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Nanosuspensions is an Emerging Carrier For Efficient Delivery of Hydrophobic Drugs

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ABSTRACT

Nanosuspensions (Muller *et al.*, 1995) have emerged as a promising strategy for the efficient delivery of hydrophobic drugs because of their versatile features and unique advantages. The present article describes the details about nanosuspensions. Nanosuspensions consist of the pure poorly water-soluble drug without any matrix material suspended in dispersion. The review article includes the methods of preparation with their merits and demerits, characterization and evaluation parameters. A nanosuspension not only solves the problems of poor solubility and bioavailability, but also alters the pharmacokinetics of drug and thus improves drug safety and efficacy.

Key words : Nanosuspensions, Hydrophobic Drugs.

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A large proportion of new chemical entities coming from drug discovery is poorly water soluble and, therefore, have low bioavailability or erratic absorption leading to hurdles in formulation development efforts. There are number of formulation approaches like micronisation, solubilization using co-solvents, precipitation techniques, use of permeation enhancers, oily solutions, surfactant dispersions, salt formations etc to resolve the problems of low solubility and low bioavailability. Each property has their own limitations. Other techniques like liposomes, emulsions, microemulsions, solid-dispersions and inclusion complexes using cyclodextrins show reasonable success but these techniques are not applicable to the drugs, which are not soluble in both aqueous and organic medias. Hence, there is need of some different and simple approach to tackle the formulation problems to improve their efficacy and to optimize the therapy with respect to pharmacoeconomics. Nano-suspension technology can resolve the problems associated with delivery of poorly water-soluble drugs and poorly lipid-soluble drugs. Nanosuspensions consists of the poorly water soluble drug with or without any matrix material suspended in dispersion (Muller *et al.*, 2000; Rabinow, 1999. They can be surfactant free, can also comprise surfactant or stabilizer or both. Nanosuspensions differ from nanoparticles (Shobha Rani *et al.*, 1999), which are polymeric colloidal carriers of drugs (Nanospheres and nanocapsules) and from solid-lipid nanoparticles (Mehnwrtw, 2000) (SLN), which are lipidic carriers of the drug.

Advantages of nanosuspension technology, over other conventional formulations technologies for poorly soluble drugs (Chubal, 2004)

– They can be employed for controlled drug delivery.

– There is an increase in dissolution rate (Muller, 2001) as particle surface area increases. As a result maximum plasma level is reached faster.

– Targeted accumulation of drugs via nanosuspension at site of action reduces side effects and increases therapeutic efficiency and therefore, therapeutic index.

– Nanosuspensions render the possibility of administering sparingly soluble drugs intravenously and thus results in rapid dissolution and tissue targeting.

– Via formulation as a nanosuspension, a reduction in injection volume of drugs can be achieved.

– When Nanosuspension of sparingly soluble drugs are administered through ocular route or by inhalation there is an increase in bioavailability and dosing is also more consistent.

Properties of nanosuspensions:

Physical long-term stability:

Dispersed systems show physical