

<http://doi.org/10.36582/j.Alkuno.2024.10.01>**Al-Kunooze University College**

Journal homepage:

<http://journals.kunoozu.edu.iq/1/archive> & <http://www.iasj.net>

Preparation, Characterization, and Applications of Solid Lipid Nanoparticles: A Theoretical Review

**Mohammed Al-Battat¹, Wesam R Kadum², and
Muqdad Alhijjaj^{1,3}**

¹*College of Pharmacy, University of Basrah, Basrah, 61004, Iraq*

²*Department of Pharmacy, Kut University College, AL Kut,
Wasit, 52001, Iraq*

³*Department of Pharmacy, Al-Kunooze University College,
Basrah, 61029, Iraq*

Correspondence: ph.mohammed.albattat@gmail.com

Abstract

Scientists have shown significant interest in solid lipid nanoparticles (SLNP) as carriers for drug delivery in recent years. This interest stems from their unique characteristics, including biocompatibility, biodegradability, cost-effectiveness, and appropriate production processes. The SLNP is an emulsion of lipids in water, emphasizing the lipid being in a solid state at room and body temperature. The formula for preparing the SLNP is primarily composed of solid lipids and surfactants. We can get three models depending on the site and the behaviors of drug distribution in the solid particles. The distribution of drugs can occur within the lipid matrix, in the core of lipid particles, or on the particle shells. This review provided a basic introduction to SLNP. Additionally, this paper focused on the main preparation, characterization methods, and different applications of SLNP. This paper covers various preparation methods such as microemulsion, double emulsion, high-pressure homogenization, solvent emulsification evaporation, solvent emulsification diffusion, supercritical fluid extraction, and solvent injection. The characterization methods are carried out by dynamic light scattering, scanning electron microscopy, differential scanning calorimetry, Fourier transform infrared spectroscopy and powder X-ray diffraction. The applications of SLNP are generally topical, parenteral, pulmonary, oral, and ocular routes of administration.

Keywords: Nanotechnology, SLNP, Solubility, Nanoparticles, Nanoemulsion