



**Genotoxicity and cytotoxicity assessment of some nanomaterials in
rats**

By

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**Genotoxicity and cytotoxicity assessment of some nanomaterials in
rats**

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ABSTRACT

Nanoparticles used in many areas of life, such as environmental protection, medicine, agriculture and cosmetic industry food and fertilizer industries, for these reasons their toxicity needs to be assessed. This study conducted to assess the genotoxicity, biochemical alterations and histopathological parameters of zinc oxide nanoparticles (ZnO-NPs) and titanium dioxide nanoparticles (TiO₂-NPs) were orally administered to rats once daily for ten week. The experiment involved the use of 55 Sprague-Dawley male rats exposed to various concentrations of nanoparticles (ZnO-NPs and TiO₂-NPs). After the adaptation period, eleven groups were created out of the fifty five 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 ten, Five groups were received with various doses ZnO-NPs and the other Five groups were received various doses TiO₂-NPs) oral gavage treatments with various doses of (ZnO-NPs) and (TiO₂-NPs) over a 10-week period. The results indicated that ZnO-NPs and TiO₂-NPs induces a lowering in body weight beginning in the sixth week while increasing serum aspartate aminotransferase (AST), alanine aminotransferase (ALT), creatinine, and uric acid activity. 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 ZnO-NPs and TiO₂-NPs. According to the findings of *in vivo* genotoxicity experiments, rats' bone marrow cells, liver and kidney can exhibit genotoxicity and cytotoxicity after exposed to ZnO-NPs and TiO₂-NPs with particle sizes of 30nm and 15nm 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 these nanoparticles.

Keywords: Rats, nanoparticles, biochemicals parameters, hematological parameters, chromosomal aberrations, comet assay, micronuclei assay, histopathology.