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Abstract

Background: Nanotechnology has been considered an auspicious approach over the last twenty years and numerous researchers are making efforts to extend its applications in pharmaceuticals. Recently, various nano-based drug delivery systems, such as nanoparticles, nanoemulgel, nanosuspension, and nanoemulsion, have been developed to deliver varieties of hydrophobics to target sites. Rosuvastatin is a competitive inhibitor of 3-hydroxy-3methylglutaryl-CoA (HMG-CoA) reductase enzyme. The application of rosuvastatin is compromised because of its poor aqueous solubility and low oral bioavailability.

Objective: This research work aimed to develop and characterize nanosuspension formulation for enhancement of the dissolution rate of rosuvastatin.

Methods: Nanosuspension of rosuvastatin was prepared by using PVP K-30 and tween 80 as a stabiliser via the high-pressure homogenization method. The nanosuspension formulation was optimised by a factorial design to determine the effect of PVP K-30 (A), the concentration of tween 80 (B) and the number of the cycle (C) of high-pressure homogenizer on particle size (Y_1) , polydispersity index (Y_2) and zeta potential (Y_3) of the developed formulation. The optimised nanosuspension formulation of rosuvastatin was assessed for particle size, zeta potential, PDI, pH, % encapsulation efficiency of the drug, solubility study and comparative in vitro dissolution study. The optimised formulation passed the stability studies in terms of physical stability (sedimentation) for three months.

Results: The optimised formulation resulted in 92.79 nm of particle size with a 0.201 polydispersity index. The nanosuspension of rosuvastatin showed higher dissolution rate as compared to the pure drug.

Conclusion: This investigation demonstrated that nanosuspension preparation could be a promising approach for improvement of the dissolution rate of BCS II class drugs.

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Keywords: <u>Rosuvastatin</u>, <u>nanosuspension</u>, <u>factorial design</u>, <u>high-pressure homogenizer</u>, <u>encapsulation efficiency</u>, <u>zeta sizer</u>, <u>PVP K-30</u>.

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