

Self Emulsifying Drug Delivery Systems - An Review Article

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Abstract- Self emulsifying drug delivery system are promising strategies to improve rate and extend the oral absorption of poorly aqueous soluble drugs . SEDDS are type of lipid based formulation that can improve bioavailability . SEDDS are isotropic mixtures of oils, surfactants and co- solvents they form fine o/w emulsion upon mild agitation following dilution by an aqueous phase.The drugs are administered by the oral route ,but that more than 40% of chemical entities exhibit poorly aqueous solubility.The paper provides an overview of the mechanism of SEDDS, composition and advantages, disadvantages of SEDDS.

I. INTRODUCTION

Self emulsifying drug delivery systems are type of lipid based formulation that can improve oral bio availability of pearly water soluble drugs.SEDDS are isotropic mixture of oils ,surfactants and co-solvents that form fine oil -in-water emulsion also have large interfacial area which provide more surface area for the drug to be dissolved and be absorbed. The SEDDS forming upon mild agitation following dilution by aqueous phase . SEDDS are increasing the solubility of drug in the aqueous environment of gastro intestinal tract. This shown to be effective for a variety of water soluble drugs including antibiotics, anti- diabetic, anti - cancer drugs and vitamins.They also been investigated for delivery of other types of drugs such as peptides and proteins. They can enhance permeation on blood stream.

Advantages of SEDDS :

- Improve bioavailability : significantly they can improve the bioavailability of poorly water soluble drugs . This can lead to better efficacy and fewer side effects.
- Increased surface area : SEDDS are fine emulsion droplets , which increase the surface area of the drug for the absorption.
- Stability : SEDDS are generally stable at room temperature which makes them for convenient for storage and transportation.

- Flexibility: SEDDS can be formulated to deliver a wide range of drugs with physicochemical properties.

Disadvantages of SEDDS :

They have some disadvantages including

- Cost : SEDDS can be more expensive to produce than other types of drug delivery systems.
- Taste : SEDDS can have a bitter taste , which can be unpleasant for some patients.
- Potential for side effects: SEDDS can sometimes cause side effects such as diarrhoea and nausea.

Composition of SEDDS :

1. Oils : The oil phase are typically a medium chains triglyceride of oilssuch as capric acids.MTC oils are surely well absorbed in the small intestine and can help to solubilize poorly soluble drugs.
2. Surfactant: surfactants is a molecules that as both hydrophobic and hydrophilic properties.That can helps to form and stable the emulsion droplets in SEDDS.
3. Co-solvents: A co-solvents is a solvent that can help to increase the solubility of drug in the oil phase of SEDD.common co-solvents such as ethanol and propylene glycol.
4. Drug : The drug to be delivered is dissolved in the oil phase of SEDDS.

Percentage of components of SEDDS :

- Oils - 50% to 70%
- Surfactant - 5% to 10 %
- Co-solvents - 5 % to 10 %
- Drug - 10% to 30% .

Formulation :

The formulation is likely a suitable for a wide range of poorly soluble drugs . The MTC's provide a good balance

of solubility and fluidity, while the Tween 80 surfactant and PEG 400 co-solvents promote rapid emulsification and drug solubilization.

Procedure for formulation of SEDDS:

- Select the appropriate oil, surfactants and co-solvents. The oil should be a good solvent for the drug and Surfactant, co-solvents able to form stable emulsion with the oil.
- Combined the oil, surfactant and co-solvents in a high shear Mixture. Mix at high speed until a homogeneous mixture is formed.
- Add the drug to emulsion and mix until it is dissolved
- Adjust the composition of SEDDS as needed to achieve a desired properties such as solubility, viscosity, pH and stability.

Mechanism of SEDDS:

- Spontaneous emulsification: when SEDDS is diluted with water the surfactant, co-surfactant molecules rapidly adsorb to the oil-water interface. This reduces the interfacial tension and allows the oil droplets to disperse into the water phase forming an emulsion.
- Drug solubilization: The drug solubilizes into the oil phase of the SEDDS. Once the emulsion is formed, the drug is delivered into the aqueous phase when it is more easily adsorbed.

Factors influencing the drug solubilization and emulsification:

1. Surfactant concentration: The surfactant concentration must be above the critical micelle concentration in order to achieve spontaneous emulsification.
2. Type of surfactants: Different surfactants have different HLB values which determine the oil and water phase. The HLB of the surfactant must be carefully selected to ensure that the SEDDS form a stable emulsion.
3. Types of oils: The oil should be able to dissolve the drug and should be compatible with the surfactant and co-solvents.
4. Drug loading capacity: SEDDS depending on the solubility of drug in the oil and the oil phase.

Application of SEDDS:

- Improved bioavailability

- Reduced first pass metabolism
- Improved drug stability
- Increased solubility and dissolution
- Reduced side effects

Some specific applications for SEDDS:

- Delivering vaccines
- Delivering the drug to lymphatic system
- Delivering the drug to brain

II. CONCLUSION

The conclusion of SEDDS that is a promising drug delivery technology for improving the oral bioavailability of drug. It is a versatile technology that has improved to deliver a wide range of drugs including antibiotics, vaccines, peptides and drug administered in the lymphatic system to brain.

They are also relatively easy to manufacture and formulate making them a promising technology for commercial development. SEDDS have the potential to revolutionize the way that are delivered, especially for poorly water soluble drugs.

Overall the summary provides a good review of SEDDS, their composition, potential application advantages and disadvantages, factors and conclusion of SEDDS.