Environmental Health Perspectives
Vol. 89, pp. 79-84, 1990

The Cultural Parameters of Lead Poisoning: A Medical Anthropologist's View of Intervention in Environmental Lead Exposure

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This article identifies four culturally shaped sources of lead exposure in human societies: modern and historic technological sources; food habits; culturally defined health beliefs; and beauty practices. Examples of these potential sources of lead poisoning are presented from current cultures. They include the use of lead-glazed cooking pottery in Mexican-American households; folk medical use of lead in Hispanic, Arabic, South Asian, Chinese, and Hmong communities; as well as the use of lead as a cosmetic in the Near East, Southeast Asia, and South Asia. Four interacting cultural conditions that create barriers to the reduction of lead exposure and lead poisoning are identified and discussed. These are knowledge deficiencies, communication resistance, cultural reinterpretations, and incongruity of explanatory models.

Introduction: Elements of Culture

Health, illness, and environmental risks always take place within an overall human cultural context. Culture is the mechanism human groups use to interpret, interact with, and to modify their surroundings. In many cases, being culturally correct is more important and a more powerful stimulus for behavior than being correct in any universal or scientific sense.

No two human cultures view reality in identical ways, nor do they interpret illness or hazards from the same perspective. The consequence of this human diversity is that cultural beliefs and culturally associated behavior become important variables in the recognition and control of environmental hazards such as lead poisoning.

Culturally Related Sources of Lead Poisoning

The cultural milieu of a particular society sculptures the types of hazards to which individuals will be exposed as a consequence of their beliefs, technological adaptations, and general social considerations. For the purposes of this article, the most important sources of lead exposure lie in the areas of subsistence, food habits, health, and beauty.

Subsistence: Technological Basis for Cultural Survival

We have created a complex interlocked technology in our culture. Coupled with people's demand for a high standard of living, technology causes individuals to be exposed to hazards due to their occupation, the environment in which they live, or improper use of cultural artifacts. Subsistence-related cases of lead poisoning come from environmental sources such as lead paint in homes, living near smelters, soil contaminated by the fumes from leaded gasoline near roadways, and from direct or indirect occupational exposure to lead (*1,2*).

Instead of duplicating information to be covered in excellent detail in other papers, this paper will neglect these subsistence-based problems in order to more closely explore other cultural parameters of lead poisoning; the areas where lead poisoning occurs due to beliefs and behaviors outside the boundaries of technological exposure. This is an area where the sources of lead poisoning are extremely insidious because they are unexpected. They lie hidden behind curtains of cultural differences in a pluralistic society such as our own.

Food Habits: We Are What We Eat

One cultural source of lead poisoning, from ancient times to the present, is the human process of food consumption; not merely eating, but doing so within a broad social context. No other area of human behavior is more pervasive. A considerable portion of our cultural identity revolves around significant foods and the social processes associated with eating and drinking.

Thus, an important source of exposure is to eat food or drink beverages that have high lead content from contamination during food growth or processing prior to consumption (*1,3*). A second source is high lead content vessels and utensils used to prepare food or beverages for consumption. Exposure ranges from accidental poisoning from lead-glazed

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ceramic vessels to the deliberate use of lead containers for cooking, fermenting, or food storage (*4,5*).

Lead glaze and the use of lead containers is not a new hazard. Ancient civilizations may have fallen due to widespread chronic lead exposure. Lead poisoning may have contributed to the degeneration of the Roman Empire. Their practice of boiling grape juice in lead pots to enhance the color of wines, as well as storing and curing beverages in lead-lined containers, may have caused serious problems for their society (*6,7*). And lead poisoning may also have contributed to a decline of the British upper class during the eighteenth and nineteenth centuries. Their heavy consumption of Port wine has been shown to have induced high blood lead concentrations in part of that population (*6,8*).

Similar problems exist today. Research on two lead-based folk remedies described below (*8,9*) produced the discovery that the primary commercial use for one remedy was as glaze for the most common utility earthenwares used on the U.S.-Mexico border. This pottery is used to cook several of the staples in the Mexican-American diet, including pinto beans, rice, and meat. This conjunction of medicinal and food use for the same substance suggested that research should be done on the pottery itself, as well as the remedy.

