



Abstract 7

Biochemical and histopathological alterations induced by subchronic exposure to zinc oxide nanoparticle in male rats and assessment of its

genotoxicicty

Amal G. Ramadan¹, Ahmed A. M. Yassein¹, Eissa A. Eissa¹, Mohammed S. Mahmoud², Gamal M. Hassan¹

¹Department of Genetics, Faculty of Agriculture, Fayoum University, Fayoum 63514, Egypt.

²Zoology Department, Faculty of Science, Fayoum University, Fayoum 63514, Egypt Published in: *Journal of Umm Al-Qura University for Applied Sciences*, (2022): 8:41–49. ISSN:

In the food and fertilizer industries, zinc oxide nanoparticles (ZnO-NPs) are frequently utilized. Our study was conducted to assess the genotoxicity, biochemical alterations and histopathological parameters of ZnO NPs with a particle size of 30 ± 5 nm which were orally administered to rats once daily at doses of 100, 200, 300, 400, and 600 mg/kg for ten week. The experiment involved the use of 30 Sprague–Dawley male rats exposed to various concentrations of ZnO-NPs. After the adaptation period, six groups were created out of the thirty rats (Five rats per group). Rats in Group 1 (G1), known as the control group, were fed a standard synthetic meal and had unlimited access to drinking water *ad libitum*, while those in the other five groups received oral gavage treatments with various doses of zinc oxide nanoparticles over a 10-week period. The results indicated that ZnO-NPs induces a lowering in body weight beginning in the sixth week while increasing serum AST, ALT, creatinine, and uric acid activity. However, the addition of different concentrations of ZnO NPs compared to the control caused insignificantly decrease in the plasma glucose level in all treated animals. Numerous chromosomal aberrations, including fragments, chromosome rings, chromatid breaks, end-to-end association, and centric fusion, were observed through cytogenetic investigation. When compared to the control group,

hepatic vacuolation, large sinusoidal dilatation, degenerative alterations, and cellular congestion were observed in the liver of the male rats treated with 400 and 600 mg/kg of ZnO-NPs. According to the findings of *in vivo* genotoxicity experiment, rats' bone marrow cells, can exhibit genotoxicity and cytotoxicity after exposure to ZnO NPs with particle sizes of 30 nm for ten weeks. The findings of this study could raise more concerns regarding the potential damage to human health associated with the widespread use of ZnO NPs.

عميد الكلية

رئيس القسم

أ.د/ صالح عبد العليم محمد العوني

أ.د/ عبدالكريم محد عبداللطيف