

Hidden Threats: Lead Poisoning From Unusual Sources

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ABBREVIATIONS. BLL, blood lead level; CDC, Centers for Disease Control and Prevention; CPSC, US Consumer Product Safety Commission.

It has been estimated that 890 000 children in the United States have blood lead levels (BLLs) of $10 \mu\text{g}/\text{dL}$, currently defined as a level of concern by the Centers for Disease Control and Prevention (CDC).¹ The proportion of US children aged 1 to 5 years with BLLs $\geq 10 \mu\text{g}/\text{dL}$ has decreased from 88.2% during the period from 1976 through 1980, to 4.4% during the period from 1991 through 1994.² Although several risk factors have been identified, lead-based paint is currently the most important source of lead exposure for children in the United States.² As screening, education, and abatement programs result in decreased numbers of persons with lead poisoning, health care providers must remain alert for new or unusual sources of potential exposure in children.

CASE REPORTS

Case 1

A 2-year-old child was noted to have a BLL of $43 \mu\text{g}/\text{dL}$ on screening during a routine well-child examination. A physical examination was normal and the history indicated no obvious risk factors for lead poisoning. The health department thoroughly investigated all settings frequented by the child, and identified no potential sources of lead exposure to which the child had access. The child's mother, however, suspected the cause was a necklace that had been given to him approximately 10 weeks earlier. He had worn it on 3 days, and was noted to have the beads in his mouth frequently when wearing the necklace. The necklace had 5 metallic cubes stamped with letters on a string. It had been imported from China and had been purchased at a large chain department store. The necklace was removed from the child, and approximately 3 weeks later the child's BLL had dropped to $24 \mu\text{g}/\text{dL}$ without specific treatment.

A bead from the child's necklace was tested and found to have 20 200 mg/kg of lead. For comparison, US Consumer Product Safety Commission (CPSC) regulations require paint to contain $< 600 \text{ mg}/\text{kg}$ of lead. Subsequently, several other imported necklaces were tested, and found to have levels of lead as high as 62 000 mg/kg. The CPSC was notified.

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Case 2

An 11-month-old child was found to have a BLL of $43 \mu\text{g}/\text{dL}$ on routine screening. Evaluation of the home identified no obvious source of exposure to lead. Discussion with the parents revealed that they had applied "surma" to the child's eyes daily for 5 months to "strengthen them." Surma is a fine powder that resembles mascara. It is applied to the conjunctival surface of the eyelid for cosmetic or medicinal purposes in many Asian countries.³ It had been brought from India by the child's grandmother. Testing of the powder applied to this child's eyes found it to be 25% lead by weight (252 000 mg/kg). Application of the material was discontinued, and the child's BLL dropped to $23 \mu\text{g}/\text{dL}$ within 8 weeks.

DISCUSSION

Over the past 2 decades, mean BLLs in children in the United States have dropped substantially.⁴ Concurrently, evidence of the adverse health effects of low-level lead exposure has accumulated and the BLL considered a matter of concern by the CDC has been lowered to $10 \mu\text{g}/\text{dL}$.² At present, the principal sources of lead exposure for children in the United States are paint dust, soil, and water.⁵ Although these well recognized sources of lead exposure are being eliminated, new or more obscure sources may continue to provide risk and should be suspected in cases of lead poisoning.

Although children often put necklaces in their mouths, oral contact with children's jewelry has not, to our knowledge, previously been implicated as a source of lead intoxication. Subsequent to this case, public health authorities in Utah identified a 9-year-old child with a BLL of $18 \mu\text{g}/\text{dL}$ and no identified source of lead exposure other than frequent mouthing of a similar imported necklace (personal communication, Ronald Marsden, Utah Department of Health, December 10, 1998). In 1994 the United States imported \$569 million worth of costume jewelry, with China, South Korea, and Taiwan being the leading suppliers.⁶ In this case, the CPSC did not take regulatory action because the necklace in question had not been intended for use by children in an age group likely to mouth jewelry. The CPSC did request manufacturers to voluntarily remove unnecessary lead from such products. It is important that physicians report previously unsuspected sources of lead poisoning to their local health departments so that such information can be forwarded to the CPSC and other agencies as appropriate.