There are two types of traditional pots in common use in the border area. One is called a *jarro*. These are tall cylindrical pots with a bulb-shaped bottom. They are generally unglazed, yellow-brown ware on the outside. The inside is glazed and normally a yellow to yellow-brown in color. The glazing compound is lead oxide (PbO), called *greta*. The second style of pot is called a *casuela*. It is a covered pot that is wider at the base than the top, and glazed inside and out. Most casuelas are decorated with floral patterns in several colors, because they are not only used for cooking, but for serving food as well. Greta is the primary component of the glaze for this pottery as well.

A sample of this utility pottery was drawn from the most popular markets in a large Mexican border town to examine the pottery as a possible source of lead contamination. The pots were selected from each of three market areas, using a table of random numbers. The procedure used to test the pots was to wash them with dilute alkaline detergent, rinse with distilled water, fill them with 6% acetic acid (and record the volume), cover with plastic film, and let stand at room temperature for 18 hr. The lead levels were determined by atomic absorption and reported as micrograms per milliliter (ppm). A total of 36 pots were tested. The lowest lead reading was 0.33 μg Pb/mL, and the highest was 3620 μg Pb/mL. The analytical results are presented in Table 1.

Given the high concentrations of lead produced by this pottery, an ethnographic survey was conducted in the Lower Rio Grande Valley to help determine the risk this type of utility ware represented in Texas border communities. We asked every third patient to answer a questionnaire in either Spanish or English. The interviews were conducted by bilingual clinic staff throughout the day and on the same day at three clinic sites in the Lower Rio Grande Valley of Texas. The female head of household was asked if jarros or casuelas were used at home for any purpose, and if so, to explain that purpose. This survey should be considered a convenience, rather than a random sample, but similar findings from other related research in the area suggests that this technique is sufficiently representative of the region to warrant serious attention.

Table 1. Lead concentrations derived from Mexican utility pottery.[a]

Pot number	μg Pb/mL	Pot number	μg Pb/mL
1	969	19	1490
2	391	20	483
3	248	21	36
4	905	22	83
5	3620	23	22
6	0.33	24	66
7	124	25	42
8	129	26	100
9	796	27	2.44
10	1420	28	1.58
11	980	29	2.51
12	553	30	1.37
13	387	31	350
14	138	32	1300
15	60	33	2510
16	1.93	34	575
17	1240	35	940
18	1.23	36	160

[a]The analysis of lead content was performed by The Texas Department of Health, Bureau of Laboratories, at the request of Patrick Farley, Department of Internal Medicine, El Paso, TX. Date reported was 7-10-84.

The survey results indicated that about 27% of the households surveyed used jarros purchased in Mexico, while 37% used casuelas. The primary uses of the pots were for cooking beans and rice, storing water in the refrigerator, cooking soups, browning meat, and cooking Mexican-style squash. Almost everyone interviewed was actively aware that the pots were a potential source of lead poisoning.

People have developed methods for choosing pots and testing them to see if they are "safe" in order to overcome the lead hazard. Ethnographic interviews, conducted prior to beginning the tests reported above, were used to identify these selection criteria, so the pots tested were ones that might actually have been chosen for use in Mexican-American households. Bad pots are not taken home.

If you want to buy a safe and useful jarro or casuela, you tap the pot and listen to the sound it makes. A dull sound means that it is broken. You also smell the pot. A "bad" smell means that you should not buy it. Informants were not able to describe a pot that smelled wrong and did not have any examples available for me to smell or test. They suggested taking someone along who had experience in this type of selection, to help find the right pot. Finally, you look for bubbles in the glaze. If they exist, then you do not buy the pot because the bubbles will break during cooking and get into the food.

Several informants recommended a final test, after you bring the pot home. Fill the pot with vinegar and let it stand for a day or two. Some said that following this procedure made the pot safe, because this took all the extra lead out. Others said if you get a white residue in the bottom of the pot, you should throw it away and get a new one, because it has too much lead in it.

Each of the pots we tested was inspected for discolora-

tion, or any other visible change suggested by the ethnographic interviews. The test concentration was similar enough to the acetic acid concentration in the vinegar our informants would have used to make the comparison worthwhile.

