

Zebrafish as a Bioindicator for Water Quality Assessment in Endemic CKDu Regions in Anuradhapura District

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Zebrafish (*Danio rerio*) exhibit sensitivity to various environmental stressors and share physiological similarities with humans, making them valuable models for environmental toxicology studies. Given that groundwater consumption is implicated as a risk factor for chronic kidney disease of unknown etiology (CKDu), this study aims to assess the possibility of using zebrafish as bio-indicators to assess water quality in CKDu endemic areas of the Anuradhapura district. Groundwater samples were collected from wells 17 CKDu endemic MOH divisions in Anuradhapura and pH and electrical conductivity (EC) values were measured. Then zebrafish eggs were exposed to groundwater samples at 24 hours post fertilization (hpf). Zebrafish survival rate and hatching rate were observed at 3 days post fertilization (dpf) and morphological variations were observed at 8 dpf. The pH ranged from 6.74 - 7.38. The analysis of EC in groundwater samples showed values ranging from 102.80 $\mu\text{S}/\text{cm}$ to 851.30 $\mu\text{S}/\text{cm}$, notably higher compared to distill 8.71 $\mu\text{S}/\text{cm}$ and Ro-filtered water 31.63 $\mu\text{S}/\text{cm}$. The zebrafish survival rate was notably lower in the Rabewa MOH Division, whereas both the Rabewa and Horowpothana MOH Divisions experienced a significant decline in hatching rates. However, no significant morphological changes (pericardium edema, Yolk sack edema) were observed between the samples. The observed differences in zebrafish survival and hatchability rates indicate potential variations in water quality among different regions affected by CKDu. Further large-scale research is recommended to comprehensively evaluate water quality in CKDu endemic regions and its potential association with the disease.

Keywords: *CKDu; Groundwater; Zebrafish; Chronic kidney disease of unknown etiology; Anuradhapura*

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