Research in Pharmaceutical Sciences, 2012;7(5)
School of Pharmacy and Pharmaceutical Sciences
Isfahan University of Medical Sciences

Preparation and *in vitro* evaluation of docetaxel nanoparticles against HepG2 cell lines

P. Ebrahimnejad[1,*], M. Shokrzadeh[2], M. Omidi[2]

[1]*Department of Pharmaceutics, Faculty of Pharmacy, Mazandaran University of Medical Sciences, Sari, Iran*
[2]*Department of Toxicology, Faculty of Pharmacy, Mazandaran University of Medical Sciences, Sari, Iran*

Background and Aims: The aim of this study was to prepare and evaluate mucoadhesive core-shell nanoparticles of docetaxel based on copolymerization of thiolated chitosan coated on poly methyl methacrylate cores as a carrier for oral delivery and cytotoxicity effects against HepG2 cell lines.
Methods: Docetaxel-loaded nanoparticles with various concentrations were prepared via a radical emulsion polymerization method using cerium ammonium nitrate as an initiator. The physicochemical properties of the obtained nanoparticles were characterized by dynamic light-scattering analysis for their mean size, size distribution, and zeta potential; scanning electron microscopy and transmission electron microscopy for surface morphology; and differential scanning calorimetry analysis for confirmation of molecular dispersity of docetaxel in the nanoparticles. MTT assay performed for determination of cytotoxity against HepG2cell lines.
Results: Nanoparticles were spherical with mean diameter below 200 nm, polydispersity of below 0.15, and positive zeta potential values. The entrapment efficiency of the nanoparticles was approximately 90%. In vitro release studies showed a sustained release characteristic for 10 days after a burst release at the beginning. Docetaxel nanoparticles showed a high cytotoxicity effect in the HepG2cell lines after 24, 48 and 72 hours.
Conclusions: It can be concluded that by combining the advantages of both thiolated polymers and colloidal particles, these nanoparticles can be proposed as a drug carrier system for mucosal delivery of docetaxel.

Keywords: Docetaxel; Nanoparticles; HepG2 cell; Nanotechnology