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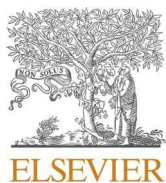
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Review

A systematic review and meta-analysis of human biomonitoring studies on exposure to environmental pollutants in Iran

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ABSTRACT

Population exposure to environmental contaminants can be precisely observed through human biomonitoring studies. The present study aimed to systematically review all the biomonitoring studies conducted in Iran on some selected carcinogen environmental pollutants. In this systematic review study, 11 carcinogen agents were selected including arsenic, cadmium, chromium, nickel, lindane, benzene, trichloroethylene (TCE), pentachlorophenol (PCP), radon-222, radium-224, - 226, - 228, and tobacco smoke. The Web of Science, PubMed, and Scopus databases were searched for peer-reviewed articles published in English. After several screening steps, data were extracted from the studies. Meta-analyses (a random-effect model using the DerSimonian-Laird method) were performed only for the biomarkers with more than three eligible articles, including cadmium in blood and breast milk, and arsenic in breast milk. Methodological quality of the studies was assessed using the Newcastle-Ottawa Quality Assessment Scale adapted for cross-sectional studies. Of the 610 articles found in the database search, 30 studies were eligible for qualitative review, and 13 were included in the meta-analysis (cadmium in blood (n = 3), cadmium in breast milk (n = 6), and arsenic in breast milk (n = 4)). The overall pooled average concentrations (95% CI) of cadmium in blood, cadmium in breast milk, and arsenic in breast milk were 0.11 (95% CI: 0.08, 0.14), 5.38 (95% CI: 3.60, 6.96), and 1.42 (95% CI: 1.02, 1.81) µg/L, respectively. These values were compared with the biomarker concentrations in other countries and health-based guideline values. This study showed that there is a need for comprehensive action plans to reduce the exposure of general population to these environmental contaminants.

1. Introduction

Population exposures to environmental contaminants take place through multiple routes including ingestion, inhalation, and dermal absorption (WHO, 2015). It is important to determine and quantify such exposures and take proper actions to control and/or prevent exposures

to harmful substances. Human biomonitoring (HBM) is a tool to measure the exposure to environmental pollutants by measuring the substance, its metabolite/markers, or reaction products in human specimens (CDC, 2019). The concentrations obtained by HBM reflect the total intake from all routes of exposure to one specific pollutant (WHO, 2015). National-level HBM studies have been conducted in developed countries

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