of emulsifying system. The limited surfactant unit is orally acceptable. Mainly Non-ionic surfactants are having high Hydrophilic and Lipophilic Balance (HLB). The most commonly used Surfactants are various solid or liquid ethoxylated polyglycolyzed glycerides and polyoxyethylene 20 oleate. Optimum amount of surfactant unit is used for preparation nanoemulsion but large quantity of surfactant can chemical toxicity. Hence the safety is major considerable parameter for selection of Surfactant molecule. The molecule of surfactant is obtained in natural as well as synthetic origin. Surfactant having limited capacity of Self Emulsification[30].

The Non-ionic surfactant having more stable as compared to Ionic surfactant molecule and they are nontoxic and Thermodynamically Stable Molecule. The lipid mixtures of molecules with higher surfactant and co-surfactant and oil ratios lead to the formation of SMEDDS and SNEDDS is Responsible for Enhancement of Oral Bioavailability of Poorly Water Soluble Drugs. The surfactant concentration is mainly based on the Size of droplet Molecule for preparation of emulsification and Nanoemulsification. This is important for stabilization of oil Droplet under part of surfactant system. The surfactant concentration is mainly depend on size of droplet the surfactant concentration was increases ultimately size of droplet was increases. It is important Component of preparation of Nanoemulsion system for improving the solubility of poorly water soluble drugs[31].

Classification surfactant molecule[32]

Surfactant molecule is mainly classified has four types;

Anionic surfactants
Cationic surfactants
Ampholytic surfactants
Non-ionic surfactants

Anionic Surfactants

The hydrophilic group carries a negative charge is known as Anionic Surfactant.

The negative charged group such as carboxyl (RCOO-), sulphonate (RSO3 -) or sulphate (ROSO3-).

Examples - Potassium laurate, sodium lauryl sulphate.

Cationic surfactants

The hydrophilic group carries a positive charge is known has cationic Surfactant.

Example - quaternary ammonium halide.

Ampholytic surfactants / Zwitter or Zwitterionic surfactants

The surfactant unit consist of both charges Positive as well as negative Charge.

Example - sulfobetaines.

Non-ionic surfactants

The hydrophilic group carries no charge but derives its water solubility because it can contain strong polar functional groups such as hydroxyl or polyoxyethylene (OCH2CH2O).

Examples - Sorbitan esters (Spans), polysorbates (Tween 20)

Co-surfactant

Co-surfactant is similar function to surfactant unit. Co-surfactant was added along with surfactant unit or combination of surfactant unit to able to increases the ability Surfactant to improving water solubility of poorly water soluble drug. The co-surfactant are Single chain Surfactant unit are able to Prevent the Interfacial Fluidity. The co-surfactant molecule is come into contact with surfactant, oil and water it can separated by Monomolecular Layer of surfactant molecule. The Monomolecular Layer of Surfactant molecule is known as Liquid Crystal formation layer. The most important application of co-surfactant in self Nanoemulsifying Drug Delivery system (SNEDDS) is to prevent interfacial tension between oil and water interface. Cosurfactant like

Ethanol, Methanol, Pentanol, Glycol, Propylene Glycol[33].

Co-solvent

Co-solvent is important to prevent interfacial tension and provide the larger Surface area.

It is important to increasing oral bioavailability of poorly water soluble drugs[34].

Factors

The Nature or Type of drug is important factor for preparation of nanoemulsion and Concentration of surfactant is always optimum because larger quantity of surfactant can shows toxicity[35].

Mechanism

The Self Nanoemulsification is occurs, The Entropy was changes that favours the dispersion is greater than the energy is required to increases the surface of dispersion hence the free energy of conventional emulsion is direct function of energy is required to create new surface between oil and water phase and emulsion was stabilized[36].

The free energy of conventional emulsion is associated with ΔG,

$$\Delta G = \sum_{i} N_i \pi r_i^2 \sigma$$

Where**,**

ΔG = free energy associated with the process

N = number of droplets

r = Radius of droplets

б = interfacial energy

The Two phases of emulsion tend to separate with time to reduce the interfacial area, and subsequently, the emulsion is stabilized by emulsifying agents[36].

