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Design and development of interpenetrating polymeric network hydrogel beads as delivery carrier for modified release of simvastatin

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The aim and objective of the present investigation describes the development and evaluation of chitosan based Interpenetrating polymeric network of hydrogel beads for modified release of simvastatin. A Box benhken design was employed to design Interpenetrating polymeric network of hydrogel beads of simvastatin by precipitation technique. Simvastatin is class-II drug hence effort is to increase the solubility by forming an inclusion complex (1:1) with beta-cyclodextrin and then incorporate in to polymer blend. This effort also protects the drug from solvent and crosslinker effect during preparation. The effect of critical formulation variables namely amount of polymers, concentration of glutaraldehyde, and time of crosslinking on percentage drug entrapment, beads diameter, swelling and *In vitro* drug release was investigated using response surface methodology. The optimized formulation showed 91.12 cumulative percentage releases in duration of 12 h following zero order kinetics. The percentage drug entrapment, area increased after swelling study and beads diameter were found to be 78.51%, 35.0 mm^2 and 1.22 mm^2 respectively. The mechanism of drug release was characterized by Higuchi diffusion model. The experimental values of the response parameters were in agreement with those predicted by the mathematical models confirming the prognostic ability of multiple linear regression analysis (MLRA) and ANOVA. Optimized formulation further process for various instrumental study such as scanning electron microscopy (SEM) and trinocular optical microscopy to study surface morphology of beads. Fourier transform infrared spectroscopy (FTIR) study and differential scanning calorimeter (DSC) are used to confirms the crosslinking, stability of drug in the formulation, to confirm the formation of inclusion complex, characterization of drug and polymers as well as drug- excipients compatibility. Stability study on optimized formulation also performed as per ICH guideline for 6 week. It was concluded from results that the prepared formulation fulfill the aim of the work.

Biography

Biswajit Basu has completed his B. Pharm and M. Pharm in Pharmaceutics from Rajiv Gandhi Universiy of Health Sciences, Karnataka, India. He has published more than 20 research articles in reputed International & National journals and a book in International Lambert Academic Publishing as well as made some oral and poster presentation in National level conferences. Presently completed his Ph.D. research work at Bhagwant University in India and working as Asst. Prof. in Atmiya Institute of Pharmacy, Gujarat, India.

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