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Daily intake of essential minerals through drinking water in a chronic kidney disease of unknown etiology prevalence area, Sri Lanka

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Background: Chronic Kidney Disease of unknown etiology (CKDu) is increasing at an alarming rate in North Central Province, Sri Lanka. Based on previous observations, CKDu has a profound relationship with drinking water quality. The contribution of drinking water to the total dietary intake of essential minerals is pronounced. Essential minerals are required for humans in limited quantities, and excessive or insufficient intake of vital minerals can cause various chronic effects such as CKDu.

Objective: This study aimed to assess the essential mineral intake of human body via drinking water obtained from a CKDu endemic area in Sri Lanka.

Method: Thirty drinking water samples were randomly collected from dug wells in Girandurukotte grama niladhari division, Badulla District, Sri Lanka. The collected water samples were stored in pre-cleaned containers, sealed, and transported to the laboratory at a refrigerated temperature. They were filtered through 0.45 µm membrane filters. Selected essential minerals, including calcium (Ca), magnesium (Mg), copper (Cu), zinc (Zn), ferrous (Fe), and manganese (Mn), were analyzed using Inductive Coupled Plasma Mass Spectrometry (ICP-Agilent-7800). Mean Oral Daily Intake (ODI) for an adult human was determined in triplicates using the concentrations of essential minerals.

Results: The results obtained for Ca, Mg, Cu, Zn, Fe, and Mn were 1.1±0.1 mg/L, 20.3±0.8 mg/L, 1.1±0.0 µg/L, 18.4±1.0 µg/L, 108.3±12.6 µg/L, and 143.0±21.6 µg/L respectively. Mean ODI value (µgkg⁻¹day⁻¹) for Ca, Mg, Cu, Zn, Fe, and Mn were 0.04, 0.74, 3.89x10⁻⁵, 0.07x10⁻², 0.04x10⁻¹, and 0.01 respectively. Mean concentrations of selected essential elements in drinking water complied with WHO standards except for Mg.

Conclusion: The reported chronic ODI values indicate low potential harmful health risks to the people of the study area. However, long-term use of this water may pose a hazard to human health. Therefore, regular monitoring and taking all necessary precautionary measures before using this water can be recommended.

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