PREPARATION OF SELF NANO EMULSIFYING DRUG DELIVERY SYSTEM (SNEDDS)

The Preparation of Self Nanoemulsifying drug delivery system (SNEDDS) is Prepared by two ways

Preparation of Liquid SNEDDS

It is important method for preparation of self Nanoemulsifying drug delivery system having the surfactant/co-surfactant ratio and oil/S/CoS ratio was selected From the Psedoternary phase diagram. A Number of series of the formulation was prepared by different concentrations of oil, surfactant and Cosurfactant. The oil and surfactant was weighed in suitable properties and drug was dissolved in this mixture and the mixture was dissolved stored at room temperature[37].

Preparation of Solid SNEDDS

It is second most important method for preparation of Self Nanoemulsifying drug delivery system (SNEDDS) was prepared by mixing selected liquid SNEDDS Was mixing in a small mortar and pestle. Resultant damp mass was passed through sieve no. 120 and dried at ambient temperature[37].

METHODS FOR PREPARATION OF SELF NANOEMULSIFYING DRUG DELIVERY SYSTEM (SNEDDS)

High energy approach

The formation of nanoemulsion is a high energy method is based on the selected composition of mixture, the mixture containing in surfactant, co-surfactant, cosolvents and other functional compound and for preparation of the mixture energy is applied. The emulsification undergoes mechanical processing to from nanoemulsion[38].

High Pressure Homogenizer

The High pressure homogenizer is one of the important device for detection and preparation of nanoemulsion. It is important device to produced fine emulsions. This method is important in which the oil in water surfactant mixture under very high pressure and the mixture was pumped by resistive valve. The very high shear stress is responsible for the formation of very fine emulsion droplets. The combination of two theories, turbulence and cavitation, explain the droplet size reduction during homogenization process. The high velocity of resultant mixture gives the liquid high energy in the homogenizer valve generates intense turbulent eddies of the same size as the mean diameter droplet (MDD). Droplets were apart from Eddie currents resulting in a reduction in droplet size. Simultaneously, the pressure drop across the valve, cavitation occurs and generates further eddies disruption droplets. Decreasing the gap size ultimately increases the pressure of the droplet, is

responsible for greater degree of cavitation. Emulsion droplet having diameters as small as 100 nm can be produced using this method if the sufficient amount of surfactant present to completely cover the mixture of oil-water interface formed and the adsorption kinetics was high, is important to prevent droplet coalescence[38].

Microfluidizatiion

It is important device to detect and prepared Nanoemulsion. The Micro fluidization technology makes use of a device called 'Micro Fluidizer". This type of device is uses in high pressure positive displacement pump (500-300 PSI) which forces the product through the interaction chamber, it can consisting of small channels droplet is called as micro channels. The product was flows through the micro channels on to the impingements area has resulting in very fine particles of submicron range i.e. Nanoemulsion. The two solutions containing mixture of aqueous phase and oil phase system are under combination and formed in the inline homogenizer to yield of course emulsion. The course emulsion under processing of a micro fluidizer and it undergoes further processed to from Homogeneous, transparent, stable nanoemulsion was formed[39].

Sonication Method

This type of method is important for determination of size of droplet and it is important for reduced size droplet of conventional emulsion with the help of sonication mechanism.It is only applicable for small batches of Nanoemulsion[39].

Phase inversion Method

Phase inversion method is important for preparation of micro emulsion and Nanoemulsion. The method is mainly based on the response to temperature. In this type of method many physical changes occur that can include physicochemical changes, particle size and *in vivo - in vitro* drug release rate. These methods make use of changing the spontaneous emulsion formation. The non-ionic surfactant can be achieved by changing the temperature of the system. The forcing a transition from o/w nanoemulsion was formed at low temperature and w/o Nanoemulsion was formed at higher temperature[40].

Psedoternary Phase Diagram

Psedoternary phase diagram is important for determination of self Nanoemulsifying drug delivery system (SNEDDS). It is diagrammatic representation of oil, surfactant and co-surfactant (Smix), water is known as Psedoternary phase diagram. Psedoternary phase diagram was constructed by Phase titration method and Phase inversion method. The procedure consisted of preparing solutions Containing oil and the different ratio of surfactant to co-surfactant by weight such as 1:1, 2; 1, 3:1 etc, these solutions then vortexed for 5 min and isotropic mixture was obtained. Observed for their appearance (turbid or clear). Turbidity of the samples would indicate formation of a coarse emulsion, whereas a clear isotropic solution would indicate the formation of a Nanoemulsion (SNEDDS) Percentage of oil, Smix and water. The values were used to prepare Pseudo ternary phase diagram. This diagram corner can represent 100% concentration of each phase content. The diagram is important to give information related to binary mixture of two components such as surfactant/co-surfactant, water/drug or oil/drug[41].

