



PREVALENCE OF CHRONIC KIDNEY DISEASE OF UNKNOWN AETIOLOGY (CKDu) WITH SPECIAL REFERENCE TO WATER HARDNESS AND FLUORIDE IN DRINKING WATER WELLS

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Abstract

The prevalence of Chronic Kidney Disease of Unknown aetiology (CKDu) has increased alarmingly over recent decades in Sri Lanka. North Central Province is the area which is most affected by CKDu (Anuradhapura 18.9% and Polonnaruwa 13.9%). Among the hypothesis which related to CKDu, the existing evidences favors a multi-factorial aetiology. However, synergistic effect of fluoride and hardness has not been studied yet. The present study was conducted to determine synergistic effect of fluoride and hardness of drinking water in selected CKDu high-prevalence, low-prevalence and non-prevalence areas. Water samples were collected from Padaviya, Galnewa and Angunukolapelessa during July, 2020. Water Temperature, pH, Electrical Conductivity (EC), Dissolved Oxygen (DO) and Turbidity were measured at the site itself and concentration of Fluoride, N-NO₃⁻, N-NO₂⁻, N-NH₃ and Total Phosphate (TP) were analyzed using standard spectrophotometric methods. Total Hardness (TH) was measured using standard titrimetric method. The results showed the concentration of Fluoride in water was ranged from 0.193 to 2.410 mg L⁻¹ while TH was varied from 92 to 416 mg L⁻¹. The highest fluoride and hardness levels (1.97, 390.33 mg L⁻¹ respectively) were recorded in Padaviya where is the high CKDu prevalence area while lowest fluoride and hardness values (0.37, 147.00 mg L⁻¹ respectively) were detected in Agunukolapelessa where is a CKDu non prevalence area. Moderate fluoride and hardness levels (1.00, 298.67 mg L⁻¹ respectively) were recorded in Galnewa where is a CKDu low prevalence area. The values given for Fluoride and TH by Sri Lankan Standard Institution (SLSI) are 1.0 mg L⁻¹ and 250 mg L⁻¹ respectively. Other studied ground water quality parameters; Water Temperature, pH, EC, DO, Turbidity, N-NO₃⁻, N-NO₂⁻, N-NH₃ and TP were recorded within the values given for drinking water by (SLSI). Since there may have synergistic effect of fluoride and hardness on CKDu and further studies are being progressed along with an animal model.

Keywords: CKDu Prevalence, Fluoride, Total Hardness, Water Quality