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Title: The influence of outdoor air pollution on cadmium exposure assessment: a cross-sectional population-based Italian study

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Text:
Background and aims: Cadmium (Cd) poses serious environmental health hazards to humans. Cigarette smoking and diet are usually main sources of exposure in non-occupationally exposed subjects, while non-ferrous metal industrial production, fossil fuel combustion, cement production and waste incineration are main anthropogenic sources of outdoor air Cd. The study aim was to assess the influence of outdoor air pollution on serum Cd levels in an Italian population.
Methods: Outdoor exposure to particulate matter≤10μm (PM10) from motorized traffic was assessed for fifty residents randomly-selected from Modena municipality. We geocoded their residence and modeled the corresponding ambient air PM10 concentration using the CAlifornia LINE Source Dispersion Model version 4 (CALINE-4) as a proxy of environmental air Cd level. We compared these estimates with serum Cd, measured with inductively coupled plasma mass spectrometry. Information on smoking habits and Cd dietary intake were collected with a semi-quantitative food frequency questionnaire. We determined with both crude and multivariate linear regression models the influence of outdoor PM10 levels, smoking and dietary Cd intake on serum Cd, computing β-coefficients and their 95% confidence interval (CI).
Results: Median values (25th–75th) for serum and dietary Cd were 40.60 ng/l (30.05–53.50) and 13.36 μg/die (10.45–16.77). Crude β-coefficients for PM10, dietary Cd and smoking on serum Cd levels were 0.617 (95% CI -0.194–1.428, P=0.133), 0.026 (-0.827–0.829, P=0.952) and 6.962 (-0.022–13.945, P=0.051), respectively. Adjusted values were 0.463 (-0.365–1.292, P=0.266), -0.036 (-0.866–0.793, P=0.930) and 6.057 (-1.175–13.289, P=0.099), respectively.
Conclusions: In our population, the most important factor influencing Cd serum content appears to be cigarette smoking, followed by outdoor air pollution (measured by PM10 levels) and lastly diet, possibly for the limitations of dietary assessment methodology. In addition, other unmeasured factors could have influenced serum Cd content, such as a slow release from liver and kidney due to antecedent long-term exposure.