

Spices as a source of lead exposure: a market-basket survey in Sri Lanka

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Summary

We performed a laboratory analysis of spices sold in Sri Lanka for lead content. Samples of curry powder, chilli powder and turmeric powder from seven provinces, collected using the market basket survey method, underwent atomic absorption spectrometry. Blanks and standards were utilised for instrument calibration and measurement accuracy. The results were validated in two different laboratories. All samples were found to have lead levels below the US Food and Drug Administration's action level of 0.5 µg/g. Spices sold in Sri Lanka contain lead concentrations that are low and within the stipulated safety standards.

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Introduction

Sri Lanka is famed for its long tradition of exporting exotic, high quality spices. This survey was undertaken following case reports of spices imported from India causing lead intoxication in children and adults living in the United States of America (USA) [1]. Vigilance against paediatric lead exposure is important and was recently reiterated by the Center for Disease Control and Prevention in USA which lowered the blood lead level of concern to 5µg/dl [2]. Chronic exposure of children to even small amounts of lead affects intelligence [3,4]. Spices are now considered a potential non-paint, non-petrol source of lead poisoning within apparently lead safe home environments [5,6]. The objective of the study was to determine lead content in spices commonly used in Sri Lankan cuisine.

Methods

Three commonly used spices sold in local markets (curry powder, turmeric powder, and chilli powder) were analysed for concentrations of lead. Samples were collected using market-basket survey method from 14 randomly selected districts, representing seven of nine

provinces in Sri Lanka. Spices manufactured in Sri Lanka and sold as commercially packed products or unpacked were purchased from retail stores in each district. A specific brand was included only once. Samples were labeled with numerical identifiers and sent for analysis to the Department of Chemistry, University of Colombo and Institute of Chemistry Rajagiriyia. Acid digestion of the samples in a lead-free vessel produced an analytical solution, and the lead concentrations were measured by atomic absorption spectrophotometry. Blanks and standards were utilised for instrument calibration. The analytical method was validated and sample measurement accuracy confirmed in two laboratories.

Results

The samples were collected from 14 districts in Central, Western, Southern, Eastern, Northern, North Central and Sabaragamuwa provinces. All samples collected from local markets were found to have lead concentrations well below the USA Food and Drug Administration's action level of 0.5 µg/g. Maximum concentration detected was 0.087µg/g in chilli powder (mean 0.083 µg/g) (Table 1). All values obtained were less than half the concentration stipulated as the safety limit.

Discussion

The presence of heavy metals in spices has been reported from several geographical locations [6,7,8]. Contamination may occur accidentally through contaminated irrigation water and fertilizer or deliberately when weight and colour are deceptively enhanced for profit.

Daily exposure to low levels of lead through food additives can result in chronic dosing and is of particular concern because recent literature report significant reduction in the safe paediatric blood lead level. Spices imported from India were reported to be the cause of toxic levels in blood in children and adults in the USA [1].

Market basket survey was the sample collection method we utilised. This methodology enables systematic study of food items consumed in the community for assessment of food availability, cost and quality at individual household, community or national levels [8, 9].

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Table 1. Mean concentration and range of lead (Pb) in spices purchased in 14 districts in Sri Lanka

Product	Number of samples	Mean lead level ($\mu\text{g/g}$)	Range
Chilli powder	24	0.083	0.044 - 0.087
Turmeric	24	0.026	0.007 - 0.040
Curry powder	16	0.038	0.029 - 0.042

We found spices sold in Sri Lanka to contain very low concentrations of lead. Detected lead levels were well below the stipulated Codex Standard for spices ($0.3\mu\text{g/g}$) and the USA's Food and Drug Administration's action level ($0.5\mu\text{g/g}$) [6,10]. We concluded that spices sold in Sri Lanka are not contaminated with lead. Although these results are reassuring, all varieties of spice sold in Sri Lanka were not included in this market basket survey. Therefore we recommend more studies and periodic screening to ensure the safety of Sri Lankan spices.

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