

Assessing potential toxicity of drinking water from selected dug wells in Medawachchiya, Anuradhapura District, Sri Lanka, using plant and fish bioassays

K.A.W.S. Weerasekara^{1*}, A. Pathiratne² and H.M.P. Kithsiri¹

¹National Aquatic Resources Research and Development Agency (NARA), Crow Island, Colombo 15, Sri Lanka

² Department of Zoology and Environmental Management, Faculty of Science, University of Kelaniya, Sri Lanka

Chronic Kidney Disease of Unknown aetiology (CKDu) is prevalent in the Medawachchiya area in Sri Lanka. This study was aimed at assessing potential toxicity of waters in the selected dug wells (drinking water sources) in Medawachchiya area using *Allium cepa* (common onion) root based and *Cyprinus carpio* (common carp) erythrocyte based bioassays. During prolonged dry period in 2016, water from eight dug wells were sampled for assessments which included four drinking water wells of CKDu affected families and four reference wells which had been used by the families with no clinical signs of CKDu. Bioassays were carried out following standard protocols with aged tap water and mineral water as negative controls. Onion bulbs were exposed to well waters and negative controls (n=5) for two days and root growth, mitotic index and nuclear/chromosomal abnormalities in meristematic cells were determined to evaluate potential toxicity. Concurrently, fingerlings of *C. carpio* were exposed to the different exposure media for five days and erythrocytes from peripheral blood and head kidney were used for erythrocytic abnormality tests. The results of plant bioassay indicated potential toxicity associated with water in the dug wells used by CKDu affected families based on root growth retardation and mitotic index depression effects compared to the negative controls (Mann-Whitney U test; $p < 0.05$). Significant induction of chromosomal and nuclear abnormalities in the root meristems was also noted. Fish bioassay showed potential toxicity associated with water in the dug wells used by CKDu affected families and reference dug wells in some cases based on apoptosis of erythrocytes of the fish exposed to well water compared to those of negative controls (Mann-Whitney U test; $p < 0.05$). Both plant and fish bioassays revealed potential toxicity associated with the drinking water of the dug wells used by CKDu affected families.

Keywords: bioassay, CKDu, drinking water, dug wells, toxicity

*Corresponding author- email: shyamalikaww@nara.ac.lk