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A COMPLETE REVIEW ON NANOSUSPENSIONS: A NOVEL DRUG DELIVERY SYSTEM AND FENOFIBRATE AS A MODEL DRUG

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ABSTRACT

Nanosuspesion is defined as very finely colloid; biphasic dispersed solid drug particles in aqueous vehicle, a size below 1 micron methods for stabilized by suitable drug delivery application. Solubility is the crucial factor for drug absorption it depend on route administration. Nanosuspensions technology provide efficient delivery of hydrophobic drug it increase the bioavailability. Production techniques such as media milling and high Nanosuspesion is defined as very finely colloid; biphasic dispersed solid drug particles in aqueous vehicle, a size below 1 micron methods for stabilized by suitable drug delivery application. Solubility is the crucial factor for drug absorption it depend on route administration.

Keywords: Nanotechnology, particle size, homogenization, Polymer, drugs, surfactant

INTRODUCTION:

Nano is a Greek word, which means 'dwarf'. Nano means it is the factor of 10-9 or one billionth. Additionally 40% of the new chemical entities being generated via drug discovery applications are badly water soluble or lipophilic compounds. Formulating a poorly water soluble drug has usually been a difficult has slecon fronted faced by the pharmaceutical scientist**.**

Nanosuspensions are described as the submicron colloidal dispersions of pharmaceutical energetic component particles in a liquid State, size under 1μm, without any Origin material that are stabilized with the aid of surfactants and polymers [1]. The unique features of nanosuspensions have enabled their use in numerous dosage forms, consisting of specialized delivery structures consisting of mucoadhesive hydrogels. The major use of this technique is its preferred applicability to maximum capsules and its simplicity. Preparation of nanosuspension is simple and applicable to all drugs which can be water insoluble. Nanosuspensions are organized with the aid of moist mill, high stress homogenizer, emulsion solvent evaporation, melt emulsification and supercritical fluid strategies.

Characterization of nanosuspension are as follow for *In vitro* evaluation particle size, particle charge, crystalline morphology, dissolution velocity and for *In vivo* evaluation surface hydrophobicity, Adhesion Properties [1].

Benefits of nanosuspension are as follow: Improved biological efficiency, ease of production and scale-up, long term physical stability, due to a decrease in particle size, the absorption from absorption window of drug can be increased due to reduction of particle size. Rapid dissolution and tissue targeting can reach by IV route of administration.

Criteria for selection of drug for nanosuspensions[2] :

Nanosuspension may be prepared for the API that is having either of the following subsequent characteristics:

- Water insoluble but might be soluble in oil
- API are insoluble in both water and oils
- Drugs with decreased tendency of the crystal to dissolve, irrespective of the solvent
- API with very huge dose[2].

Advantages and disadvantages of Nanosuspensions:

Advantages[3] :

- May be implemented for the poorly water soluble drugs.
- Speedydissolution and tissue focused on can be carried out by IV direction of

management.

- Oral administration of nanosuspensions gives speedy and improved bioavailability.
- Lengthy time period physical balance because of the presence of stabilizers.
- Nanosuspensions can be integrated in pills, pellets, hydrogels.

Disadvantages[3] :

- Physical balance, sedimentation and compaction can reason of problems.
- It is cumbersome enough care should be taken at some stage in handling and transport.
- Uniform and correct dose cannot be executed except suspension.

Applications:

1. **Topical formulations:**

   Incorporation of Nanosuspensions into topical formulation-supersaturated structures (expanded saturation solubility) improved diffusion pressure of drug.

2. **Oral-cavity formulations** (paste, gel, patches);

   a. For drugs that did not have sufficiently excessive bioavailability in traditional oral formulations-small particles improved adhesion and extended residence

   b. Reduction in inter-issue version progressed dose proportionality and increased availability due to growth in bioadhesion.

3. **Parentral Drug Delivery**:

   Nanotechnology is additionally used in the parenteral drug delivery system. The advantage of this technique is it need simplest a lot much less quantity of toxic cosolvent for poorly soluble drugs. This may uplift the therapeutic impact of the drug compared with the conventional oral formulation and targeting the drug to the macrophages. The drug clofazimine is given as iv the concentration within the liver, spleen, and lungs reached an excessive degree i.e.; higher than minimal inhibitory awareness, for most of the mycobacterium avium lines. Tarazepide is formulated as nanosuspension in order to triumph over using surfactants and cyclodextrins to enhance the bioavailability.

4. **Ocular delivery:**

   Nanosuspension can show to be a boon for drugs that expose bad solubility in lachrymal fluids. Nanosuspensions constitute a unique method for ocular delivery of hydrophobic drugs due to their inherent capability to adjust saturation solubility of drugs. Kassem et al., have advanced Nanosuspension delivery system for positive glucocorticoid drugs.

