

Is the long-term exposure to trace elements and fluoride the main factor for the prevalence of CKDu?

Perera W.P.R.T.*, Dayananda M.D.N.R., Botheju W.S.M. and Liyanage J.A.

Department of Chemistry, University of Kelaniya, Kelaniya, Sri Lanka

Toxin-mediated renal failure may extensively contribute to the increase of the prevalence of Chronic Kidney Disease of unknown etiology (CKDu) in the North Central Province, Sri Lanka. Long term exposure to Fluoride and toxic trace elements have been revealed as contributing risk factors for the cause of chronic renal damages. Therefore, this study determined Fluoride and toxic trace elements in drinking water of dug wells and tube wells in Dimbulagala Grama Niladhari Division (GND) (CKDu hotspot), Polonnaruwa, Sri Lanka. Triplicated 30 water samples were collected from fifteen dug-wells and fifteen tube-wells and on-site measurements; conductivity, dissolved oxygen and pH were recorded. Trace elements and Fluoride concentrations were analyzed using Inductive Coupled Plasma Mass Spectrometry and Ion Chromatography respectively. Results were statistically analyzed by MINITAB software. According to the obtained results, mean fluoride content in tube-wells was complied with the SLS standards (0.81 mg/L) and mean fluoride level in dug-wells was 1.59 mg/L, which exceeding SLS drinking water quality standards (1.0 mg/L). Fluoride contents in dug well water were significantly higher than tube well waters ($p = 0.007$). Furthermore, analyzed nephrotoxics in tube wells such as Cr (0.789ppb), Cd (0.020ppb), Pb(0.545ppb), and As (0.119ppb) and that were in dug wells including Cr(0.353ppb), Cd(0.07ppb), Pb(0.415ppb) and As(0.400ppb) did not exceed the SLS permissible limits. The calculated water quality index for tube-well water was 55.3, which indicates poor water quality according to the classification of weighted arithmetic method. Hence, it can be concluded that long-term exposure to fluoride and trace elements via drinking water may be one of the main risk factors for chronic renal failures such as CKDu.

Keywords: Risk factors, fluoride, nephrotoxic trace elements and water quality index

*Corresponding author: 2017_perera@kln.ac.lk