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Microcystin -LR contamination status of Nile tilapia (*Oreochromis niloticus*) and biomarker response

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Microcystin-LR (MC-LR) is a cyanotoxin derived from some cyanobacteria. Nile tilapia (*Oreochromis niloticus*) is the most popular freshwater fish among people in Sri Lanka. MC-LR accumulation in tilapia from thirteen reservoirs; Nallachchiya Wewa, Galkulama Wewa, Anakattiya Wewa, Padaviya Wewa, Nachchaduwa Wewa and Kalawewa in Anuradhapura District and from four reservoirs; Parakrama Samudraya, Halmilla Wewa, Kaudulla Wewa and Ambagas Wewa in Polonnaruwa District Muwapatigewela Wewa in Ampara District and Ulhitiya Wewa and Rathkinda Wewa in Badulla District was determined to evaluate the risk posed by the MC-LR contamination in fish on human health. Sample collection, transportation and analysis were followed according to the standard protocols and MC-LR was quantified by High Performance Liquid Chromatography. Fish skin, flesh and head were analyzed for MC-LR and Tolerable Daily Intake (TDI) values were calculated according to the WHO guidelines. MC-LR levels of fish in different reservoirs were compared with WHO standard of TDI (0.04 µg/kg/day). MC-LR level of fish skin (717.14 ± 0.82 µg/kg), flesh (105.11 ± 0.08 µg/kg) and head (553.24 ± 0.12 µg/kg) collected from Padaviya Wewa were recorded the highest mean concentrations of MC-LR. The mean concentrations of MC-LR in the skin and head of fish were significantly higher than that of flesh ($p < 0.05$). The Average Daily Intake of MC-LR in the skin and head of all fish exceeded the provisional TDI set by WHO. Thus, the results of the present study revealed that consumption of head and skin of fish has a potential risk on accumulation of MC-LR in human body. Cyanobacterial toxins have been shown to affect aquatic organisms such as fish, resulting in oxidative stress. Among the antioxidant enzymes, glutathione peroxidase (GPx) plays an important role in the detoxification of MCs. Fish tissues such as head, flesh and skin were obtained for “GPx” gene expression analysis and results showed availability of detoxifying enzymes in fish skin and head collected from Parakrama Samudraya, Padaviya Wewa, Nallachchiya Wewa and Galkulama Wewa. MC-LR contamination in Galkulama Wewa showed a negative result. Therefore, previous exposure of fish for MC-LR shows indicator of the expression of gene of any detoxifying enzyme. Therefore, the results support the use of GPx in fish as a biomarker to assess the contamination by MC-LR

Keywords: *Oreochromis niloticus*, Microcystin-LR, GPx, Biomarker

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