



HEAVY METALS AND THEIR ADVERSE EFFECTS: SOURCES, RISKS, AND STRATEGIES TO REDUCE ACCUMULATION IN TEA HERB - A SYSTEMATIC REVIEW

Masoud Kazemini¹✉, Ali Mehrabi², Ramin Khorrami¹, Maryam Rezaeifar¹, Hajar Khedmati Morasa², Razzagh Mahmoudi³✉

¹ Department of Food Hygiene and Quality Control, Faculty of Veterinary Medicine, University of Tehran, Iran

² Department of Food Hygiene and Safety, School of Public Health, Qazvin University of Medical sciences, Qazvin, Iran

³ Professor, Medical Microbiology Research Center, Qazvin University of Medical Sciences, Qazvin, Iran

✉ Masoudkazemini@gmail.com and r.mahmoudi@yahoo.com

<https://doi.org/10.34302/crpjfst/2023.15.4.3>

Article history:

Received: 6 April 2022

Accepted: 16 October 2023

Keywords:

Heavy Metal;

Tea Herb;

Ecological pollution;

Public health.

ABSTRACT

Heavy metals (HMs) such as arsenic, cadmium, chromium, lead, mercury, aluminum, iron, and barium can accumulate in tea herbs and pose health risks to consumers. This systematic review analyzes research from 2000-2022 on HM contamination in tea, associated health effects, and strategies to minimize exposure. Initial searches yielded 961 articles, with 157 selected for final review after the screening. HMs have no biological role; their toxicity depends on metal type, oxidation state, and solubility. Chronic ingestion of HM-contaminated tea can impair numerous organs and biochemical processes, potentially causing cancer, cardiovascular, neurological, reproductive, and developmental damage. Factors influencing HM levels in tea herbs include soil, air, and water contamination, proximity to pollution sources, genetic differences, brewing methods, and steeping time. Strategies to reduce HM uptake and toxicity include using cleaner irrigation water, avoiding acidic fertilizers, liming soil, and restricting tea cultivation near pollution sources. Processing methods and shorter brewing can also decrease HMs extracted into tea infusions. Ongoing research should further investigate phytoremediation and genetically engineering tea cultivars. Consuming contaminated tea poses cumulative risks, so sustainable agriculture and pollution control are vital to minimize HM exposure and protect public health. This review enhances understanding HM dynamics, toxicity, and mitigation strategies for producing safer tea.
