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Research Paper

Development, *in vitro and in vivo* Evaluations of Solid-Lipid Microparticles based on Solidified Micellar Carrier System for Oral Delivery of Cefepime

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ABSTRACT

This study seeks to formulate and evaluate a solid lipid nanoparticle-based, solidified micellar carrier system for oral delivery of cefepime. Cefepime has enjoyed a lot of therapeutic usage in the treatment of susceptible bacterial infections; however, its use is limited due to its administration as an injection only with poor patient compliance. Since oral drug administration encourage high patient compliance with resultant effect in improved therapy, cefepime was formulated as solid lipid microparticles for oral delivery using the concept of solidified micellar carrier system. The carrier system was evaluated based on particle yield, particle size and morphology, encapsulation efficiency (EE %), and thermal analysis using differential scanning calorimeter (DSC). Preliminary microbiological studies were done using gram positive and negative bacteria. *In vitro* release study was performed using biorelevant media, while *in vivo* release study was performed in white albino rats. The yield of solid lipid microparticles (SLM) ranged from 84.2 – 98.0 %. The SLM were spherical with size ranges of 3.8 ± 1.2 to 42.0 ± 1.4 µm. The EE % calculated ranged from 83.6 – 94.8 %. Thermal analysis showed that SLM was less crystalline with high potential for drug entrapment. Microbial studies showed that cefepime retained its broad spectrum anti-bacterial activity. *In vitro* release showed sustained release of cefepime from SLM, and *in vivo* release study showed high concentration of cefepime released in the plasma of study rats. The study showed that smart engineering of solidified micellar carrier system could be used to improve oral delivery of cefepime.

KEYWORDS: Solid-lipid nanoparticle; Cefepime; Solvent injection; reverse micellar solution.