

(123)

Spatial Distribution of Nephrotoxic Heavy Metals in Chronic Kidney Disease of unknown Prevalence Areas via Water Analysis, Sri Lanka**Dayananda M.D.N.R. *, Botheju W.S.M., Perera R.T., Liyanage J.A.***Department of Chemistry, Faculty of Science, University of Kelaniya, Kelaniya, Sri Lanka***roshanid@kln.ac.lk***Abstract**

Chronic Kidney Disease of unknown etiology (CKDu) occur due to permanent functional damage of nephrons. Recent research findings explore that Cadmium (Cd), Arsenic (As) and Lead (Pb) can be the most causative nephrotoxic heavy metals due to unavoidable introduction and exposure with the usage of synthetic agrochemicals in intensive agriculture. Present study attempted to determine the spatial distribution of nephrotoxic heavy metals in drinking water, Ambagaswewa GN division, Polonnaruwa, Sri Lanka. 30 drinking water samples were collected from drinking water wells in both dry (Mach, 2019) and wet (November, 2018) seasons and were analysed using Inductively Coupled Plasma mass spectrometry. An analytical framework was developed by Inverse Distance Weighted and Spatial Autocorrelation tools in ArcMap 10.2.2 software to interpolate the spatial distribution of toxicants. According, to the results for the dry season, Cd concentration was ranged between 0.0001 ppb and 0.6524 ppb with an average of 0.1865 ± 0.0967 ppb. The average As content was 0.2992 ± 0.1989 ppb and ranged between 0.001 ppb and 1.6279 ppb while Pb concentration changes from 0.0072 ppb to 6.0601 with an average of 1.3013 ± 0.9845 ppb. According to the Moran's index (MI) value resulted from spatial auto correlation, Cd (MI=0.1807) and Pb (MI=0.1969) distributions showed clustered patterns especially in the paddy field areas and As showed a random pattern (MI=-0.0439). Pb content in dry season was significantly higher than the wet season ($p=0.05$). The results conclude that though the concentrations of analysed toxicants were not exceeding the Sri Lankan drinking water quality standards, the people in particular area at a risk with long-term exposure to contaminated drinking water with nephrotoxic heavy metals. Innovative Integrated agricultural systems with minimum usage of synthetic agrochemicals and affordable filtration techniques should implement to reduce further impacts.

Keywords: Nephrotoxic, Heavy metals, Interpolate, Autocorrelation, Integrated