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Trace metal accumulation in *Holothuria atra* in south and northwestern coasts of Sri Lanka

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Abstract

Trace metals are a significant group of aquatic pollutants due to their ability to bioaccumulate and through the food web resulting from their non-biodegradable property. Sea cucumbers are popular in the export industry as beche-de-mer. They are considered bioindicators to investigate the pollution level in marine and coastal ecosystems due to their feeding behavior. This study was conducted to assess trace metal accumulation in body wall tissues of *Holothuria atra* in Sri Lanka. A total of 20 *H. atra*, 03 sediment, and 03 seawater samples were randomly collected from the intertidal zones of three sampling sites (Kalpitiya, Madiha, and Dondra) during March to October 2023. The samples were prepared according to the AOAC protocol and subjected to microwave digestion to determine the concentrations of copper (Cu), zinc (Zn), iron (Fe), chromium (Cr), cadmium (Cd), and lead (Pb) using inductively coupled plasma optical emission spectrophotometry (ICP-OES). The trace metal concentrations in *H. atra* ranged; Cu (3.54 - 5.54), Zn (193.66 - 298.07), Fe (205.3 - 249.02), Cr (8.93 - 12.11), Cd (2.10 - 8.27), and Pb (3.17 - 10.03) mg/kg on dry weight basis. Trace metal concentration in sediment across three sites was identical in the order of Zn> Fe> Cr> Cu> Pb> Cd. Zinc showed the highest concentration (5.941 - 7.032 µg/L), and Cd showed the lowest concentration (0.003- 0.007 µg/L) in seawater across three sites. Bioconcentration factors for Pb and Cd were lower than 1. Cu, Fe, and Cr concentrations in *H. atra* were below the permissible levels, while Zn exceeded the permissible limits. Pb and Cd concentrations in *H. atra* were above the maximum permissible levels established by WHO and FAO guidelines. The total target Hazard Quotient (<1) revealed no potential health risk for target populations by the consumption of *H. atra*. In conclusion, *H. atra*, from the coasts of Kalpitiya, Madiha, and Dondra, can be still considered safe for human consumption.

Keywords

Trace metals, sea cucumbers, bioaccumulation, bioindicators, ICP-OES