

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

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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% *Ö6: ' +." nct i g"i gq o gvtke" rctvkeng"uk |g"*@7Û o +" ykvj "c"ur jgtkecn"cpf" rqtqw u"uwthceg."cpf" sustained drug release (up to 48 h). Increasing the concentration of poly (ethyleneimine) 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 c f g s w c v g " c g t q f { p c o k e " r t q r g t v k g u " y k v j " c " ; 9 0 8 : " Ö " 3 0 2 9 ' " t g e q x g t { . " 4 7 0 5 5 " Ö " 5 0 5 4 ' " fine particle fraction, and low cytotoxicity. Intratracheal administration of LPMs demonstrated significantly higher lung deposition, systemic bioavailability, and n q p i g t " t g v g p v k q p " v k o g " * r " > " 2 0 2 7 + " e q o r c t g f " v q " q t c m m { " c f o k p k u v g t g f " X k c i t e Ì " v c d n g v u 0 " The study concluded that SC-loaded LPMs could provide better therapeutic efficacy, reduced dosing frequency, and enhanced patient compliance.

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