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Biomonitoring of 18 trace elements in human hair and nail from inhabitants of Girandurukotte and Kandy by ICP-MS

S. Diyabalanage[1], S. Fonseka[2*], D.M.S.N.B. Dasanayake[2] and R. Chandrajith[3]

[1]Postgraduate Institute of Science, University of Peradeniya, Sri Lanka, [2]Department of Pharmacology, Faculty of Medicine, University of Peradeniya, Sri Lanka, [3]Department of Geology, Faculty of Science, University of Peradeniya, Sri Lanka
[*]Sanjeewani.fonseka@yahoo.com

An alarming increase of chronic kidney disease with unknown etiology (CKDu) has recently been reported in several provinces in Sri Lanka and chronic exposures to toxic trace elements were blamed for the etiology of the disease.

Keratinized matrices such as hair and nails were investigated in order to find out the possible link between CKDu and toxic element exposures. Elements: Li, B, Al, Cr, Mn, Fe, Co, Ni, Cu, Zn, As, Se, Sr, Mo, Cd, Ba, Hg and Pb of hair and nails of patients from Girandurukotte and age-matched healthy controls from Kandy were determined with Inductively Coupled Plasma Mass Spectrometer (ICP-MS).

The results showed that trace element contents in hair of patients vary in the order of Zn> Fe> Al> Mn> Cu> Ba> Sr> Ni> Pb> Cr> B> Hg> Se> Mo> Co> As> Li> Cd while Fe> Al> Zn> Ni> Cu> Mn> Cr> Ba> Sr> B> Pb> Se> Mo> Co> Hg> Li> As> Cd in nail samples. The hair As levels of 0.007 to 0.165 μg g^{-1} were found in CKDu subjects; however, no significant difference was observed between cases and controls. The total Se content in hair of CKDu subjects ranged from 0.043 to 0.513 μg g^{-1} while it varied from 0.031 to 1.15 μg g^{-1} in controls. Selenium in nail samples varies from 0.037 μg g^{-1} to 4.10 μg g^{-1} in CKDu subjects and from 0.042 μg g^{-1} to 2.19 μg g^{-1} in controls.

Despite the gender, age and occupational exposure, this study implies that substantial proportions of the Sri Lankan population are Se deficient. Although cutaneous manifestations were observed in patient subjects, chemical analyses of hair and nails indicated that patients were not exposed to toxic levels of arsenic or other studied toxic elements. Therefore, early suggested causative factors such as exposure to environmental As and Cd can be ruled out.

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