

Combination of Physico-Chemical Analysis and A Plant Bioassay for Screening Potential Toxicity of Drinking Waters in Selected Dug Wells in Medawachchiya Area, Sri Lanka: A Preliminary Study

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Chronic Kidney Disease of unknown aetiology (CKDu) is becoming a major health problem especially in the North Central Province of Sri Lanka showing the highest prevalence in Medawachchiya area. Aetiology of this disease seems to be multifactorial which includes chronic exposure to environmental toxicants. This study reports the preliminary results of an ongoing study which has mainly focused on evaluating potential toxicity of drinking water in the dug wells in the Medawachchiya area using combination of physico-chemical analysis and bioassays. Eight dug wells were selected for the study using judgmental sampling method which included four drinking water sources of CKDu affected families and four wells which have been used by the families with no clinical signs of CKDu (Reference wells). Water samples obtained from these wells during prolong dry season in August 2016 were analyzed for physico-chemical parameters and the herbicide glyphosate using standard analytical methods. Potential toxicity of water samples was examined by the bioassay with the plant model (*Allium cepa*) following standard protocols with aged tap water and mineral water as negative controls. Results revealed that total hardness of the water of dug wells used by CKDu affected families were above the standard limits (250 mg/L, SLSI:2013). Alkalinity levels of water of all the wells used by the CKDu affected families and one reference dug well also exceed the stipulated limits for drinking water (200 mg/L, SLSI:2013). Arsenic was detected (2.0 µg/L) in water of one dug well used by CKDu affected families. Glyphosate was not detected in all drinking water samples (< 5 µg/L, detection limit). The bioassay indicated potential toxicity associated with water in the dug wells used by CKDu affected families based on *A. cepa* root growth retardations effect compared to negative controls and reference dug wells ($P < 0.05$). Further studies will be continued using bioassays with plant and animal models covering different climatic seasons in order to evaluate potential toxic/cytotoxic/genotoxic effects associated with the drinking waters of the dug wells used by CKDu affected families.

Keywords: *Chronic Kidney Disease, bioassay, Physico-chemical characterization, toxicity, dug wells*

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