The Psedoternary phase diagram is represent mixture of surfactant, co-surfactant, oil, and water phase is shown in Figure No.4.

EVALUATION OF SELF NANO EMULSIFYING DRUG DELIVERY SYSTEM (SNEDDS)

Thermodynamic stability of emulsion

The Thermodynamic stability of lipid based formulation is also crucial to it performance, which can be adversely affected by precipitation the drug in the excipients matrix. In addition poor formulation Thermodynamic stability can lead phase separation of the excipients affecting not only formulation performance as well as visual performance[42].

Centrifugation study

The formulations were centrifuged using laboratory centrifuge at 5000 rpm for 30 min. The resultant formulations were then checked for any instability problem, such as phase separation, creaming or

cracking. Formulation which is stable selected for further studies[42].

Heating and cooling cycle

Three heating/cooling cycles between 4˚C and 40˚C with storage at each temperature for not less than 24 h. The resultant formulations were assessed for their Thermodynamic instability like phase separation and precipitation. Formulation which passes this test subjected for further test[42].

Freeze thaw cycle

Freeze thawing was employed to evaluate the stability of SNEDDS. Formulations were subjected to 3 freeze-thaw cycles, which included freezing at −4˚C for 24 h followed by thawing at 40˚C for 24 h. Centrifugation was performed at 3000 rpm for 5 min. The formulations were then observed for phase separation. Smix concentrations were optimized formulation[42].

Droplet Size

Droplet size of (SNEDDS) was determined by photon correlation spectroscopy that analyses the fluctuations in light scattering due to Brownian motion of the particle, using a Zetasizer 1000HS (Malvern Instruments, UK). Light scattering was monitored at 25 ºC at a 90º angle. The optimized nanoemulsion sample was diluted by distilled water, placed in quartz corvette and subjected to droplet size analysis[43].

Viscosity

The Viscosity (rheological property) of the selfnanoemulsifying drug delivery system (SNEDDS) was evaluated by Brookfield Viscometer for Determination of Consistency of Nanoemulsion Formulation[44].

Stability study

The Stability study is important to determine the quality as well as purity of Nanoemulsion system. Stability is determine the tolerance of formulation. The different nanoemulsion formulations was determine for its stability by subjecting them at mechanical stress conditions (centrifugation at 2000-4000 rpm) as well as formulation was stored at different temperatures ranging from 4 ± 1 °C to 40 ± 1°C for different time intervals. The effect of the mechanical stress conditions on the Physiochemical stability of the nanoemulsion was observed by determining the percent phase separation, breaking of nanoemulsion or any physical change. The studies having no relevant change in the formulations after 60 min of centrifugation at 2000 rpm[45].

Drug Content

It is important for determination of percent content of drug product as well as percent purity of nanoemulsion system. In this evaluation twenty tablets was weighed individually and the average weigh was noted. Then, all twenty tablets were being crushed together. After that, the average weigh of the sample was took and diluted, then further analysed using HPLC as in dissolution test and determine percent drug content present in nanoemulsion system[46].

Dispersibility test

The efficiency of self-emulsification of oral nano or micro emulsion is determined by using a standard USP XXII dissolution apparatus II. One millilitre of each formulation is added to 500 ml of water at 37±0.5ºC. The stainless steel dissolution paddle rotating at 50 rpm provided gentle agitation. The in vitro performance of the formulations is visually determine by using the following grading System.[47]

Grade A

Rapidly forming (less than 1 min) nanoemulsion, having a Transparent or bluish appearance[47].

Grade B

Rapidly forming, slightly less transparent emulsion, having a bluish white appearance[47].

Grade C

It is a Fine Whitish milky emulsion that formed within 2 min[47].

Grade D

Dull, grayish white emulsion having slightly oily appearance that is slow to emulsification process[47].

Grade E

Formulation, exhibiting either less or minimal Emulsification with large oil globules present on the surface[47].

Grade A and Grade B formulation will remain as nanoemulsion was dispersed in GIT. While formulation was falling in Grade C could be

recommend for SNEDDS as well as SEDDS of formulation[47].

Morphological study

Morphological study is important to give information related to the external appearance of the formulation like colour, odour, consistency, density, appearance was determine by Morphological study. In self-Nano emulsifying drug delivery system (SNEDDS) globules was observed by transmission electron microscope (TEM) Sample was visualized and detected[48].

pH Measurements

The of pH Nanoemulsion formulations was measured by a pH meter or Potentiometer. Electrodes were completely dipped into the semisolid or liquid formulations and pH was noted[49].

