TOXICITY EVALUATION OF EXPOSURE TO NANOPESTICIDES

BY

SHIMAA GHAREEB MAHMOUD MARZOUK

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ABSTRACT

Nanomaterials have been widely used in different fields like industry, medicine, electronics, and agriculture. Nanopesticides may have some effects on the rats, and thus the safety of their use as pesticide needs to be studied. The present study aimed to evaluate the toxicity orally administrated of titanium dioxide nanoparticles (TiO_2 NPs) and titanium silicon oxide nanoparticles ($TiSiO_4$ NPs). The expression profile of genes encoding oxidative stress-related enzymes (Gpx, Cu-Zn SOD), protein folding (Hsp70), apoptosis (p53), and metal toxicity (Mt1) was determined in the liver of male rats at 7 and 28 days after a single oral dose (250 mg/kg b.w.) of 25 ± 5 nm TiO_2 NPs. At 7 days, changes in the expression of all genes were observed. Hepatic effects of TiO_2 NPs on (Gpx, Cu-Zn SOD, p53, and Hsp70) genes were reversible at 28 days. Except for the Mt1 gene, the gene expression remained high after 28 days. Our study focuses on the potential toxic effect of exposure to TiSiO4 in male rats using biochemical markers (Total protein (TP), Albumin, Total cholesterol, Triglycerides, Superoxide dismutase (SOD), glutathione peroxdiase (GPx), Immunoglobulin G (IgG), Immunoglobulin M (IgM), acetylcholinesterase (AChE), Alanine aminotransferase (ALT), Aspartate aminotransferase (AST), Lactate dehydrogenase (LDH), bilirubin, creatinine, urea, Luteinizing hormone (LH), Follicle-stimulating hormone (FSH), Progesterone, Testosterone, and Comet assay). Distribution of Si and Ti in rat tissues and histopathological examination of target organs in $TiSiO_4$ NPs exposed rats were also studied. Differences between the $TiSiO_4$ NPs groups and the control group in some biochemical markers values and histopathological findings were found. The accumulation of Si in the organs was also noticed.

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