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Mesoporous aluminosilicates-highly efficient catalysts of oligomerization of α- olefins

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Rotigotine is a non-ergoline and selective dopaminergic (D2) receptor agonist which is effective in the treatment of Parkinson's disease. Despite the therapeutic potential, its long-term clinical practice has been hindered due to low oral bioavailability (1%) and extensive first-pass effect. The aim of this study was to develop and evaluate rotigotine-loaded chitosan nanoparticles (RNPs) for nose-to-brain delivery. RNPs were prepared by ionic gelation technique. The effect of chitosan, sodium tripolyphosphate and rotigotine concentration on particle size, polydispersity index (PDI), zeta potential and entrapment efficiency were optimized. Solid-state characterization studies include transmission electron microscopy, scanning electron microscopy, atomic force microscopy, fourier-transform infrared spectroscopy, differential scanning calorimetry and X-ray diffraction. The effect of RNPs on the integrity of mucosa was investigated by histopathological study of treated and untreated goat mucosa after 24 h of the drug permeation experiment. Cytotoxicity of RNPs was evaluated in human neuroblastoma SH-SY5Y cell using MTT assays. The optimized RNPs had a hydrodynamic particle size of 75.37 ± 3.37 nm, PDI of 0.368 ± 0.02, zeta potential of +25.53 ± 0.45 mV and entrapment efficiency of 96.08 ± 0.01%. There was no toxicity or structural damage to nasal mucosa by RNPs was observed in histopathological study. The cell viability was more than 90% after 24 h incubation with RNPs. RNPs showed neuroprotective effect against 6-hydroxydopamine (6-OHDA)-induced neurotoxicity. Our results indicated that RNPs are a promising carrier for nose-to-brain delivery. *In-vivo* behavior of these nanoparticulate carriers should be further evaluated in animal models of Parkinson's disease.