Percent Transmittance

The percent transmittance of the nanoemulsion Formulation (SNEDDS) was measured using UV-Visible double beam spectrophotometer or Single Beam Spectrophotometer Keeping distilled water as blank at 560 nm[50].

APPLICATION

Improving water solubility of poorly water soluble drug

The Self Nanoemulsifying Drug Delivery System (SNEDDS) is important to improved water solubility of poorly water soluble drug and increases oral bioavailability of poorly water soluble drug[51].

Applications of nanoemulsion in drug delivery

Nanoemulsion (SNEDDS) have been applied in various aspects of drug delivery including Cosmetics and transdermal delivery of drug delivery system, cancer therapy, vaccine delivery,

Cell culture technology, formulations is important to increases oral delivery of poorly soluble drug, ocular as well as otic drug delivery system, intranasal drug delivery, parenteral drug delivery and pulmonary delivery of drugs as well as intranasal drug delivery system[52].

Protection against biodegradation

SNEDDS, SMEDDS and SEDDS is important ability to deliver macromolecules like peptides, hormones, enzyme substrates are inhibitors and it is important to protect from enzymatic degradation[53].

Table No.1: Differences between SEDDS and SMEDDS

S.No	SEDDS	SMEDDS	References
1	It is a mix. drug, oil, surfactant	It is a mix. drug, oil, surfactant, co-surfactant	7
2	Droplet size was 100-300nm	Droplet size was Less than 50 nm	8
3	turbid appearance	Transparent appearance	7
4	Thermodynamically not stable	Thermodynamically stable	8
5	Ternary phase diagram is required to optimize the SEDDS	Psedoternary phase diagram is required to optimize SMEDDS	7

Table No.2: Comparision between SMEDDS and SNEDDS

S.No	SMEDDS	SNEDDS	Reference
1	It is Self-Micro emulsifying drug delivery system	It is Self-Nano emulsifying drug delivery system	10
2	It is turbid in nature	Less energy required for preparation	11
3	Large amount of energy is required for preparation as compare to nanoemulsion	Less energy required for preparation	12
4	Droplet size is 100-300nm	Droplet size is less than 100nm	13
5	It is thermodynamically stable	It is thermodynamically and kinetically stable	14
6	It is optimized by ternary phase diagram	It is optimized by Psedoternary phase diagram	15

