

Consumer Health Risk Assessment from Some Heavy Metal Bioaccumulation in Common Carp (*Cyprinus Carpio*) from Lake Koka, Ethiopia

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Abstract : Lake Koka is one of the Ethiopian Central Rift Valleys lakes, where the absorbance of domestic, agricultural, and industrial waste from the nearby industrial and agro-industrial activities is very common. The aim of this research was to assess the heavy metal bioaccumulation in edible parts of common carp (*Cyprinus carpio*) in Lake Koka and the health risks associated with the dietary intake of the fish. Three sampling sites were selected randomly for primary data collection. Physicochemical parameters (pH, Total Dissolved Solids, Dissolved Oxygen and Electrical Conductivity) were measured in-situ. Four heavy metals (Cd, Cr, Pb, and Zn) in water and bio-accumulation in the edible parts of the fish were analyzed with flame atomic absorption spectrometry. The mean values of TDS, EC, DO and pH of the lake water were 458.1 mg/L, 905.7 μ s/cm, 7.36 mg/L, and 7.9, respectively. The mean concentrations of Zn, Cr, and Cd in the edible part of fish were also 0.18 mg/kg, ND-0.24 mg/kg, and ND-0.03 mg/kg, respectively. Pb was, however, not identified. The amount of Cr in the examined fish muscle was above the level set by FAO, and the accumulation of the metals showed marked differences between sampling sites ($p < 0.05$). The concentrations of Cd, Pb and were below the maximum permissible limit. The results also indicated that Cr has a high transfer factor value and Zn has the lowest. The carcinogenic hazard ratio values were below the threshold value (< 1) for the edible parts of fish. The estimated weekly intake of heavy metals from fish muscles ranked as $Cr > Zn > Cd$, but the values were lower than the Reference Dose limit for metals. The carcinogenic risk values indicated a low health risk due to the intake of individual metals from fish. Furthermore, the hazard index of the edible part of fish was less than unity. Generally, the water quality is not a risk for the survival and reproduction of fish, and the heavy metal contents in the edible parts of fish exhibited low carcinogenic risk through the food chain.

Keywords : bio-accumulation, cyprinus carpio, hazard index, heavy metals, Lake Koka

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