

Investigation of toxic metals contamination status in red raw rice (Bg 350) grown in North Central province in Sri Lanka

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Red raw rice consumption is high due to its nutritional properties. The chemical components of food are correlated with their ability to sustain better human health. Rice is the staple food of Sri Lanka. Although it is a good source of nutrients in a diet, its consumption can also lead to exposure to toxic metals due to environmental pollution. Rice is grown extensively in the North Central Province (NCP) where the prevalence of chronic kidney disease of unknown origin (CKDu) is high. This study was aimed to determine the toxic metal content such as Arsenic (As), Cadmium (Cd), and Lead (Pb) in domestically grown red raw rice in NCP and assess the risk of these values to human health. A total of 35 samples of red raw rice were obtained from farmers in NCP during Yala growing cycle in 2021 based on the eight sampling sites. As, Cd and Pb levels were analyzed by Inductively Coupled Plasma-Mass Spectrometry (ICP-MS). The potential health risk was estimated by Estimated Daily Intake (EDI). The mean Pb levels in red raw rice were higher than the FAO/WHO allowable limits (Pb-200 µg/kg) in all the selected areas except the Rambewa area. The highest mean Pb concentration was recorded in the Horowpathana area as 429.93±100.93 µg/kg. As and Cd values were within FAO/WHO allowable limits (As-200 µg/kg, Cd-400 µg/kg). The highest mean value of as was recorded in the Medirigiriya area, and it was 97.72±18.19 µg/kg. The highest Cd level was recorded in the Horowpathana area as 60.70±24.39 µg/kg. The estimated daily intake (EDI) values are also significantly lower than the Tolerable Daily Intake (TDI) (Pb-250 µg/day, Cd-62 µg/day, As-3 µg/day). Dietary exposure is the most common route through which these toxic metals enter the human body. Long term consumption of red raw rice causes to accumulate the toxic metals in body tissues and generates adverse health effects of residents in selected CKDu prevalent areas in NCP. It is suggested that further studies are needed to get a more comprehensive idea on the public health concerns of toxic metals due to red raw rice consumption in Sri Lanka.

Keywords: CKDu, Contamination, Toxic metals

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