BIORESPONSIVE PROLIPOSOMES BASED DRY POWDER OF ANTI-NEOPLASTIC AGENT FOR LUNG CANCER TARGETING

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By

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Abstract:

The aim of the present investigation was to develop and evaluate bioresponsive proliposomes based dry powder of docetaxel using spray drying technique. Docetaxel can improve the cancerous condition if given in the form of bioresponsive proliposomes as dry powder inhaler(DPI) dosage form. Bioresponsive proliposomes based dry powder of docetaxel was evaluated for particle size, percent drug entrapment, flow property, zeta potential, surface morphology, aerosol performance, *in-vitro* drug release study and stability study. Optimization of process parameter were done by Box Behnken Design (BBD) using Design Expert software. FTIR study shows that neither drug decomposition nor drug-excipients and excipient-excipient interactions occurred in the formulation. Analytical method was performed using HPLC. Bioresponsive proliposomes based dry powder was successfully prepared using Docetaxel (7%w/w), HSPC (82%w/w), cholesterol (10%w/w), Dextran-b-poly(l-histidine)(5%w/w), Elastin (3%w/w), Respitose SV001 (15%w/w), Magnesium stearate (0.5%w/w). Optimization study of process parameter shows that batch prepared with inlet temperature 90°C, aspiratory rate 45 Nm^3/hr, feed flow rate 2 ml/min considered as optimum condition for spray drying. Particle size, zeta potential, and percent drug entrapment were found to be 2.56 ± 0.09 µm, -19.0 ± 0.1 mV and 65.71 ± 0.12%. Scanning electron microscopy study indicates that the particles were found to be in spherical shape. Carr's index, hausner's ratio and angle of repose were found to be 14.65 ± 0.18%, 1.17 ± 0.01 and

28.33 ± 0.11° respectively which show good flow property of bioresponsive proliposomes based dry powder. I*n-vitro* drug release of optimized batch was found to be 97.25 ± 0.27 % up to 24 hr. Fine Particle Fraction (FPF), Fine Particle Dose (FPD), Geometric Standard Deviation (GSD) and Mass Median Aerodynamic Diameter (MMAD) were found to be 14.96, 1.42mg, 1.62 and 2.85 µm respectively for optimized batch. Stability study shows Docetaxel loaded bioresponsive proliposomes based dry powder was stable at accelerated condition. The present study demonstrated that, a bioresponsive proliposomes based dry powder inhalation system is suitable for respiratory deposition and hold great potential for deep lung targeting.

Keywords: : Cancer Targeting ; Docetaxel ; Lung Cancer ; Bioresponsive proliposomes based Dry Powder ; Dry Powder Inhaler; Box Behnken Design ; Spray Drying.