

Assessing Potential Genotoxic Effects of Nano-Titanium Dioxide on Nile Tilapia (*Oreochromis Niloticus*)

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Due to widespread use of titanium dioxide nanoparticles (nano-TiO₂) in many industrial applications, significant release of nano-TiO₂ to the environment can occur which may eventually reach aquatic ecosystems. Hence biological impacts of nano-TiO₂ to the aquatic fauna especially fish under chronic exposure need to be explored. Nile tilapia, *Oreochromis niloticus* is used as a bioindicator for evaluating toxic effects to environmental substances in tropical waters. The aim of the present study was to assess the potential genotoxic effects of water-borne nano-TiO₂ on Nile tilapia under chronic exposure conditions. Fish were exposed to a range of nano-TiO₂ (<25 nm, anatase) concentrations viz 0.1 mg/L, 0.5 mg/L and 1.0 mg/L along with the controls for 21 days and genotoxic effects were evaluated weekly by micronucleus assay and Comet assay using peripheral erythrocytes. Even though micronuclei induction in the erythrocytes was higher in the fish exposed to the lowest nano-TiO₂ concentration (0.1 mg/L) at 7 and 21 days of exposure, a statistically significant concentration-response pattern was not observed ($P > 0.05$). Comet assay revealed that DNA damage in erythrocytes of Nile tilapia could be induced by nano-TiO₂ even at 0.1 mg/L level ($P < 0.05$) by 21 days of exposure. Compared to micronucleus assay, Comet assay was more effective in detecting genotoxic effects on Nile tilapia. The results indicate that nano-TiO₂ exposure could lead to genotoxic hazards to the fish populations in the contaminated water bodies.

Keywords: nanoparticle; titanium dioxide; genotoxicity; Nile tilapia; Comet assay

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