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Lipid Nanoparticles for Spironolactone Delivery: Physicochemical Characteristics, Stability and Invitro Release

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Abstract : Spironolactoe (SP) a synthetic steroid diuretic is a poorly water-soluble drug with a low and variable oral bioavailability. Regarding to the good solubility of SP in lipid materials, SP loaded Solid lipid nanoparticles (SP-SLNs) and nanostructured lipid carrier (SP-SLNs) were thus prepared in this work for accelerating dissolution of this drug. The SP loaded NLC with stearic acid (SA) as solid lipid and different Oleic Acid (OA) as liquid lipid content and SLN without OA were prepared by probe ultrasonication method. With increasing the percentage of OA from 0 to 30 wt% in SLN/NLC, the average size and zeta potential of nanoparticles felled down and entrapment efficiency (EE %) rose dramatically. The obtained micrograph particles showed pronounced spherical shape. Differential Scanning Calorimeter (DSC) measurements indicated that the presence of OA reduced the melting temperature and melting enthalpy of solid lipid in NLC structure. The results reflected good long-term stability of the nanoparticles and the measurements show that the particle size remains lower in NLC compare to SLN formulations, 6 months after production. Dissolution of SP-SLN and SP-NLC was about 5.1 and 7.2 times faster than raw drugs in 120 min respectively. These results indicated that the SP loaded NLC containing 70:30 solid lipid to liquid lipid ratio is a suitable carrier of SP with improved drug EE and steady drug release properties.

Keywords : drug release, lipid nanoparticles, spironolactone, stability
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