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Occupational exposure to potentially toxic elements in home-based and informal workers

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Abstract

BACKGROUND AND AIM: Biological matrices, such as blood, can be used to monitor occupational exposure to potentially toxic elements (PTEs). This research intended to evaluate the PTEs exposure in informal outsourced workers from Limeira-SP, Brazil, who perform jewelry soldering in the home environment. **METHODS:** Sixty-six individuals from the exposed group (informal workers and families) and 49 controls (without occupational chemical exposure) were included. As, Mn, Ni, Cd, Sb, Sn, Cu, Zn, Pb, and Hg concentrations in blood was determined by inductively coupled plasma mass spectrometry. Health information was collected using a questionnaire. **RESULTS:** Most participants were adults (53.9%), all those were female aged 19 to 62 years, and children and adolescents (1-18 years old) were 50.9% male and 49.1% female. No significant differences were found between the groups for smoking, exercise, medication consumption, educational level, and skin color variables ($p < 0.05$). Alcohol consumption ($p = 0.02$; 60% of the exposed workers reported consuming alcohol) and time residing in the region ($p = 0.0005$; 80.6% of the exposed group lived in the region for more than 15 years) were statistically significant variables. Among the health responses, only the symptom of shortness of breath showed a statistically significant difference between the groups ($p = 0.004$;

88.9% of the exposed participants reported experiencing shortness of breath frequently).

Although we did not have observed differences for respiratory diseases, 40.9% of the

participants reported having bronchitis, asthma, or upper respiratory tract infection. Blood PTEs concentrations proved to be higher in the exposure group for As (0.44 $\mu\text{g L}^{-1}$), Cd (0.21 $\mu\text{g L}^{-1}$) and Pb (1.88 $\mu\text{g L}^{-1}$) compared to controls (As=0.35 $\mu\text{g L}^{-1}$, Cd=0.01 $\mu\text{g L}^{-1}$, Pb=1.04 $\mu\text{g L}^{-1}$).

CONCLUSIONS:The workers and relatives constitute a particular risk group because of the home environment with uncontrolled occupational activity. The higher concentrations of PTEs in exposed population raises a concern and may impact health outcomes. Funded by FAPESP (#2018/18391-0; #2017/25424-9; #2017/20752-8). **KEYWORDS:** Biomonitoring, Occupational Exposure, Toxic Elements, Informality, Health



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