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Varietal-Specific Assessment of Arsenic and Mercury Content and Associated Health Risks in Traditional Sri Lankan Rice**Ekanayaka E.M.S.L.¹, Perera W.M.R.¹, Karunarathna K.G.P.B.²,
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Rice (*Oryza sativa* L.) provides over 45% of Sri Lanka's caloric intake; however, concerns remain regarding trace metal contamination. This study presents a varietal-specific assessment of Arsenic (As) and Mercury (Hg) concentrations in traditional rice cultivars to determine contamination levels, identify high-risk varieties, and evaluate dietary exposure against international safety standards. Forty-four certified rice varieties from the Rice Research and Development Institute, Bathalagoda, were analyzed for As and Hg using Inductively Coupled Plasma-Mass Spectrometry (ICP-MS) following microwave-assisted acid digestion. Health risk was assessed by calculating the Estimated Daily Intake (EDI), Target Hazard Quotient (THQ), and Hazard Index (HI). Tolerable daily intake values of 2.14×10^{-3} mg kg⁻¹ bw⁻¹ day⁻¹ for As and 0.57×10^{-3} mg kg⁻¹ bw⁻¹ day⁻¹ for Hg were applied, assuming an adult body weight of 60 kg and rice intake of 300 g day⁻¹. Arsenic levels ranged from 22.5 µg/kg (Suduru Samba) to 117 µg/kg (Inginimitiya), averaging 57.0 µg/kg, but all below the 200 µg/kg safety limit. Mercury was undetectable (<LOD) in 32 varieties, while the remaining 12 contained 3.45 µg/kg (Hondarawalu) to 18.87 µg/kg (Kolikuttu), within the 20 µg/kg safety limit. The highest THQ values were 0.285 for As (Inginimitiya) and 0.166 for Hg (Kolikuttu), both below the reference threshold of one. Combined HI values ranged from 0.05 (Suduru Samba) to 0.29 (Thatu Wee), indicating no significant non-carcinogenic risk. Overall, the estimated exposure to As and Hg from the consumption of these rice varieties appears to be within acceptable limits under typical dietary intake circumstances. However, some variability in metal accumulation was observed among the different varieties. These results indicate that the traditional rice varieties examined are generally consistent with established safety guidelines for human consumption, while highlighting the importance of continued monitoring.

Keywords: *Arsenic, Mercury, ICP-MS, Traditional rice, Health risk assessment*