Development of polysorbate-80 coated galantamine nanorticles to treat Alzheimer’s disease

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Galantamine is an alkaloid that is used for treating mild to moderate Alzheimer’s disease. Due to the presence of blood brain barrier, Galantamine has very poor bioavailability to the brain. Hence, an attempt was made to develop polysorbate 80 coated galantamine nanoparticles to target brain. The nanoparticles were successfully prepared by simple ionic gelation method using chitosans and optimized to obtain a size under 200nm. The prepared nanoparticles were characterized for its physiochemical properties, in vitro cytotoxicity and internalisation of nanoparticles in SH-SY-5Y human neuroblastoma cell line. The particle size of optimized chitosan nanoparticles ranged from 116 ± 4.2 to 155 ± 3 nm and the zeta potential value ranges from +31.2 ± 1.7 to +40 ± 1.5 mV. The drug entrapment ranged from 42.3 ± 1.6% to 70.6 ± 1.5% and in vitro drug release values varied from 55.2 ± 2.8 to 64.5 ± 3.2 %. Cytotoxicity studies established absence of any toxicity on SH-SY-5Y human neuroblastoma cell with the drug concentrations of 10 and 100µg/ml. Internalisation of galantamine nanoparticles in SH-SY-5Y human neuroblastoma cell lines revealed that polysorbate-80 coated nanoparticles facilitated time depended uptake in the human neuronal cells. In vivo pharmacokinetics and brain distribution studies revealed that the polysorbate-80 coated nanoparticles had better brain targeting efficacy than the uncoated nanoparticle. Hence polysorbate-80 coated chitosan nanoparticles will be a potential carrier to target brain.

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