



Statistical Optimization of Sertraline Hydrochloride Loaded Solid Lipid Nanoparticles Using Box-Behnken Design

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Abstract : Sertraline hydrochloride is an antidepressant with limited bioavailability and solid lipid nanoparticles (SLN) is one of the approaches to improve bioavailability. This study describes a box behnken experimental design to optimize the formulation of sertraline hydrochloride loaded solid lipid nanoparticles (SLN) by the probe sonication method. For optimization, a three factors and two levels box - behnken design was applied to study the effect of independent variables (factors) i.e. drug to lipid ratio (X_1), surfactant concentration (X_2) and probe sonication time (X_3) on dependent variables (responses) i.e. particles size (Y_1), entrapment efficiency (Y_2). Polynomial equations were generated on the basis of statistical analysis of data. The particle size and % EE for the 13 batches (R_1 to R_{13}) showed a wide variation of 145-201 nm and 80.5-88.8 %, respectively. The physical characteristics of sertraline hydrochloride loaded SLN were evaluated using FT-IR, differential scanning calorimetry and X-ray diffraction. The results of the optimized formulation showed an average particle size of 130.6 nm and entrapment efficiency of 85.30 %.

Keywords: Sertraline hydrochloride, Depression, Solid lipid nanoparticles, Box - Behnken design, Probe sonication.

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