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Carcinogenic and non-carcinogenic risk assessment of heavy metals contamination in duck eggs and meat as a warning scenario in Thailand

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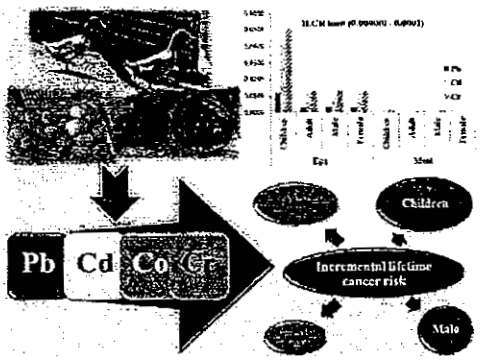
HIGHLIGHTS

- The calculated ILCR levels of Pb, Cd and Cr in duck egg and meat consumption were highest in children, adult, male and female.
- Children were more risk than adults when consuming contaminated duck eggs for Pb, Cd and Cr.
- The THQ was higher in males than females upon exposure to contaminated duck eggs.

GRAPHICAL ABSTRACT



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ABSTRACT

The aim of this study was to determine the levels of Pb, Cd, Co and Cr in duck eggs and duck meat and to assess the risk of carcinogenic and non-carcinogenic effects caused by the consumption of duck products collected in Thailand. The human health risk assessment refers to the formulation of the USEPA standard focused on Estimated Daily Intake (EDI), Incremental Lifetime Cancer Risk (ILCR), Target Hazard Quotient (THQ) and Total Target Hazard Quotient (TTHQ). Ninety-eight percent of duck egg samples in this study were contaminated with Pb, with the average level typically above the standard limit. The EDI evaluation of heavy metal in children was the highest for all metals in the eggs. The calculated ILCR levels of Pb, Cd and Cr in eggs and meat consumption were higher than 10^{-3} in children, adults, males, and females. Children were at risk when consuming contaminated duck eggs and the risk was higher than in adults by 3.9 times for Pb, Cd and Cr. This finding suggests that there is a high probability of cancer risk, particularly for children, which is higher than adults by absorption of these carcinogenic heavy metals through eggs. The calculation of THQ if consuming heavy metals contaminated duck eggs and meat in human exposure (70 years) could conclude that the THQ male was higher than the female for all metals. However, the calculations of TTHQ for Pb, Cd, Co and Cr contamination in a duck egg and meat scenario for adults, males and females were still below the standard limit of 1, which means there was no risk.

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