

Dietary exposure assessment of cadmium, arsenic, and lead in market rice from Sri Lanka

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Rice is frequently reported to be contaminated with heavy metals (HMs); thus, the human health risks from its consumption have received increasing attention. A total of 165 commercial rice samples from Sri Lanka were collected to determine their cadmium (Cd), arsenic (As), and lead (Pb) concentrations. The exposure risk for Sri Lankans from the estimated daily intakes (EDIs) of these toxicants was assessed. Simultaneously, non-carcinogenic and carcinogenic risks were evaluated using hazard quotients (HQs) and the hazard index (HI). The results revealed that the average levels of Cd, As, and Pb in commercial rice were 0.080 ± 0.130 , 0.077 ± 0.040 , and 0.031 ± 0.050 mg/kg, respectively, with ranges of 0.003–0.727, 0.019–0.217, and 0.001–0.345 mg/kg (expressed on a dry weight basis), respectively. The average EDIs of Cd, inorganic As (iAs), and Pb were 0.772, 0.490, and 0.306 $\mu\text{g}/\text{kg}$ body weight (bw)/day, respectively; these were below provisional tolerable weekly intake (PTWI) values recommended by the Joint FAO/WHO Expert Committee on Food Additives (JECFA), but iAs was above the recommended reference doses (RfDs) recommended by the United States Environmental Protection Agency (USEPA). However, approximately 25% and 75% of the Cd and iAs HQs for the Sri Lankan population, respectively, were greater than 1, suggesting a potential health risk, whereas the HQs for Pb was less than 1. Considering the additive effect, HI values of the P90, P95, P97.5, and P99 percentiles would reach 4.773, 6.458, 8.392, and 11.614, implying that intake of the combined metals might result in potential health risks.