

A Review on Design, Development and Evaluation of Self Nano emulsified drug delivery system.**Sucheta Moharana, Prasanta Kumar Biswal, Surya Narayan Das****Gayatri College of Pharmacy, Jamadar Pali, Sason, Odisha, India, 768200****Communication Author: Sucheta Moharana****Abstract:**

Innovative through research developments of science, pharmacy & engineering have progressed very fast toward the synthesis of nanomaterials to achieve unique properties that are not the same as the properties of the bulk materials. The particle reveals interesting properties at the dimension below 100 nm, mostly from two physical effects. The two physical effects are the quantization of electronic states apparent leading to very sensitive size-dependent effects such as optical and magnetic properties and the high surface-to-volume ratio modifies the thermal, mechanical, and chemical properties of materials. The nanoparticles' unique physical and chemical properties render them most appropriate for a number of specialist applications. Mainly focus the design, development & evaluation of pharmaceutical process using methods of engineering technology.

Key words: Nanomaterial, Quantization, Optical & magnetic, Surface-to-volume ratio.

INTRODUCTION:

Now a days, maximum active pharmaceutical ingredients are water insoluble that is why solubilities are being enhanced by using different techniques. For the enhancement of the solubility of poorly soluble drugs which include physical and chemical modifications of drug and other methods like particle size reduction, crystal engineering, Salt formation, Solid dispersion, use of surfactant, complexation etc.

Now, another new technique developed i.e., Self-nano -emulsified drug delivery system. Approximately 1/3rd of newly discovered drug molecules shows insufficient water solubility and therefore low oral bioavailability. Self-nanoemulsifying drug delivery system (SNEDDS) are one of the emerging strategies developed to tackle the issue associated with their oral delivery.

SNEDDS are composed of an oil phase, surfactant and co-surfactant or co-solvent. SNEEDS characteristics their ability to dissolve a drug and in vivo considerations. are determinant factor in the choice of SNEEDS. A SNEEDS formulation can be optimized through phase diagram approach of statistical design of experiments.

NEED OF THE RESEARCH:

Use of nanotechnology in pharmaceutical industry is growing, when nano particles are employed as drug delivery, they can overcome many poorly water-soluble drug formulation challenges. They also offer key advantages in improving drug efficacy and decreasing adverse reactions.

LITERATURE REVIEW

1. Self-nano emulsifying drug delivery system of Docetaxel and Carvacrol synergizes the anticancer activity and enables safer toxicity profile, optimization and in-vitro, ex-vivo and in-vivo pharmacokinetic evaluation
2. Effects of carbohydrate polymers in self-micro emulsified tablets on the bioavailability of Atorvastatin in-vitro and in-vivo study
3. Development of optimized SNEDDS of Carvedilol with enhanced bioavailability potential

Aim and objectives: After gone through literature reviews, now I was selected some poorly water-soluble drugs to enhance the solubility and their bioavailability by Self nano emulsified drug delivery system but due to stability problem again I shall convert it into solid dosage form

Proposed methodology: Self nano emulsifying formulations are isotropic mixtures of lipids/oils, surfactants and co-surfactants. On mild agitation followed by dilution in aqueous media such as GI fluids, SNEEDS can form oil-in-water (o/w) nano emulsion.

Methods of preparation of Nano emulsion

1. High pressure homogenization
2. Micro fluidization
3. Ultra sonification
4. High energy emulsification

1. High pressure Homogenization: In a high-pressure Homogenizer, the dispersion of two liquids (oil phase and aqueous phase) is achieved by forcing their mixture through a small inlet orifice at very high pressure (500-5000 Psi), which subjects the product to intense turbulence and hydraulic shear resulting in extremely fine particles of emulsion.

Advantages: Produce nano emulsion of extremely low particles size (upto 1nm)

Disadvantages: High energy consumption and increase in temperature of emulsion during processing.

2. Micro fluidization

- Patented mixing technology
- Use of a device called micro fluidizer
- This device uses a high-pressure positive displacement pump(500-20000Psi) which forces the product through the interaction chamber which consist of small channels called “micro channels”
- The product flows through the micro channel onto an impingement area results on very fine particles of sub-micro range.

3. Ultra sonication systems: Ultra sonication systems function to dispense nanoparticle suspension by propagating acoustic waves through the medium which results in high energy cavitation that act to break apart agglomerates. Several types of sonication systems are available for NP dispersion preparation and are classified by manner of energy delivery as either direct or indirect method.

Direct ultra sonication involves immersing a probe directly into the suspension which allows for a high intensity energy delivery.

4. High energy emulsification: It approaches more appropriate because they permit the use of natural or nontoxic emulsifiers at low concentration, they simplify the scale-up production and the required equipment is commercially available.

STABILITY OF NANO EMULSION: Brownian movement=Low rate of Sedimentation due to the small particle size, low Gravitational force. As Particles become smaller, the attraction force of Vander wall's force.

Evaluation parameter for Nano Emulsion

Average Globule size And Size distribution

Methods used are:

- a Transmission electron
 - b Microscopy
 - i) Droplet size analysis
 - ii) Light scattering
 - c) Rheological Evaluation
2. Major parameters
- 1) Viscosity
 - 2) Refractive Index
 - 3) Zeta potential
 - 4) Area of interfacing

C) Zeta potential= It is used to determine surface charge by the help of mobility and electrophoretic velocity of dispersed globules.

d)Area of Interfaces =It can be determined by following

$$S=6/d$$

Where, S=Total area of interface (Sq.cm)

d=Diameter of globules (cm)

Analytical test (UV, HPLC)

Biological Studies

E) In vitro drug release

The invitro release kinetics of nano particles provides critical information regarding their ability to modify the drug release, is an important parameter to be considered for the assessment of the safety, efficacy and quality of the product.

Application of Nano emulsion:

Use of Nano emulsion in co-solvency

I)Antimicrobial nano emulsion

Ii) Nano emulsion as Nontoxic disinfectant cleaner

iii)Nano emulsion in cell culture technology.

iv)Nano emulsion as a vehicle for transdermal drug delivery system.

v)Nano emulsion as a mucosal vaccine

vi)Nano emulsion as a vehicle for ocular delivery.

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