World Academy of Science, Engineering and Technology
International Journal of Biomedical and Biological Engineering
Vol:10, No:01, 2016

Formulation and Invivo Evaluation of Salmeterol Xinafoate Loaded MDI for Asthma Using Response Surface Methodology

Authors : Paresh Patel, Priya Patel, Vaidehi Sorathiya, Navin Sheth

Abstract : The aim of present work was to fabricate Salmeterol Xinafoate (SX) metered dose inhaler (MDI) for asthma and to evaluate the SX loaded solid lipid nanoparticles (SLNs) for pulmonary delivery. Solid lipid nanoparticles can be used to deliver particles to the lungs via MDI. A modified solvent emulsification diffusion technique was used to prepare Salmeterol Xinafoate loaded solid lipid nanoparticles by using compritol 888 ATO as lipid, tween 80 as surfactant, D-mannitol as cryoprotecting agent and L-leucine was used to improve aerosolization behaviour. Box-Behnken design was applied with 17 runs. 3-D surface response plots and contour plots were drawn and optimized formulation was selected based on minimum particle size and maximum % EE. % yield, in vitro diffusion study, scanning electron microscopy, X-ray diffraction, DSC, FTIR also characterized. Particle size, zeta potential analyzed by Zetatrac particle size analyzer and aerodynamic properties was carried out by cascade impactor. Pre convulsion time was examined for control group, treatment group and compare with marketed group. MDI was evaluated for leakage test, flammability test, spray test and content per puff. By experimental design, particle size and % EE found to be in range between 119-337 nm and 62.04-76.77% by solvent emulsification diffusion technique. Morphologically, particles have spherical shape and uniform distribution. DSC & FTIR study showed that no interaction between drug and excipients. Zeta potential shows good stability of SLNs. % respirable fraction found to be 52.78% indicating reach to the deep part of lung such as alveoli. Animal study showed that fabricated MDI protect the lungs against histamine induced bronchospasm in guinea pigs. MDI showed sphericity of particle in spray pattern, 96.34% content per puff and non-flammable. SLNs prepared by Solvent emulsification diffusion technique provide desirable size for deposition into the alveoli. This delivery platform opens up a wide range of treatment application of pulmonary disease like asthma via solid lipid nanoparticles.

Keywords : salmeterol xinafoate, solid lipid nanoparticles, box-behnken design, solvent emulsification diffusion technique, pulmonary delivery
Conference Title : ICBPS 2016 : International Conference on Biomedical and Pharmaceutical Sciences
Conference Location : San Diego, United States
Conference Dates : January 21-22, 2016