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Effects of ZnO-NPs and ZnSO₄ as nanoform and as compound form to aquatic system**S Deepa**

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ZnO Nanoparticles (NPs) are used extensively in health and cosmetics fields, but information about the toxicity and mechanisms underlying the toxic effects of NPs is still very restricted. However, the available toxicological information was inadequate to assess the potential ecological risk of ZnO-NPs and also ZnSO₄, soluble form, to aquatic organisms and the public. In this work, the physicochemical properties of ZnO-NPs (<50 nm) were characterized and exposed to 6-month-old male carp *Cyprinus carpio* in six groups at three different doses (10, 50 and 100 µg/L) of ZnO-NPs and ZnSO₄ for seven days with one group of control to assess the toxicity. The ZnO-NPs crystallite size, morphology and elemental analysis conformed by using the X-ray Diffraction Technique (XRD), Field Emission Scanning Electron Microscopy (FESEM), Transmission Electron Microscopy (TEM) and electron dispersive scattering and by using XRD. We conformed the particle size is 30 nm, ZnO NPs was obtained as spherical shape and size is ~20-30 nm. The EDS, zeta potential studies clearly conformed the pure ZnO-NPs its sizes and supporting the XRD, morphology data. The expressions of several transcriptional genes such as (*20β-HSD*, *CYP11A1*, *DMRT1*, *Activin*, *DAX*, *FOXL2*, *WNT5* and *SF-1*) were analyzed and quantified in control and treated (ZnO-NPs and ZnSO₄) groups and the expression levels of these genes were up-regulated and down-regulated. Correspondingly, the activity of oxidative stress, enzymes such as catalase, superoxide dismutase and glutathione-S-transferase, were significantly increased in the testis of the treated groups when compared to control. The data also indicate that the cytotoxicity is triggered primarily through Reactive Oxygen Species (ROS) mediated pathway. Along with that, dose dependent increase in DNA damage was observed. Taken together, present findings suggested that exposure of zinc containing compounds (ZnO-NPs and ZnSO₄) even at their minimum concentration may raise the health issues and adversely affect the male reproductive system of the carp through regulation of specific signaling pathways when compared to ZnO-NPs can be considered more or less safe and grant.

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