5. **Pulmonary:**

   Nanosuspensions can be advantageous for delivering drugs that exhibit poor solubility in pulmonary secretion. Presently to be had approaches for pulmonary delivery such as aerosols or dry powder inhalers own sure disadvantages which include restrained diffusion at required site, much less residence time and many others, which may be conquer by means of Nanosuspensions. Fluticasone and budesonide had been successfully formulated as Nanosuspension for pulmonary Delivery.

6. **Dermal:**

   The nanocrystalline form possesses increased saturation solubility ensuring in improved diffusion of the drug into the pores and skin. Nanocrystals also exhibit various properties together with increased penetration into a membrane, enhanced permeation.

7. **Mucoadhesion of Nanoparticle:**

   If the nano suspension is orally administered, it the liquid medium and adheres to the mucosal surface before absorption. It improves the bioavailability and concentrated on to the parasite persisting the git.eg; buparvaquone in opposition Cryptosporidiparvum.

8. **Targeted drug delivery:**

   Nanosuspensions can be used for targeted delivery as their surface the stabilizer or the milieu. Their versatility and ease of scale-up and properties and in-vivo behaviour can effortlessly be altered by means of changing both commercial production allows the improvement of commercially feasible nanosuspensions for targeted delivery[5, 6, 7] .

CONCLUSION

Nanosuspension formulations solved the problem of solubility dissolution to improve bioavailability of drug. Routes of administration for Nanosuspension are Oral, parenteral, pulmonary, ocular, topical routes. Due to Nano technique & less requirement of excipients, increased dissolution velocity and saturation solubility many poor bioavailability drugs Nanosuspension form are formulated in Nanosuspension form. Nanosuspensions are nanosized colloidal dispersion systems that are stabilized by surfactants and/or polymers.

REFERENCES

1. Shid RL, Dhole SN, Kulkarni N, Shid SL. Global researchonline.net. [cited 2021 Dec 20]. Available from: https://globalresearchonline.net/journalcontents/v221/20.pdf
2. Jayaprakash R, Krishnakumar K, Dineshkumar B, Jose R, Nair SK. Nanosuspension in Drug Delivery-A Review [Internet]. Saspublishers.com. [cited 2021 Dec 20]. Available from: https://saspublishers.com/media/articles/SAJP-55138-141.pdf

3. View of NANOSUSPENSION: AN OVERVIEW [Internet]. Innovareacademics.in. [cited 2021 Dec 20]. Available from: https://innovareacademics.in/journals/index.php/ijcpr/article/view/19584/10961
4. Pethe A. Nanosuspension [Internet]. Slideshare.net. [cited 2021 Dec 20]. Available from: https://www.slideshare.net/AnilPethe/nanosuspension-107411574
5. Kumari K, P.V, Rao S, Y. Nanosuspensions: A Review. International Journal of Pharmacy [Internet]. 2017 [cited 2021 Dec 20];7(2):77–89. Available from: https://www.pharmascholars.com/abstract/nanosuspensions-a-review-51162.html
6. Hussain MS, Baquee A, Debnath J. Nanosuspension: A promising drug delivery system for poorly water soluble drug and enhanced bioavailability. Int J Pharm Sci Res [Internet]. 2020; Available from: https://ijpsr.com/?action=download_pdf&postid=67351
7. Nanosuspension: A promising drug delivery system for poorly water soluble drug and enhanced bioavailability [Internet]. International Journal Of Pharmaceutical Sciences And Research.
8. Nanosuspension: A promising drug delivery system for poorly water soluble drug and enhanced bioavailability [Internet]. International Journal Of Pharmaceutical Sciences And Research IJPSR. 2020 [cited 2021 Dec 20]. Available from: https://ijpsr.com/bft-article/nanosuspension-a-promising-drug-delivery-system-for-poorly-water-soluble-drug-and-enhanced-bioavailability/
9. Loxoprofen: Small intestine ulcer and ileal ulcer perforation: case report. React Wkly [Internet]. 2015 [cited 2021 Dec 20]; 1567(1):139–139. Available from: https://go.drugbank.com/drugs/DB09212
10. Naproxen: Bullous fixed drug eruption: case report. React Wkly [Internet]. 2014 [cited 2021 Dec 20]; 1497(1): 30–30. Available from: https://go.drugbank.com/drugs/DB00788
11. Ketoconazole: Hepatic toxicity: case report. React Wkly [Internet]. 2014 [cited 2021 Dec 20]; 1522 (1):105–105. Available from: https://go.drugbank.com/drugs/DB01026.