Twelve of the 36 pots tested showed definite discoloration in the glaze. The test results for these pots ranged from a low of 129 μg Pb/mL to a high of 3620 μg Pb/mL. No low-lead pots were found in the discolored group. Unfortunately, many pots that produced very high lead concentrations did not show any discoloration either. Five pots were found in the nondiscolored group that produced lead concentrations ranging from 20 to 99 μg Pb/mL, and 10 pots that ranged from 100 to 1240 μg Pb/mL. These high concentration vessels represent nearly one-half of the pots tested. So, at best, the folk testing routine reduces the risk somewhat, but not to any acceptable level.

Additional ethnographic interviews were conducted to see if anything else was done to the pots prior to their use. Informants identified a variety of processes used to cure the pots. The most common methods included boiling lime (calcium carbonate) in the pot and letting it sit for two or three days; boiling rice in the pot; boiling water in the pot (and repeating the process until the water no longer has a strong smell); boiling beans in the pot (the first two batches often come out black, and you should keep boiling beans until they do not turn black); smearing oil or grease in the pot and heating it like you would an iron skillet; or crushing garlic, smearing it in the pot, and leaving it out in the sun for a day. It is unclear if these processes actually reduce the risk from the lead, but it certainly reduced the fear of risk. Nearly everyone swore by one method or another as a solution to the lead problem in Mexican pottery.

The pot is considered ready to use for cooking after one or more of these procedures are carried out. The popularity of the pots stems from the taste of the beans, rice, and other food cooked in them. My informants stated that they could always tell the difference between the flavor of food cooked in traditional pots and food cooked in modern pots and pans. They stated that the traditionally cooked food was always tastier and had more zest to it. From our informants' perspective, that improvement in flavor made the problems with the pots worth dealing with, and overcame their concern about using them. This type of attitude is very common in virtually all cultures and forms one of the hidden barriers to the reduction of lead poisoning from cultural sources.

Health Benefits As Sources of Lead Poisoning

Concepts of health and the treatment of illnesses vary widely between cultures. Both traditional folk medicine and modern medicine contain knowledge and effective treatments for common illnesses. And both fail to have an effective cure for some conditions, such as the common cold, AIDS, and many degenerative diseases. Human groups have tested a wide variety of substances—animal, vegetable, and mineral—in the process of discovering cures. Folk-discovered pharmaceuticals are in use today in both folk remedies and modern medicines, including such widely used substances as reserpine, ephedrine, or digitalis. Lead, along with other toxic metals, has a long history as a folk medicine (*11*).

On the other hand, the medicinal use of lead is not merely a historic artifact. It is currently administered in U.S. Mexican-American communities and in Mexico (*9,10,12–14*) as a treatment for a folk illness. The initial discovery of this problem was made through a public health inquiry on lead oxides being used as folk remedies in Mexican-American households in California and Colorado (*10,11*). It was subsequently discovered that both lead oxide (greta), and lead tetroxide (called *azarcon*) were linked to the treatment of the folk illness *empacho (9,10)*. Empacho is a blockage of the intestine thought to be caused by eating the wrong food at the wrong time, or by forcing children to eat food they do not like. A survey determined that this folk disease was being treated in anywhere between 25 and 96% of the households in Texas, New Mexico, and Arizona, in addition to instances reported in California and Colorado. The survey was conducted in 31 different locations in those states, and the most common percentage of households treating empacho was between 40 to 50% (*9*).

In many cases, greta and azarcon are being used only as treatments for particularly persistent cases of the illness. But they are used with sufficient frequency to create problems on a long-term basis, since the belief in these substances as remedies is ubiquitous. The survey indicates that approximately 20% of the households treating empacho used greta or azarcon as one of the treatments, and estimated that as much as 10% of the children in the households may have been exposed to episodic lead poisoning from this source (*9*).

The use of greta and azarcon in the United States and Mexico (*9,15*) is alarming, but by no means unique. The medicinal use of lead is not limited to New World or to Hispanic populations. A lead-based folk remedy was recently discovered in use among Hmong refugees in Minnesota and traced back to widespread use in Southeast Asia (*16*) for colds, flu, and other ailments. Lead is also currently used as a medicinal substance in Arabic countries to aid children with teething, as an astringent rubbed on the umbilicus of newborns and inhaled (*17–19*); used in traditional African medicine, primarily as a cosmetic (*20*); and in parts of Asia as an astringent (*21*).

