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Assessing potential biological hazards associated with the Kelani River water using Nile tilapia (*Oreochromis niloticus*) as an aquatic model species

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Kelani River receives complex mixtures of pollutants from diverse sources which include waste from industries, agriculture, domestic and municipal sources. However, scientifically based evidences on biological impacts associated with the Kelani River water are limited. Nile tilapia (*Oreochromis niloticus*) is a practically feasible aquatic model for toxicological assessments under tropical conditions. The present study assessed erythrocytic nuclear abnormalities (ENA), hepatic ethoxyresorufin O-deethylase (EROD) and hepatic glutathione S-transferase (GSTs) activities of Nile tilapia following exposure to selected surface water samples collected from the Kelani River and its tributaries in order to assess the potential biological impacts. Fingerlings of fish were exposed to surface water samples from an industrial effluent receiving canal (Menikagara ela; Site B), canal confluent (Site M), downstream of Kelani river at Sedawatta (contaminated with oil installation complex effluents and house hold waste; Site S) and up stream of Kelani river at Ruwanwella (reference site; Site R) and aged tap water (as controls) for 10 days under static renewal conditions. Physico-chemical parameters of exposed water were measured using standard analytical methods. Blood and liver samples of the exposed fish were collected from each treatment after 5 and 10 days of exposure, and ENA and EROD and GST tests were performed using standard methods. Water quality parameters indicated high levels of chemical oxygen demand, biochemical oxygen demand, total dissolved solid, salinity and conductivity and elevated levels of total phosphate content, nitrate content, heavy metal Cr, Cu and Pb levels in the water collected from the Sites B, M and S compared to tap water ($P < 0.05$). Frequencies of total ENA were significantly higher in the fish exposed to water from the sites B, M and S compared those of the fish exposed to the tap water for 5 and 10 days. Blebbed and notched nuclei contributed mainly to the induction of total ENA than micronuclei and nuclear buds. Total number of nuclear abnormalities was elevated by the 10^{th} day of exposure. Hepatic EROD and GST activities of the fish exposed to polluted water were not significantly different ($P > 0.05$) from those of the fish exposed to tap water, but the enzyme activities were increased in each treatment at 10^{th} day of exposure. Comparison of nuclear abnormalities and hepatic EROD & GST activities of *O. niloticus* together with physico-chemical analysis revealed that Sites B, M and S of Kelani River are contaminated with organic and inorganic xenobiotics, which may pose harmful cyto-genotoxic impacts on the feral fish populations.

Keywords: Industrial pollutants, Biological impacts, Cyto-genotoxicity

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