

Correlation of Ground Water Fluoride with Total Hardness and Total Alkalinity in CKDu Prevalent areas in Uva Province

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Chronic Kidney Disease of unknown etiology (CKDu) describes as a multifactorial effect. Thus, postulates on CKDu focus on the cumulative effect of nephrotoxic contaminants which deteriorate the kidney function progressively. This study aimed to determine the influence of total hardness (TH) and total alkalinity (TA) on fluoride (F-) content of groundwater in CKDu prevailing areas in Uva Province. Divisional secretariats of Mahiyangana (MDS), Rideemaliyadda (RDS), Wellawaya (WDS), and Siyambalanduwa (SDS) were selected as CKDu prevailing areas for sample collection. Water samples from 45 dug wells were collected by following a simple random sampling method and the samples were triplicated. Samples were analysed by standard methods of water analysis (APHA 1985). Statistical data analysis was carried out using IBM SPSS 21.0 software. The range of F- contents in MDS (n= 17), RDS (n= 8), WDS (n= 11) and SDS (n=9) were 0.01– 1.80±0.08 mg L⁻¹, 0.02 – 0.61±0.13 mg L⁻¹, 0.01±0.01- 5.8±0.1 mg L⁻¹ and 0.17±0.02– 1.42±0.11 mg L⁻¹ respectively. The highest mean value for TH was observed from WDS (156.44±21.53 mg L⁻¹) and the least was observed from RDS (116.36±21.95 mg L⁻¹). All the mean values for TA were recorded within the permissible level according to WHO guidelines for drinking water and the highest was observed from WDS (336.36±117.58 mg L⁻¹). Results of the linear regression analysis on the dependence of F- on TH indicated a positive correlation in MDS, WDS, and SDS as well as a negative correlation (r= - 0.33) in RDS. All the test areas were observed with positive correlations between F- content, and TA. Among the selected DS areas, 44% of the water samples in SDS, 36% of the water samples in WDS, 12% of the water samples in MDS, and 0% of the water samples in RDS exceeded the maximum permissible level for F- defined by WHO. The influence of total hardness and total alkalinity on Fluoride content in groundwater is required to be studied further.

Keywords: Fluoride, Total Hardness, Total Alkalinity, CKDu, Uva Province

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