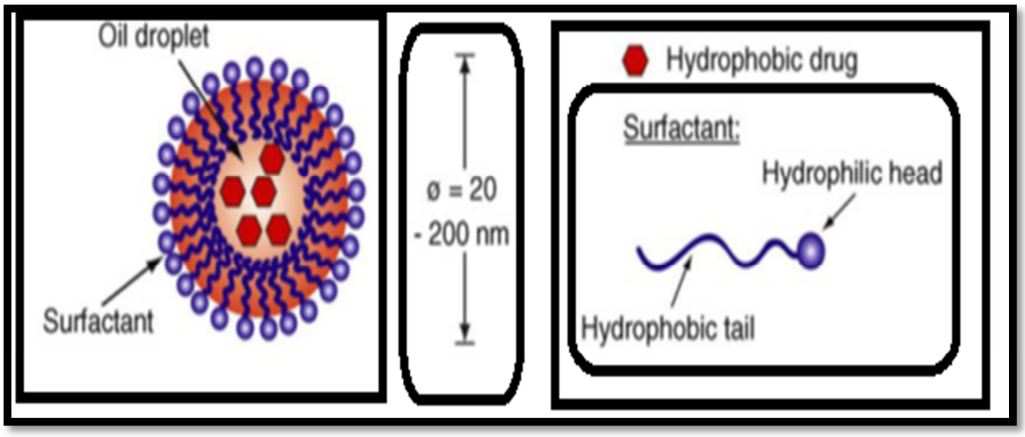

Figure No.1: Formation of o/w Nano emulsion

Figure No.2: Comparision between nanoemulsion and microemulsion

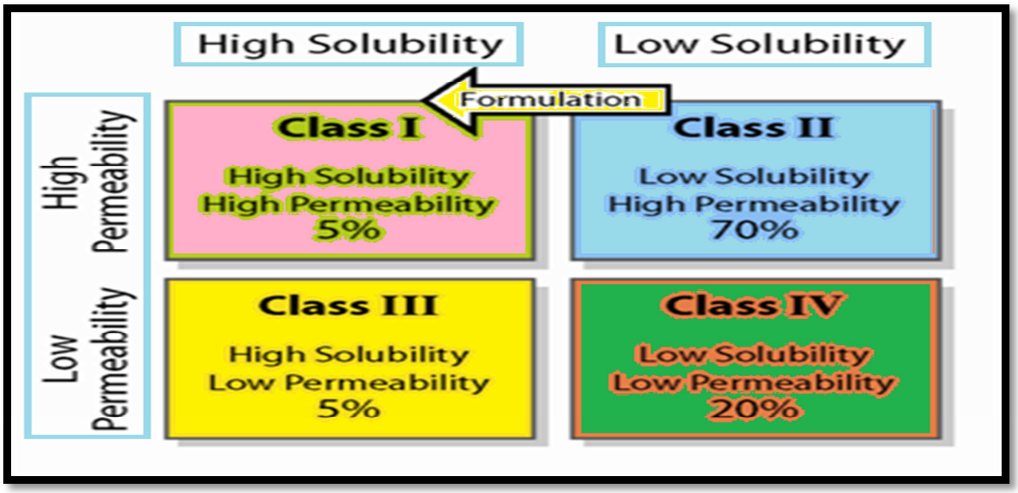

Figure No.3: Biopharmaceutical Classification System

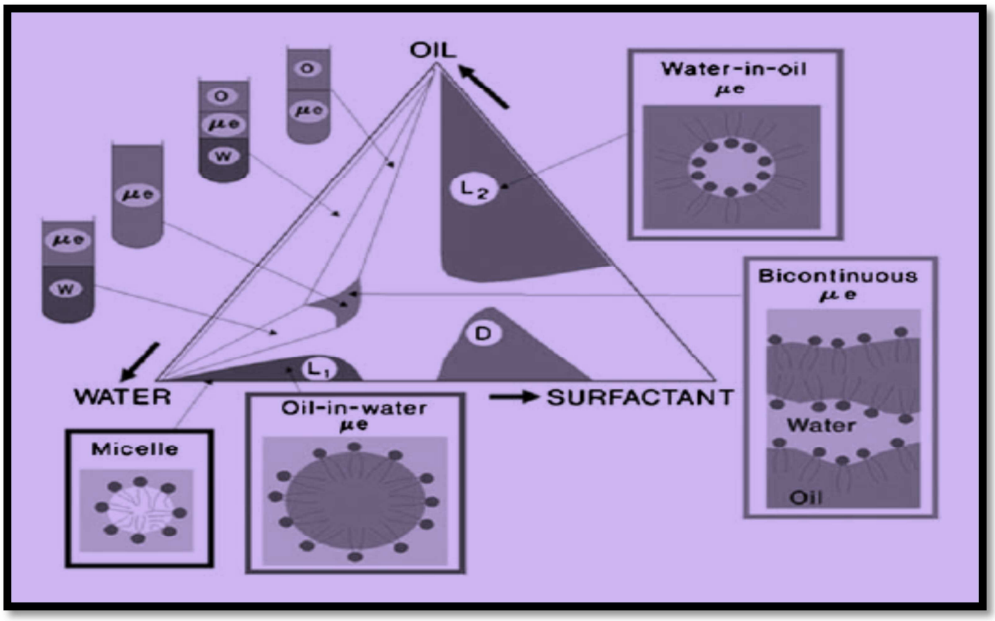

Figure No.4: Psedoternary Phase diagram

CONCLUSION

Self Nanoemulsifying drug delivery system (SNEDDS) is a Novel Approach for the formulation of drug molecules with poor water solubility. Self Nanoemulsifying drug delivery system (SNEDDS) is an Isotropic mixture of oils, surfactants, Co-surfactant (Smix) and co-solvent. When introduced into aqueous phase, it emulsifies spontaneously to produce fine o/w Nanoemulsion under gentle agitation. SNEDDS is represent a good alternative for the formulation of poorly water soluble drugs. SNEDDS improves the dissolution of the drugs due to increased surface area on dispersion and Absorption rate of Drug molecule. The oral delivery of lipophilic drugs can be made possible by SNEDDS, is important to improve oral bioavailability. According to this approach it is possible to prolong the release of drug via incorporation of polymer in composition. SNEDDS seems to be appear as unique and industrially survival approach with future development.

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CONFLICT OF INTEREST

We declare that we have no conflict of interest.

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