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Preparation and *in vitro* characterization of atorvastatin nanosuspension

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Background and Aims: In recent years, reducing the drug particle size further down to the submicron range has been gaining much attention, since a much higher oral bioavailability could be achieved due to the further enlarged surface area in comparison with micronized drugs. In addition, saturation solubility can also be increased for drugs in the submicron range, which would further increase dissolution rate and oral bioavailability.The purpose of this work was to produce atorvastatin nanosuspension for dissolution rate enhancement.

Methods: In this study, a bottom-to-top strategy has been used for preparation of nanosuspension form of the HMG-Co-A-reductase inhibitor drug atorvastatin. The method was based on precipitation of drug in an aqueous solvent. The effective factors for Nanosuspension preparation were temperature, addition time (feeding drug concentration), and stirring time.

To investigate the significant factors and optimizing size of particles, the response was in the range of 60 to 70 nm.

Dynamic laser light scattering (DLLS) technique was used to measure the particle size. Effects of surfactant type and concentration and drug concentration on particle size were investigated. Morphology and thermal behavior of the raw atorvastatin and precipitated particles were examined by scanning electronic microscopy (SEM) and differential scanning calorimetry (DSC), respectively. Also, FTIR was used to investigate the nanodrug chemical structure.

Conclusions: Nanosuspension of atorvastatin with desirable particle sizes prepared reproducibly in this study using antisolvent precipitation technique for the enhancement of solubility and dissolution rate. Antisolvent precipitation can thus be a simple and effective approach to produce submicron particles of poorly water-soluble drugs.