Surma has been used in Asia for medical and cosmetic purposes for centuries. The name derives from an Urdu word for antimony, although this major constituent has recently been replaced with

TABLE 1. Some Potential Unusual* or Unexpected Sources of Lead Toxicity

Material	Source	Use	Reference
Folk medicines			
Azarcon, greta	Mexico	Medication for gastrointestinal symptoms	7,8
Paylooah	Southeast Asia	Medication for fever, rash	8
Surma, kohl, kajal	India, Pakistan, other Asian and Middle Eastern countries	Medicinal or decorative cosmetic for eye, skin	3,7–9
Ghasard, bala goli, kandu	India	Medication for gastrointestinal symptoms	7
Teething powder (Saoott, Cebagin)	Saudi Arabia	Pain reliever	11
Folk remedy of powdered rock	United Arab Emirates	Relief of colic	11
Calcium supplements from bonemeal, dolomite	United States	Dietary supplement	12
Flour	West Bank, Israel	Food product contaminated during milling	13
Candy	Mexico	Food, packaged in lead-containing ceramic jar	14
Lozeena	Iraq	Food coloring, orange powder	14
Pottery	Various	Storing food or water before consumption	15,16
Metal urns/kettles	Various	Boiling water before consumption	11
Retained pellets after gunshot	Various	Accidental exposure	17
Ingestion of lead foreign bodies (fishing sinkers, clothing accessories, bullets, curtain weights, etc.)	Various	Items not intended for consumption	18

* The most common sources of lead exposure include lead-containing paint, soil/dust, leaded gasoline, plumbing leachate (water), occupational exposure, and hobbies using lead-containing materials.

lead sulfide.³ Surma (also called kohl in the Indian subcontinent and in the Middle East) can be a powder, gel, or liquid.⁷ There have been several reports linking surma to “cosmetic plumbism” in other countries, but few in the United States.^{3,7–9} Surma is used by adults as well as children of both sexes. Importation of surma for sale is illegal in the United States, although it may still be brought in by persons returning from pilgrimages to Saudi Arabia or visits to their countries of origin.¹⁰ Studies suggest that use of lead-containing eye cosmetics remains common among persons of Asian and Middle Eastern origin.^{3,7,10} Given the large number of ethnic groups present in this country, it is not unexpected that instances of exposure to folk remedies and imported or homemade medicines, foods, or cosmetics might lead to lead poisoning.

Table 1 lists some unusual sources of lead toxicity that have been reported in the medical literature.^{7–9,11–18} Anecdotal reports have also identified sources such as imported or antique children’s toys, antique furniture, and imported salves applied to a mother’s breast before breastfeeding.

The 2 cases reported here were discovered as a result of routine screening. As practitioners move away from universal screening and toward more selective testing, it will become increasingly important to take thorough histories from patients regarding potential risk factors and signs and symptoms of plumbism, to identify persons who would benefit from testing.

These episodes serve as examples of the importance of thorough investigation of any cases of lead poisoning. Investigation should be directed toward identifying a likely source of exposure, to which a patient had sufficient access to explain the intoxication. One study documented that after detailed investigation, the source of exposure was not iden-

tified in 18% of infants and 9% of toddlers with lead intoxication.¹⁹ In such cases, special attention should be given to the possibility of unusual or previously unrecognized sources of lead exposure, including inquiry about exposure to imported lead-containing products. All potential sources of exposure should be identified and removed, with close follow-up to ensure that a patient is responding appropriately to interventions. If a patient does not respond as expected to removal of an identified source of lead exposure, other potentially less obvious sources must be expeditiously investigated.

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