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Health Risk Assessment of Heavy Metal Accumulation in Medicinal Plants Available in the Shiraz Consumer Market

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ABSTRACT

Introduction: In recent years, the use of medicinal herbs has grown significantly due to their perceived safety compared to synthetic drugs. However, these plants are capable of accumulating toxic heavy metals, which may enter the food chain and pose potential health risks. This study aimed to assess the levels of zinc (Zn), lead (Pb), and cadmium (Cd) in commonly consumed medicinal plants—*Matricaria chamomilla, Hyssopus officinalis, Thymus vulgaris,* and *Origanum majorana*—sold in Shiraz.

Methods: Three samples from each plant species were collected, acid-digested, and analyzed using atomic absorption spectrophotometry in triplicate. Statistical analyses were performed using SPSS software.

Results: The mean concentration of Zn ranged from 10.49 ± 0.51 mg/kg in *Thymus vulgaris* to 27.73 ± 0.86 mg/kg in *Matricaria chamomilla*. For Pb, values ranged from 8.42 ± 0.43 mg/kg in *Origanum majorana* to 12.23 ± 0.45 mg/kg in *Matricaria chamomilla*. Cd levels ranged from 2.93 ± 0.19 mg/kg in *Matricaria chamomilla* to 23.2 ± 0.24 mg/kg in *Thymus vulgaris*.

Conclusion: Health risk index (HRI) values for all samples were below 1, suggesting no immediate health threat. However, compared to World Health Organization (WHO) standards, Zn levels were within acceptable limits in all samples, while Cd exceeded the permissible threshold in every sample. Additionally, Pb concentrations in *Thymus vulgaris* and *Matricaria chamomilla* surpassed WHO limits. Based on these findings, cautious and regulated consumption of these herbs is recommended to mitigate potential health risks.

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