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Distribution of heavy metals across different tissue types in *Etroplus suratensis* from Mahakanadarawa reservoir: Investigating dietary implications for CKDu in Sri Lanka

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The escalating cases of chronic kidney disease of uncertain etiology (CKDu) in rural communities, especially in the Maradankulama-Mahakandrawa region of Sri Lanka, stipulate a critical public health investigation. Given the significant dietary reliance on *Etroplus suratensis* due to geographical and logistical complexities in obtaining sea fish, bioaccumulated toxic metals in this species can be a potential risk factor for CKDu. This study investigated the heavy metal content (As, Pb, Cd, Cr, Ni) in the gut, gill, and muscle tissues of *E. suratensis* sourced from the Mahakanadarawa Reservoir in the CKDu endemic Mihintale region. To obtain representative *E. suratensis* samples from across the Mahakanadarawa Reservoir, fish were collected using a randomized sampling method. Multiple random points within the reservoir were pre-determined and fish were caught at each location by local fishermen using appropriate techniques. The captured fish were identified as *E. suratensis* and 36 samples were separated as gut, gills, and muscles for the toxic metal analysis. The heavy metal content (As, Pb, Cd, Cr, Ni) in these samples was then analysed using inductively coupled plasma mass spectrometry (ICP-MS). To thoroughly compare metal concentrations across tissue types, the non-parametric Kruskal-Wallis ANOVA test was utilized followed by post-hoc Tukey HSD tests. The non-parametric ANOVA assessed statistically significant differences in metal levels between muscle, gill, and gut tissues. Post-hoc Tukey tests then enabled pairwise comparisons between each tissue type to determine which specific metal concentrations differed. There were significant differences between tissue types for concentrations of As, Cd, Cr and Ni ($p<0.001$). Post-hoc Tukey tests showed As, Cr, Cd and Ni were significantly higher in gut compared to that of muscle and gill tissues ($p<0.05$), with the order Gut>Gill>Muscle. Pb did not deviate significantly across tissues, however, mean Pb concentrations exceeded the WHO/FAO permissible limits for dietary intake in all tissues, while Cd remained within acceptable levels. Compared to gut and gills, muscle contained relatively low concentrations of As (0.01±0.01) mg/kg, Cr (0.22±0.03) mg/kg, Pb (0.508±0.36) mg/kg, and Cd (0.015±0.13) mg/kg and Ni (0.06±0.01) Although edible muscle in some samples met regulatory limits, frequent consumption of *E. suratensis* from this CKDu endemic area may pose a health risk, warranting further study on geographical and seasonal variation. Ultimately, this study contributes to the growing body of evidence suggesting that bioaccumulation of toxic metals in fish poses significant CKDu risk factors.

Keywords: Bioaccumulation, CKDu, *Etroplus suratensis*, Heavy metal, Inland fish