Nor is lead the only toxic metal in use. Arsenic is taken in South America to treat, among other ailments, a folk illness called *susto*, the "fright illness" (*22*). The research on empacho treatments in the United States uncovered the use of elemental mercury and laundry bluing (some forms of which contain aniline dye), in addition to greta and azarcon (*9,23*). And it is highly likely that there are other instances we have not uncovered, simply because we have not looked.

One interesting and consistent fact evolved from this cross-cultural review of medicinally based lead exposure. Toxic metals are frequently used to treat gastrointestinal disorders or to protect against infection, as is the case of lead compounds applied to the umbilical cord as part of birth or neonatal rituals in parts of the Near East and Asia (*17,19*). This area of inquiry deserves further effort on the part of

researchers and might provide a direction for identifying the use of lead compounds in other cultures.

Beauty Aids As a Source of Lead Poisoning

The concept of beauty is common to all human cultures, but the expression of that concept is very much a factor of the specific tastes in a particular group. In most cultures, natural beauty is enhanced through the use of clothing, jewelry, and cosmetics. Humans have been using plant and earth pigments to enhance beauty throughout much of the world's prehistoric record and that practice remains very much in evidence today.

Lead compounds are among the substances that were, and still are, used to improve the attractiveness of both adults and children. Middle Eastern, Asian, and Nigerian cosmetics, called *surma, kohl,* and *Tiro,* have been identified as sources for elevated blood levels in children (*20,21,24*). They are applied around the child or adult's eyes to emphasize the beauty of that feature. In the case of children, the pigment is fairly often transferred to the fingers, and consequently to the mouth as children suck their fingers, causing the reported elevated blood lead levels. While most of the research on this subject has focused on the Middle East and Asia, many other human groups use earth-based cosmetics. This potential source of heavy metal poisoning deserves further investigation.

Sources of Resistance to Reducing Cultural Vectors of Lead Poisoning

The persistence of these four cultural vectors of episodic poisoning and elevated blood lead levels suggests a need to expand education and intervention efforts on the consequences of lead poisoning. However, the culturally imbedded nature of these sources of lead poisoning also demands an expanded understanding of barriers that the socio-cultural context creates for any attempt at resolution. As culture plays a significant factor in causing lead poisoning, it also plays an equally important role in raising barriers to problem solution. These barriers are virtually impassable if improperly approached and can provide strong support mechanisms for success if appropriately considered.

There are four general areas of resistance to dealing with cultural sources of lead poisoning in human groups. Two are pan-cultural. These are knowledge deficiencies and communication resistance. In the first case, problems are created by what people do not know; in the second, they are created by the fact that people refuse to acknowledge problems exist. The exact nature of the other two barriers is dependent on the configurations of specific cultures. One is the bicultural mixing of beliefs, knowledge, and behavior (cultural reinterpretation). The other is the incongruity of explanatory models of health and illness that exists between any two cultures. All four of these factors are in effect at the same time in a pluralistic society such as the United States. This makes the situation very complex.

Knowledge Deficiency

Everyone participates differentially in their own culture. This produces a wide disparity of knowledge and experience within any society. Thus, intracultural variation must be accommodated in any attempt at health education and disease prevention.

The simplest form of knowledge deficit is the need to socialize new members of a culture. Children and newcomers are not expected to know everything, but they are expected to diligently learn all of the important components of their culture. Any significant health education effort on lead poisoning must direct at least one component at childhood audiences, or culturally unexposed audiences to help transfer the appropriate knowledge to the next generation.

More complex knowledge deficits exist in adult populations. People often lack knowledge about their culture and environment due to differential exposure, rather than willful misunderstanding or refusal to learn. Any significant lead education effort must have a component that reaches those people who have a key knowledge deficit through their lack of experience with a particular aspect of their own culture. The crux of the problem is identifying who is most likely to need to know the information but does not have adequate access to it.

