

LEVELS OF LEAD AND MERCURY IN BREAST MILK IN SEVEN CHINESE CITIES AND THEIR RELATIONSHIP TO FAMILY FACTORS

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Backgrounds and Aims Although breast milk remains the best source of nutrition for infants, it may represent a potential source of toxicant exposure and a concern for public health, especially in developing countries. The purpose of this study is to investigate the levels of lead and mercury in breast milk in postpartum women in seven cities of China and to explore related determinants.

Methods National surveys were conducted between October and December, 2008 in seven cities in China. A total of 1600 questionnaires were handed out with a response rate of 83.4%. About 10 mL breast milk was obtained from each mother at about 9:00 am 3 to 5 days after delivery. Breast milk samples were fully digested using a microwave protocol and then were analyzed by inductively coupled plasma mass spectrometer (ICP-MS) for lead, zinc (and other trace metals), and by a Direct Mercury Analyzer (DMA80) for mercury.

Results The concentrations of lead varied significantly by region, with overall P25, P50 and P75 values of 2.92•g/L, 5.11•g/L, and 9.14•g/L respectively, and the highest lead concentrations in Xiamen (median 8.76•g/L). Mercury levels also varied by region, with overall P25, P50 and P75 values of 0.87•g/L, 1.65•g/L, and 3.18•g/L respectively, and the highest levels in Guangzhou (median 3.99•g/L). Results of multivariable linear regression showed that lower educational attainment of fathers (P=0.01), active smoking status of mothers (P=0.00) was associated with a higher level of lead in breast milk. Factors associated with a higher mercury concentration in breast milk included the use of kitchen ventilator (P=0.03), pet bites or scratch injury during pregnancy (P=0.00), higher consumption of fish (P=0.04) and use of milk powder (P=0.02). Zinc concentrations were lower among those with less education (high school or less).

Conclusions Using microwave digestion-ICP-MS could determine the concentration of multiple elements with minimal samples of breast milk, making it ideal for population surveillance and large sample epidemiological surveys. In general, concentrations of lead and mercury, as well as the nutritional elements iron, selenium, zinc and copper, were within the acceptable range in breast milk in China. The significant regional variances in lead and mercury concentrations between the seven cities reflected different exposure levels, and most risk factors for higher levels were related to family factors.

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