

**Effect of Titanium Dioxide Nanoparticles on Tadpoles of Asian Common Toad,
Duttaphrynus melanostictus (Schneider 1799)**

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Newly emerging threat of nanoparticles on biological systems may pose a potential influence on global amphibian decline. However, data related to the effect of nanoparticles on amphibians are scarce. Nano-titanium dioxide is one of the abundantly produced and frequently used engineered nano-metal oxides in industrial applications. The aquatic environment is particularly at risk of exposure to these nanoparticles, as it acts as a sink for most environmental contaminants. The objective of the present study was to assess the effect of water borne exposure of titanium dioxide nanoparticles (TiO₂-NPs) on tadpoles of the Asian common toad (*Duttaphrynus melanostictus*), using survival, development, cholinesterase activity (AChE) and organ histology as ecotoxicological endpoints. TiO₂-NP (Anatase nano powder, particle size <25 nm, purity 99.7%, surface area 45-55 m²/g) was used in the exposure tests with the tadpoles (Gosner stage 25) under static renewal conditions (0.1-100 mg/L TiO₂-NPs for 96 hours and 0.1-10.0 mg/L TiO₂-NPs for 14 days) using standard toxicological procedures and development pattern was examined upon transfer to aged tap water. The results revealed that although, the survival was not affected by 96 hours of TiO₂-NPs exposure, the tadpoles maintained thereafter in aged tap water for another 21 days displayed significant mortalities (≥ 5 mg/L TiO₂-NPs), morphological abnormalities (Scoliosis and Oedema) and impaired development (lower snout to vent length and delays in development) (≥ 30 mg/L TiO₂-NPs) compared to the control tadpoles. In the chronic exposure, tadpoles exposed to TiO₂-NPs for 14 days displayed significant mortalities, development abnormalities and structural alterations in the gills, liver and intestine compared to the controls. AChE activity of the tadpoles exposed to TiO₂-NPs was depressed compared to the controls in a concentration dependent manner, but the differences were not statistically significant ($p > 0.05$). The results highlight the potential risk of TiO₂-NPs on amphibian populations and call for more detailed studies on biological effects of nanoparticles on aquatic animals under tropical conditions.