Communication Resistance

"Communication resistance" labels the broadest category of problems that afflict health education and cultural issues in health care delivery. Resistance is used in this context in a manner analogous to electrical resistance to the flow of energy. Some resistance is built into the channels of communication humans normally use, while other resistance is caused by the nature of the system and the way it is constructed. Problems in this category range through a spectrum from linguistic to psycho-social barriers. One type of communication resistance is the inability of people to hear or understand information due to differences in language both within and between cultures. At the other end of the spectrum, communication resistance is the willful process of not listening to, refusing to understand, or unwillingness to believe information that is available to the individual.

Linguistically based communication resistance occurs when people have the same social languages, but have different languages about health and illness, and different experience bases for interpreting medical problems. An example of this is when a patient is confused by "medical talk" and wants an explanation in "plain English." This barrier can be overcome by adequate skills in nontechnical transfer of health information through the medium of the common language of a particular cultural group.

A more extreme form of communication resistance occurs when the educator or care giver has a social and a technical language that is unintelligible to their patient. This condition necessitates competent translation of both language and concepts between two cultural systems, or health care is reduced to the level of veterinary medicine practiced on human beings without adequate translation and transfer.

A third form of communication resistance has only recently

begun to be recognized. It is psycho-socially based resistance to information. It is a refusal to hear information, rather than the linguistic inability to understand it. The linguistic elements of communication resistance are passively created by cultural training and availability of knowledge. The psycho-social is a willful process at the individual level. People refuse to hear or understand because accepting the communication would demand a change in behavior that the individual does not want to make. Individuals who refuse to hear that cigarettes are bad for your health, that high blood pressure is deadly, or that lead ingested as a folk remedy will cause problems are all examples of this type of communication resistance. Psycho-social resistance demands a very different approach to environmental health education from purely linguistic problems, if it is to be overcome.

Cultural Reinterpretations: Mixing of Beliefs, Knowledge, and Behavior

Information is subject to reinterpretation when it moves between cultures or crosses important boundaries within a culture. A good example of reinterpretation arose during my research on greta and azarcon. I was talking with one informant, who ran an herb shop in Reynosa, Mexico. The shop stocked about 800 remedies, including greta. It was patronized by people from both the U.S. and Mexico buying hundreds of home remedies each week. This man clearly indicated that he knew the greta he sold contained high levels of lead. So I asked if he knew that lead was harmful. His reply was unexpected. He said that he knew that lead was poisonous for some people and that the Anglos were particularly susceptible to its effects, which must be why we were making so much noise about greta that it was hurting his business. He went on to say that while lead was harmful to Anglos, it was not harmful to his people. He said that Mexicanos had used it for so many generations that they had adapted to it. They could take high doses and not be harmed in the same way that people who had not evolved this resistance would be harmed. Therefore it remained a good medicine for Mexicanos.

It became obvious from further discussions with this man that he had read popular accounts of adaptation and natural selection and had used that knowledge to reinterpret the hazards of lead poisoning from greta and azarcon. The fact that lead poisoning is so frequently asymptomatic and the consequences often hard to distinguish from other common health problems probably combined with the natural resistance of cultural traditions to externally induced modification to build my informant's view of the situation. His perspective was certainly not unique. It was shared by a number of his clients, who came in and were asked by this individual to corroborate his perspective once the interview was concluded.

More than simple education is necessary to overcome the problems caused by this and other types of reinterpretation of information. It is necessary to take the elements of the interpretation and tie them into other cultural assumptions to show the need for modification of belief, but also to tie the new belief into existing cultural knowledge. The medical anthropology and international health literature contain excellent examples of how this process can be used to change health practices in various groups.

Incongruity of Explanatory Models

Arthur Klineman coined the phrase "explanatory model" to describe the interrelated set of beliefs, explanations, and behaviors a particular culture holds in relation to any given illness episode (*25*). It is common for different segments of a culture to hold competing models and even more common for explanatory model competition to exist between cultures.

For example, my grandmother and many of her contemporaries explained the common cold differently from our family physician. She believed colds were caused by getting your feet wet on a cold and windy day. The exposure reduced your resistance, and if you did not take preventive measures, you were sure to get sick. Sometimes you got sick even when you used preventive measures. I spent a significant portion of my first 6 years with large globs of Vicks smeared on my chest, covered with a large piece of flannel cloth. And I was sometimes confined to bed, with at least 20 blankets piled on top. Several of my friends, on the other hand, consumed hundreds of gallons of chicken soup during the same time period. Their parents held to an explanatory model with a different cultural history than my family when it came to cures for colds. All of our parents and grandparents appeared to respect our doctors' advice to stay in bed and drink lots of liquids, but believed their own cures were more suitable for faster relief of the problem.

