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IDENTIFICATION OF DRINKING WATER WELLS WITH HIGH FLUORIDE ION CONCENTRATIONS IN HAMBANTOTA DISTRICT, SRI LANKA

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Excessive levels of fluorides in drinking water may cause dental fluorosis. According to the WHO guidelines, fluoride ions (F^-) in drinking water should be between 0.5 mg dm^{-3} – 1.5 mg dm^{-3}. This study investigated the fluoride ion concentration in drinking water wells and other selected water quality parameters in three Grama Niladhari divisions (GNDs): Medamulana, Galsiyambalayaya and Warayaya areas with a high incidence of dental fluorosis in the Hambantota District. As an initial study, water samples were collected monthly from seven drinking water wells in September and October 2020 and January, March, and April 2021. Temperature, total dissolved solids (TDS), salinity, pH, electrical conductivity (EC) were measured onsite by PCSTestr 35 multi-parameter. The measured values ranged as follows: Temperature 27.3 °C – 32.0 °C, TDS 323 mg L^{-1} – 1340 mg L^{-1}, salinity 233 mg L^{-1} – 947 mg L^{-1}, pH 7.8 – 8.6, and EC 453 µS cm^{-1} – 1886 µS cm^{-1}. The F^- concentrations in the three GNDs measured by ion chromatographic technique ranged from 1.0 mg L^{-1} to 3.6 mg L^{-1}, with most wells exceeding the WHO accepted levels. The concentration of Ca^{2+} in the above locations ranged from 22.6 mg L^{-1} to 312.3 mg L^{-1}, with most wells exceeding the WHO guideline value of 100 – 300 mg L^{-1}. The concentration of Mg^{2+} ranged from 12.3 mg L^{-1} to 83.6 mg L^{-1} and most wells exceeded the WHO threshold value of 30 mg L^{-1}. Accordingly, the hardness values from 114.6 mg L^{-1} to 1058.7 mg L^{-1} also exceeded the WHO threshold value of 180 mg L^{-1}. Therefore, drinking water consumption from dug wells in the investigated area may be a reason for the observed dental fluorosis incidents. Not only the fluoride ions but also TDS, EC and total hardness values have exceeded the WHO acceptable limits. Therefore, the water quality in the investigated area does not meet the acceptable standards and may cause hazardous health effects. This project will continue to observe whether there is a continuous deterioration of the water quality, and possible causes will be investigated.

Keywords: Dug wells, Fluoride, Ion chromatography, Warayaya