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The histopathological changes induced by intra peritoneal administration of cerium oxide on mice brain tissue

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Abstract

The use of nanoparticles (NPs) and nanoparticle- based materials raises many concerns about their impact on health related to its many applications in diverse fields, including petroleum refining, polishing agents, and coatings, as well as the toxicity of these NPs in biological/ physiological environment is a major concern. The study conducted at college of nursing – university of Basrah –Iraq,and it aimed to investigated the effect of cerium oxide nanoparticles on mice brain tissues after 30 days of intra-peritoneal I/P injection of cerium oxide nanoparticles . White laboratory mice of Mus musculus L. strain BALB/C that were supplied from (Drug Control Center - College of Science, Thi -Qar University). The mice were placed under controlled conditions of 20-25 degrees and a 12-hour light cycle. And 12 hours of darkness in plastic cages of standard sizes (30×12×11) cm, the first group injected laboratory mice with 1 ml of normal saline physiological solution as a control group. The second treatment group. Laboratory mice were injected with 1 ml of cerium dioxide at a concentration of 3.75 µl of the raw material to 996.25 µl of physiological solution. By one injection between one day and another for a period of 30 days to investigate the effects of I/P administration of cerium oxide Nano- particles on mice brain tissue after 30 day. Mice were killed and brain isolated to prepare for the histological examination which showed that cerium oxide injected for 30 day induce pathological alteration in brain tissue especially on white matter , neurofibers and glial cells. Brain of mice show degeneration of white matter, ,necrosis of glial cell aggregation of glial cell , The histopathological examination investigate that intra-peritoneal injection in mice for thirty day induce histopathological adverse changes in mice brain tissue.

Keywords: Histopathologica; Intra Peritoneal; Cerium Oxide; Mice Brain Tissue

1. Introduction

The use of nanoparticles (NPs) and nanoparticle- based materials raises many concerns about their impact on health related to it's many applications in diverse fields, including petroleum refining, polishing agents, and coatings [1]. The distinctive property of this material is its reversible conversion to a non-stoichiometric oxide [2]. Cerium oxide nanoparticles (CeO2 NPs) have promising industrial and biomedical applications. In spite of their applications, the toxicity of these NPs in biological/physiological environment is a major concern [3]. Since CeO2 NPs are poorly absorbed by the intestine, inhalation appears to be the major route of exposure. It should also be noted that complete respiratory system acts as repository for deposition of different sizes of NPs. [4,5]. Since CNPs are capable of stimulating the catalytic potency of superoxide dismutase (SOD) [6]. it could be applied as a potent antioxidant. Redox properties of CNPs could also detoxify the existing free radicals for prolonged time intervals by maintaining its bioactivity within the tissues [7]. Cerium oxide can cross the placenta and make its way to the liver, spleen, and lung tissues of adult, neonatal, and fetal mice, inducing tissue destruction and necrosis [8]. CeNPs ameliorated the neurotoxicity induced by FIP by scavenging of ROS involving a decrease of MDA and NO, enhancing antioxidant enzyme activity as SOD and GPx, and normalizing the mRNA expression of brain function genes. Therefore, it could be concluded that cerium nanoparticles have a

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