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FOOD MEDIATED EXPOSURE OF SELECTED HOFMEISTER IONS IN CKDU AFFECTED REGIONS IN SRI LANKA

Anokshan Kandasamy^{1,2}, Oshadi Hettithanthri¹, W.M.S.N Bandara³, D.N Magana-Arachchi³, Rasika Wanigatunge⁴, Chamila Jayasinghe², Meththika Vithanage^{1,5}, A.U. Rajapaksha^{1,5*}

¹Ecosphere Resilience Research Center, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka

²Department of Food Science and Technology, Faculty of Livestock, Fisheries and Nutrition, Wayamaba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka

³Molecular Microbiology and Human Diseases Project, National Institute of Fundamental Studies, Kandy, Sri Lanka

⁴Department of Plant and Molecular Biology, Faculty of Science, University of Kelaniya, Sri Lanka

⁵Instrument Center, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka
A.U. Rajapaksha*: anurajapaksha@sjp.ac.lk

ABSTRACT

Chronic kidney disease (CKD) occurring with the absence of conventional risk factors is called chronic kidney disease of unknown etiology (CKDu). It mainly affects the people who are living in the marginalized agricultural zones of Sri Lanka. There are several etiologies for CKDu proposed including chronic exposure of fluoride and other Hofmeister ions due to their Hofmeister type protein-denaturing mechanism on kidney membrane. In this study, 30 rice samples from CKDu endemic Dehiyattakandiya and Girandurukotte areas and 15 rice samples from non-CKDu endemic areas were collected to analyze the Hofmeister ion level in the rice samples to understand the exposure via food. Alkali fused digestion followed by Ion Chromatography was used to determine the concentration of fluoride and other Hofmeister anions (chloride, phosphate and sulphate). Acid digestion followed by microwave plasma atomic emission spectroscopy was used to determine the concentration of cations (sodium, potassium, magnesium, calcium and zinc). The mean concentrations of fluoride, chloride, sulphate and phosphate in rice were 53.31, 1515.31, 2704.88 and 2799.6 mg/Kg in CKDu endemic area samples and 18.23, 1152.23, 2457.13 and 4788.5 mg/Kg in non-CKDu area. The mean concentrations of sodium, potassium, calcium, magnesium and zinc were 30.6, 1002.24, 90.07, 300.75 and 12.65 mg/Kg in CKDu endemic area and 36.89, 1509.63, 132.97, 580.78 and 18.08 mg/Kg in the non-CKDu area. Though higher levels of fluoride, chloride and sulphate were found in rice samples collected from CKDu areas compared to non-CKDu areas, chloride and sulphate levels in rice samples were not significantly different ($p>0.05$). Therefore high exposure to fluoride through food could be a possible risk factor for CKDu.

Keywords – Dietary Intake; Fluoride Accumulation; Hofmeister Effect; Rice