

Formulation and optimization of sildenafil citrate-loaded PLGA large porous microparticles using spray freeze-drying technique: A factorial design and in-vivo pharmacokinetic study

Azza Ahmed ,Hend Shahin, Bhavani Prasad Vinjamuri, Azza A Mahmoud, Suzan M Mansour, Mahavir Bhupal Chougule, Lipika Chablani

Abstract

The oral administration of sildenafil citrate (SC) for the treatment of pulmonary arterial hypertension is associated with several drawbacks. The study aimed to design and formulate SC-loaded inhalable poly (lactic-co-glycolic acid) [PLGA] large porous microparticles (LPMs) for pulmonary delivery. A factorial design was used to study the effect of the composition of LPMs on physicochemical properties. The study also evaluated the effect of glucose and L-leucine concentration on the formulation. The developed LPMs demonstrated an acceptable yield% (48%), large geometric particle size (>5µm), sustained drug release (up to 48h) (ethylamine) from 0.5% to 1% in SC-loaded LPMs led to an increase in entrapment efficiency from ~3.02% to ~94.48%. The optimum LPMs showed adequate aerodynamic properties with a 97.68% recovery, 25.33% fine particle fraction, and low cytotoxicity. Intratracheal administration of LPMs demonstrated significantly higher lung deposition, systemic bioavailability, and npi gt tgygpvkqp vk o g * r > 0.05 + eq o rctgf vq qtcmm { c f o kpkuvgtgf Xkc i tc Ì "vedngvu0" The study concluded that SC-loaded LPMs could provide better therapeutic efficacy, reduced dosing frequency, and enhanced patient compliance.

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