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Abstract

Assessment of the Chemical Hazards in Herbs consumed in Europe: Toxins, Heavy Metals, and Pesticide Residues †

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Abstract: The increasing global interest in herbs and spices necessitates a thorough examination of the chemical hazards associated with their consumption. The objective of this work was to provide an understanding of the current state and prevalence of chemical contaminants (toxins, heavy metals, and pesticide residues) in herbs and spices consumed in Europe, facilitating informed decision-making in public health and regulatory frameworks [1]. Through an extensive literature search, contamination levels of chemical hazards among different herbs and spices were evaluated. The European Rapid Alert System for Food and Feed (RASFF) has shown 1133 notifications for spices and herbs in the last 10 years (2013-2023). Focusing on the chemical hazards associated with the consumption of these products, mycotoxins (especially aflatoxins and ochratoxin A) and plant-derived compounds with potential health implications (*e.g.*, pyrrolizidine alkaloids) were the most often notified. Nevertheless, besides these naturally occurring compounds, other deliberated added substances such as artificial unauthorized dyes (*e.g.*, Sudan I, II, III and IV) that can pose a human health risk have been identified. Finally, environmental contaminants could be also present in herbs and spices. Pesticide residues (*e.g.*, chlorpyrifos, carbendazim, bifenthrin) have been notified and studies in terms of their persistence and adherence to regulatory limits and heavy metals were also investigated focusing on cadmium, lead, and mercury due to the bioaccumulation abilities of plants. Other environmental contaminants such as dioxins and dioxin-like polychlorinated biphenyls (dl-PCBs) and polycyclic aromatic hydrocarbons (PAHs) were considered for the study. In conclusion, this work contributed to identifying gaps and challenges in regulatory practices and to the dialogue on the safety and quality of herbs and spices, offering a holistic perspective on toxins, heavy metals, and pesticide residues and fostering collaboration between all stakeholders to advance in public health protection in Europe.

Keywords: herbs; toxins; heavy metals; pesticide residues; risk assessment.

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