The simultaneous use of competing health models is common around the world today and must be understood if cross-cultural health education is to be effective. Unless investigated and identified, competing explanatory models will inevitably cause persistent and often hidden environmental health consequences. Jane Lin Fu has pointed out (personal communications) that the traditionally made 1000-year-old eggs that are used in some Chinese households to cure colds contain very high lead concentrations as an active ingredient in the cure. This model is in direct competition with the one that she herself has promoted in relation to the consequences of lead consumption by children. The anthropological literature is replete with descriptions of culture-bound health models such as this one, as well as social and spiritual beliefs about the cause and cure of illnesses. Explanatory models are embedded in people's beliefs about the nature or reality. Unless competing models are known, it will be difficult to modify them, should such a modification be necessary. The most dangerous assumption in a multicultural health arena is that everyone thinks in the same way and believes the same thing.

In a complex society, such as the United States, all four of these cultural barriers are in effect at the same time and interact to make the situation more complicated. Figure 1 summarizes that interaction.

Knowledge deficiency can increase communication resistance and can be a factor that causes the reinterpretation of elements either within or between cultures. Communica-

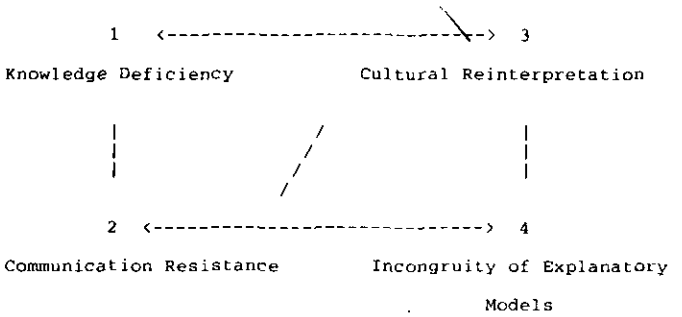

FIGURE 1. Interactions among cultural barriers to health education.

tion resistance can exacerbate problems in knowledge deficiency, lead to bicultural reinterpretations, and may help maintain incongruity between explanatory models. Reinterpretation can result in differing models, be exacerbated by communication resistance, and lead directly to persistent knowledge deficit. The only pair of processes that do not interact directly are knowledge deficiency and incongruity of explanatory models. Incongruity of explanatory models is caused by people knowing a model and following its beliefs and behaviors, not by lack of knowledge. Where models differ, interference with health care delivery is based on an active use of cultural information. Knowledge deficit can only be measured in relation to the knowledge that exists in a particular culture, not against the total knowledge that exists in the world. Otherwise, our own knowledge would be woefully deficient about thousands of beliefs and behaviors that exist around the world but are not a part of our cultural repertoire. To call this lack of information "knowledge deficit" would be ethnocentric in the extreme for any culture.

Summary and Conclusions

The widespread and frequently hidden nature of cultural sources of lead poisoning, coupled with the associated barriers to eliminating these problems, suggest that a complete eradication of environmental sources of lead intoxication will not eliminate the risk of lead to people's health. Solutions to the problems lead poses to modern society will have to take into account cultural practices in not only subsistence, but also food habits, health models, and culturally defined cosmetics. Intervention programs will have to be developed within the context of a system that overcomes knowledge deficits, communication resistance, cultural reinterpretations, and competing explanatory models. There are many vectors for the reintroduction of lead exposure from cultural sources, even if a virtually complete removal of environmental sources of lead poisoning could be accomplished. Resolution of the lead problem is possible, but must be approached as a process rather than an end condition.

