

Effect of Zinc Nanoparticles on Oxidative Stress-Related Genes and Antioxidant Enzymes Activity in the Brain of *Oreochromis Niloticus* and *Tilapia Zillii*

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Abstract : This study was carried out to determine the median lethal concentrations (LC50) of Zinc nanoparticles (ZnNPs) on *Oreochromis niloticus* and *Tilapia zillii*. The biochemical and molecular potential effects of ZnNPs (500 and 2000 $\mu\text{g L}^{-1}$) on the antioxidant system in the brain tissue of *O. niloticus* and *T. zillii* were investigated. Four hundred fish were used for acute and sub-acute studies. ZnNP LC50 concentrations were investigated in *O. niloticus* and *T. zillii*. The effect of 500 and 2000 $\mu\text{g L}^{-1}$ ZnNPs on brain antioxidants of *O. niloticus* and *T. zillii* was investigated. The result indicated that 69 h LC50 was 5.5 ± 0.6 and 5.6 ± 0.4 for *O. nilotica* and *T. zillii*, respectively. Fish exposed to 500 $\mu\text{g L}^{-1}$ ZnNPs showed a significant increase in reduced glutathione (GSH), total glutathione (tGSH) levels, superoxide dismutase (SOD), catalase (CAT), glutathione reductase (GR), glutathione peroxidase (GPx) and glutathione-S-transferase (GST) activity and gene expression. On the contrary, malondialdehyde (MDA) levels significantly decreased. Meanwhile, fish exposed to 2000 $\mu\text{g L}^{-1}$ ZnNPs showed a significant decrease of GSH, tGSH levels, SOD, CAT, GR, GPx and GST activity and gene expression. On the contrary, MDA levels significantly increased. It was concluded that, the 96 h LC50 of ZnNPs was 5.5 ± 0.6 and 5.6 ± 0.4 for *O. nilotica* and *T. zillii*, respectively. ZnNPs in exposure concentrations of 2000 $\mu\text{g/L}$ induced a deleterious effect on the brain antioxidant system of *O. nilotica* and *T. zillii*. In contrast, ZnNPs in exposure concentrations of 500 $\mu\text{g L}^{-1}$ produced an inductive effect on the brain antioxidant system of *O. nilotica* and *T. zillii*.

Keywords : ZnNPs, LC50, antioxidants, *O. nilotica*

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