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Oral bioavailability enhancement of ganciclovir through polymeric nanoparticles development: in vitro evaluation and in vivo pharmacokinetic studies in rats.

The present study was aimed at improving the oral bioavailability of Ganciclovir (GCV) through the preparation of GCV-loaded Chitosan Nanoparticles (CSNPs). CS helps in improving absorption of hydrophilic drugs via the paracellular pathway, and therefore was chosen as the nanoparticle matrix polymer for GCV. CSNPs were prepared using the ionic gelation method and evaluated for their particle size, entrapment efficiency, zeta potential, in vitro release, and surface morphology by TEM. Further, a fluidized bed drying process for the drying of GCV-loaded CSNPs was adopted, and dried GCV loaded CSNPs were filled into capsules for ex vivo and in vivo studies. Cytotoxicity and cellular uptake studies were performed within Caco-2 cells. Cell line internalization of GCV loaded CSNPs was observed within Caco-2 cells. It also protects the cells against the toxic effects of plain GCV. Furthermore, the pharmacokinetics of dried CSNPs was compared to a commercially available immediate release formulation in rats and indicated a 42.86 fold increase in bioavailability. The significant increase in bioavailability of GCV when administered in the form of CSNPs may be attributed to enhancement in permeability due to the presence of CS through its properties of mucoadhesion and its capacity to open tight junctions between epithelial cells. From the overall results, it is concluded that the GCV nanoparticulate formulation may be a promising carrier in the treatment of cytomegalovirus (CMV) infection.

Biography

Dr. Gayatri C Patel Junior Research Fellowship award by All India Council of Technical Education (AICTE), New Delhi during 2003-2005. Received All India Council of Technical Education (AICTE) grant of Rs. 8,62,500/- under Research promotion Scheme for research project entitled "Microemulsion based delivery system of Nutraceuticals as personal care products" as Principal Investigator during 2011. Received Gujarat Council on Science and Technology, Government of Gujarat (GUJCOST) grant of Rs. 5,00,000/- under Minor Research Project for research project entitled "Preparation & Evaluation of biodegradable in situ gel forming injectable controlled drug delivery system based on thermoresponsive methyl cellulose hydrogel" as Principal Investigator during 2015.

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