

Young Researcher Award-2020

By Institute of Scholars (InSc)

Dr. Namdev L. Dhas Received an Young Researcher Award-2020 for the work with following details

Cationic biopolymer functionalized nanoparticles encapsulating lutein to attenuate oxidative stress in effective treatment of Alzheimer's disease: A non-invasive approach

(Journal Name: Journal of Drug Delivery Science and Technology)

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Present investigation explores cationic biopolymer core/shell nanoparticles (Chitosan@PLGA C/SNPs) for delivering carotenoids to brain via intranasal route for suppressing oxidative stress in Alzheimer's disease (AD). The prepared C/SNPs exhibited particle size less than 150 nm with more than 80% of entrapment efficiency. Surface morphology confirmed uniform coating of shell (chitosan) over core PLGA NPs and suggested spherical nature and homogenous dispersion of C/SNPs. In-vitro release study demonstrated sustained release of lutein while C/ SNPs permeation enhancement was confirmed by ex-vivo diffusion study. The study also investigated effect of cationic-shell with respect to anionic-core NPs on biocompatibility, cellular uptake, uptake mechanism, reactive oxygen species (ROS) generation, ROS scavenging activity, blood–brain-barrier (BBB) permeation. The cellular uptake revealed enhanced internalization of nanoparticles via caveolae-mediated endocytosis. In-vitro co-culture model of BBB demonstrated efficient passage for C/SNPs through BBB. Antioxidant assay demonstrated significant ROS scavenging activity of C/SNPs. In-vivo pharmacokinetic and bio-distribution was performed along with in-vivo toxicity and stability. In-vivo toxicity demonstrated absence of any significant toxicity. Photo and thermal stability confirmed protection of lutein by C/SNPs. C/SNPs were highly deposited in brain following intranasal route. The obtained results demonstrate the potential application of cationic C/SNPs for attenuating oxidative stress in brain for effective AD therapy.