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Formulation and Evaluation of Silibilin Loaded PLGA Nanoparticles for Cancer Therapy

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Abstract : Silibinin, a flavanone as an antimicrotubular agent used in the treatment of cancer, was encapsulated in nanoparticles (NPs) of poly (lactide-co-glycolide) (PLGA) polymer using the spray-drying technique. The effects of various experimental parameters were optimized by box-behnken experimental design. Production yield, encapsulation efficiency and dissolution study along with characterization by scanning electron microscopy, DSC, FTIR followed by bioavailability study. Particle size and zeta potential were evaluated by using zetatrac particle size analyzer. Experimental design it was evaluated that inlet temperature and polymer concentration influence on the drug release. Feed flow rate impact on particle size. Results showed that spray drying technique yield 149 nm indicate nanosize range. The small size of the nanoparticle resulted in an enhanced cellular entry and greater bioavailability. Entrapment efficiency was found between 89.35% and 98.36%. Zeta potential shows good stability index of nanoparticle formulation. The in vitro release studies indicated the silibinin loaded PLGA nanoparticles provide controlled drug release over a period of 32 h. Pharmacokinetic studies demonstrated that after oral administration of silibinin-loaded PLGA nanoparticles to rats at a dose of 10 mg/kg, relative bioavailability was enhanced about 8.85-fold, compared to silibinin suspension as control hence, this investigation demonstrated the potential of the experimental design in understanding the effect of the formulation variables on the quality of silibinin loaded PLGA nanoparticles. These results describe an effective strategy of silibinin loaded PLGA nanoparticles and might provide a promising approach against the cancer.

Keywords : silibinin, cancer, nanoparticles, PLGA, bioavailability
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