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Formulation of Famotidine Solid Lipid Nanoparticles (SLN): Preparation, Evaluation and Release Study

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Abstract : Background and purpose: Famotidine is an H2 receptor blocker. Absorption orally is rapid enough, but famotidine can be degraded by stomach acid causing dose reduction until 35.8% after 50 minutes. This drug also undergoes first-pass metabolism which reduced its bio availability only until 40-50%. To overcome these problems, Solid Lipid Nano particles (SLNs) as alternative delivery systems can be formulated. SLNs is a lipid-based drug delivery technology with 50-1000 nm particle size, where the drug incorporated into the bio compatible lipids and the lipid particles are stabilized using appropriate stabilizers. When the particle size is 200 nm or below, lipid containing famotidine can be absorbed through the lymphatic vessels to the subclavian vein, so first-pass metabolism can be avoided. Method: Famotidine SLNs with various compositions of stabilizer was prepared using a high-speed homogenization and sonication method. Then, the particle size distribution, zeta potential, entrapment efficiency, particle morphology and in vitro release profiles were evaluated. Optimization of sonication time also carried out. Result: Particle size of SLN by Particle Size Analyzer was in range 114.6 up to 455.267 nm. Ultrasonicated SLNs within 5 minutes generated smaller particle size than SLNs which was ultrasonicated for 10 and 15 minutes. Entrapment efficiency of SLNs were 74.17 up to 79.45%. Particle morphology of the SLNs was spherical and distributed individually. Release study of Famotidine revealed that in acid medium, 28.89 up to 80.55% of famotidine could be released after 2 hours. Nevertheless in basic medium, famotidine was released 40.5 up to 86.88% in the same period. Conclusion: The best formula was SLNs which stabilized by 4% Poloxamer 188 and 1 % Span 20, that had particle size 114.6 nm in diameter, 77.14% famotidine entrapped, and the particle morphology was spherical and distributed individually. SLNs with the best drug release profile was SLNs which stabilized by 4% Eudragit L 100-55 and 1% Tween 80 which had released 36.34 % in pH 1.2 solution, and 74.13% in pH 7.4 solution after 2 hours. The optimum sonication time was 5 minutes.

Keywords : famotodine, SLN, high speed homogenization, particle size, release study
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