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Rainwater as an Alternative Drinking Water Source for CKDu Prone Areas of Sri Lanka: A Case Study in Girandurukotte

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Abstract

Chronic Kidney Disease of uncertain etiology (CKDu) is a fatal disease which causes death from kidney failure due to the unknown risk factors and has already affected more than 400,000 people in rural agricultural landscape (dry zone) of Sri Lanka. This has become a major health hazard in Sri Lanka. The drinking water is supplied using bowsers and several reverse osmosis (RO) plants have been installed in some areas of Sri Lanka and they are not viable solutions. Therefore, rainwater comes up as an alternative for drinking water. The primary objective of this study is to determine whether rainwater can be used as an alternative safe drinking water source in Girandurukotte area in terms of water quality. The physical, chemical and biological analysis were performed to compare the water quality parameters of 3 water sources (groundwater, surface water and rainwater) in the Girandurukotte area. The sample size of each source is 20 (n=20) and rainwater collected in pre-monsoon and post-monsoon periods. The most common storage tanks (polyethylene (PE) and ferrocement (FC) were subjected to this study to compare the water quality depending on the material of the rainwater tank. The results show that there is a significant difference in rainwater in terms of water quality compared to groundwater and surface water. There is a significant difference ($p<0.05$) in parameters such as, colour, turbidity, pH, Cd, As, Zn, Pb, Na, K, Mg, free ammonia, fluoride, total hardness, total alkalinity, nitrate and nitrite. In the comparison of storage material, rainwater in FC tank was high in pH while rainwater in PE tank was lower in pH and have a significant difference ($p<0.05$) for some water quality parameters such as pH, total alkalinity and total dissolved solids. Still water quality of rainwater collected in both tanks (PE and FC) was within portable drinking water standards (Sri Lanka Standards; 614, 2013) and there is no likelihood of Cd, Pb and As contamination in rainwater and fluoride content, hardness is well below safe limits.

Keywords: CKDu, Rainwater harvesting, Groundwater, Ferrocement, Polyethylene