

Geochemical Investigation of Groundwater of Selected Areas in the North Central Province of Sri Lanka

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Groundwater plays a major role in the North Central Province (NCP) of Sri Lanka and almost 80 % of the rural domestic and irrigational water in the area is gained by groundwater. This study was carried out to determine the geochemical constrains of the groundwater and to investigate into the relationship of the chronic kidney disease (CKD) patients that consumed these well water. The NCP also had high fluoride contents in groundwater and has become a major health threat. The investigation was carried out in Padaviya (n=25), Kabitigollawa (n=26), Horoupathana (n=27) and Madawachchiya (n=22) areas where the highest CKD patients have been recorded. Field measurements of temperature, pH, EC, ORP and DO were done during sampling using Horiba electrodes. Chemical analyses of the water samples were carried out using atomic absorption spectroscopy (AAS) for Na, K, Mg, Cu, Mn, Zn, Fe and Cr, while spectrophotometry was used to determine F-, NO_3^- , PO_4^{3-} and SO_4^{2-} contents, in September 2015. In a few locations, the parameters of the well water exceeded the WHO standards for drinking water. A few locations in all four villages exceeded WHO limits for F and PO_4^{3-} . However, waters were safe for NO_3^- in all four villages. A considerable number of locations in Padaviya area and a few locations of the other three villages exceeded the Maximum Permissible Limit (MPL) for Mn. Ferrous was high in about three locations each and Mg for a few, in all four villages. However, highly negative oxidation-reduction potential (ORP) values have been reported in almost all samples indicating reduced waters in all four villages. Consuming water with high heavy metals, PO_4^{3-} and NO_3^- than the recommended WHO values could cause adverse health effects and thus, warrants necessary precautions be taken.

Key words: Groundwater, CKD, heavy metals, health, precaution