



Indian Journal of Experimental Biology
Vol. 62, April 2024, pp. 229-237
DOI: 10.56042/ijeb.v62i04.495

NISSPR
नीलम साईन्स-रिसेच

Magnesium oxide nanoparticles administered orally promote degenerative changes and dysfunctioning in the brain

Shamshad M Shaikh* & PV Desai

School of Biological Sciences and Biotechnology, Faculty Block E, Goa University, Taleigao plateau, Goa – 403 206, India

Received 12 April 2023; revised 26 October 2023

Magnesium oxide nanoparticles (MgO NPs) have shown immense potential due to their unique and versatile properties useful for various biological applications. However, concerns about their potential toxicity to living organisms and the environment invite thorough assessment of their safety and long-term effects. Here, we examined the *in vivo* effects of MgO NPs on the brain in order to assess their potential harm. The result revealed that MgO NPs when administered orally, induced degenerative changes in brain regions like the cerebrum, cerebral cortex, medulla oblongata, and olfactory bulb. A reduction in granular, molecular, Purkinje, glial, and pyramidal cells, as well as degeneration, inflammation, and induction of pyknosis of nuclei in mitral cells and vacuolation in the granular and plexiform layers, are among these alterations. ALP, SGOT, SGPT, AChE, GS, Mg^{2+} -ATPases, Ca^{+2} -ATPases, GPx, SOD, and catalase activities declined by MgO NPs, while those of ACP, GD, and Na^+K^+ -ATPases activities elevated. Antioxidant concentrations, specifically TBARS, increased while reduced glutathione decreased. Neurotransmitters like glutamate levels were elevated, whereas those of dopamine, serotonin, and GABA declined. As a result, the study provides a glimpse into the adverse effects of MgO NPs, demonstrating their potential risk in medicine and various applications, as the alterations caused by these NPs would not only impede regular brain activity, causing neurological disorders but may also disrupt the entire organ system.

Keywords: Antioxidants, Gavaging, Neurotoxicity, Neurotransmitters