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Role of Solid Nano Dispersion in Drug Delivery

Rawat A, Gulia M, Monika, Tiwari A and Jhawat V*

Department of Pharmaceutical Science, GD Goenka University, India

***Corresponding author:** Vikas Jhawat, Associate Professor, Department of Pharmaceutical Science, School of Medical and Allied Science, GD Goenka University, Gurugram, Haryana, India, Tel: 9729216101; Email: Jhawat231287@gmail.com

Editorial

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Editorial

In the ever-evolving landscape of pharmaceuticals, researchers and scientists continually strive to enhance the effectiveness of drug delivery systems. Among the innovative solutions, Solid Nano Dispersions stands out as a groundbreaking technology with the potential to transform the way we administer medicines. These tiny, strong particles could improve drug solubility, bioavailability, and patient outcomes in the pharmaceutical workplace. This collection sought to compile works of research offering insights into the Role of Solid Nano Dispersion in drug delivery [1]. Drug solubility is crucial for oral dosage forms to reach the appropriate systemic circulation quantities. To be effective, medications must first dissolve in the gastrointestinal (GI) fluid before passing through the GI tract barrier and into the blood [2]. According to Loftsson, et al. 90% of therapeutic candidates in development and about 40% of commercially available pharmaceuticals had poor water solubility [3]. Self-nano emulsifying systems, complexation with cyclodextrin, and nanostructured lipid carriers are some of the strategies that have been investigated so far to get around the problem of water solubility and increase oral bioavailability [4]. The limitations in scale-up production and clinical treatment are affecting these formulations. Solid Nano dispersion, which blends solid dispersion with nanotechnology, may be able to overcome these problems and improve oral absorption of poorly water-soluble drugs [5]. Interestingly, there is not much research on developing and troubleshooting solid oral dosage forms including ASDs.

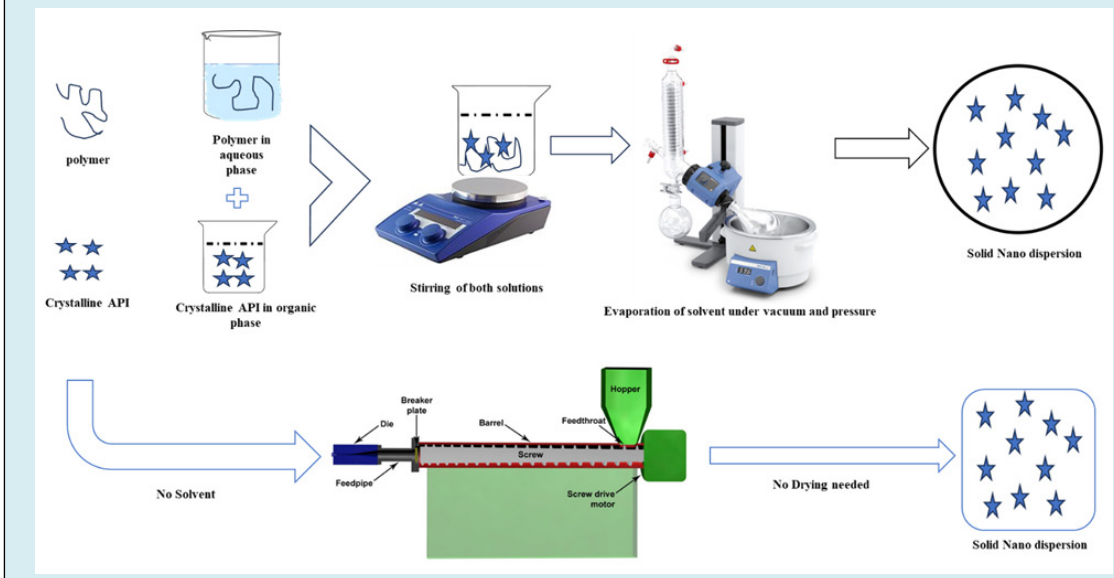

Figure 1: Representation of methods for the preparation of Solid Nano Dispersion.

One or more active ingredients dispersed in a carrier matrix material are referred to as a solid dispersion. In most cases, a polymer makes up the matrix, and examples include PVP (polyvinyl pyrrolidone), HPMC (hydroxypropyl methylcellulose), HPMCP (hydroxypropyl methylcellulose phthalate), chitosan, CMC (carboxymethylcellulose), sodium alginate and sodium starch glycolate [6]. Furthermore, adding surfactants to the ASD composition appears pertinent to boosting the production of nanoparticles during the dissolution process, and the surfactant-drug ratio is a crucial factor in enhancing oral bioavailability [7]. Spray drying, solvent evaporation, freeze drying, co-precipitation, fusion techniques, hot melt extrusion, and supercritical fluid precipitation are a few techniques that can be used to produce solid dispersions as shown in Figure 1. There are now over 20 ASD products approved for use by the FDA since 2007 [8].

Anane-Adjei, et al. [9], focused heavily on the pre-formulation evaluations and workflows used at AstraZeneca as it addresses the design, fabrication, and use of ASD formulations in preclinical drug research [9].

Arun Butreddy, et al. [10], examined whether HPMCAS LG and hydrophobic and hydrophilic polymers (HPMCAS HG, Eudragit® FS100, Eudragit® RSPO) can work together to stabilize the supersaturated condition of nifedipine (NIF) in a solution [10].

Mona Qushawy, et al. [11], used water-soluble carriers to manufacture glimepiride as a solid dispersion to increase its aqueous solubility and thereby increase its bioavailability. All produced formulations had good yields (98.4 ± 2.8 to 99.8 and 2.2%), and high drug contents (97.2 ± 3.2 to 99.6 and 2.1%) [11].

Selvakumar Muruganantham, et al. [12], prepared nanodispersions to increase zaltoprofen's solubility, using polyvinyl pyrrolidone K30 (PVP K30) and Poloxamer 407 in different ratios using the solvent evaporation approach. Their results showed the enhanced aqueous solubility of the drug [12].

In conclusion, Solid Nano Dispersions represent a remarkable advancement in the field of drug delivery, offering a lifeline to patients and a source of inspiration for researchers. Their ability to overcome solubility barriers, enhance bioavailability, and enable precise drug targeting opens new horizons in medicine. As we look forward to the future, Solid Nano Dispersions are poised to play a pivotal role in improving healthcare outcomes and advancing the pharmaceutical industry.

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