REFERENCES

1. Mahaffey, K. R. Sources of lead in the urban environment. Am J. Public Health 73 (12): 1357–1358 (1983).
2. Landrigan, P. J. Occupational and community exposures to toxic metals: lead, cadmium, mercury, and arsenic. W. J. Med. 137: 531–539 (1982).
3. Hershko, O., Abrahamov, A., Moreb, J., Hersh, M., Shiffman, R., Sahin, A., Richter, E. D., Konijn, A. M., Weissenberg, E., Graver, F., Avni, A., Shahin, S., Eisenberg, A., and Yafe, Y. Lead poisoning in a West Bank Arab village. Arch. Intern. Med. 144: 1969–1973 (1984).
4. Klein, M., Namer, R., Harpur, E., and Corbin, R. Earthenware containers: source of lead poisoning. N. Engl. J. Med. 283(13): 669–672 (1970).
5. Natelson, E. A., and Fred, H. L. Lead poisoning from cocktail glasses. J. Med. Assoc. 236(22): 2527 (1976).
6. Nriagu, O. Saturnine gout among Roman aristocrats. N. Engl. Med. 308(11): 660–663 (1983).
7. Gilfillan, S. C. Lead poisoning and the fall of Rome. J. Occup. Med. 7: 53–60 (1965).
8. Ball, G. V. Two epidemics of gout. Bull. Hist. Med. 45: 401–408 (1971).
9. Trotter, R. T. II, Ackerman, A., Rodman, D., Martinez, D., and Sorvillo, F. Azarcon and greta: ethnomedical solution to an epidemiological mystery. Med. Anthropol. Quart. 14(3): 3,18 (1983).
10. Trotter, R. T. II Greta and azarcon: a survey of episodic lead poisoning from a folk remedy. Hum. Organ. 44: 64–72 (1985).
11. McNeil, J. R., and Reinhard, M. C. Lead poisoning from home remedies. Clin. Pediatr. 6(3): 150–156 (1967).
12. Vasishtha, K. K., Agee, B., Fannin, S., James, S., Martinez, A., Ramirez, G., Tilsen, S., Batt, D. B., and Luke, M. Use of lead tetroxide as a folk remedy for gastrointestinal illness. Morbid. Mortal. Weekly Rep. 30(43): 546–547 (1981).
13. Ackerman, A., Cronin, E., Rodman, D., Horan, K., Hammond, K., Aldaz, L., Keilner, R., Oumette, D., Dunn, W., Martinez, A., and Chin, J. Lead poisoning from lead tetroxide used as a folk remedy—Colorado. Morbid. Mortal. Weekly Rep. 30(52): 647–648 (1982).
14. Bose, A., Vashistha, K., and O'Loughlin, B. J. Aracon por empacho: another cause of lead toxicity. Pediatrics 72(1): 106–108 (1983).
15. Baer, R. D., and Ackerman, A. Toxic Mexican folk remedies for the treatment of empacho: the case of azarcon, greta, and albayalde. J. Ethnopharmacol. 24: 31–39 (1988).
16. Levitt, C., Duvall, K., Godes, J., Dean, A. G., Roberts, J., and Egenberger, J. Folk remedy-associated lead poisoning in Hmong children—Minnesota. Morbid. Mortal. Weekly Rep. 32(42): 555–556 (1983).
17. Fernando, N. P., Healy, M. A., Aslam, M., Davis, S. S. and Hussein, A. Lead poisoning and traditional practices: the consequences for world health. A study in Kuwait. Pub. Health (London) 95: 250–260 (1981).
18. Stone, R. M., and Ghulmiyyah, M. Traditional Healing and Lead Poisoning in the Eastern Province, Saudi Arabia (unpublished manuscript). Folklore Department, Indiana University and Al-Hasa Support Services Unit, Health Education, Saudi Arabia.
19. Abdullah, M. A. Lead poisoning among children in Saudi Arabia. J. Trop. Med. Hyg. 87: 67–70 (1984).
20. Healy, M. A., Aslam, M., and Bamgboye, O. A. Traditional medicine and lead containing preparations in Nigeria. Public Health (London) 98(1): 26–32 (1984).
21. Aslam, M., Davis, S. S., and Healy, M. A. Heavy metals and some Asian medicines and cosmetics. Public Health 93: 274 (1979).
22. Baer, R. D., and Ackerman. A. Arsenic as a home remedy: treatment of susto in Western South America. Social Pharmacol. 2(1): 37–49 (1988).
23. Geffner, M. E., and Sandler, A. Oral metallic mercury. A folk medicine remedy for gastroenteritis. Clin. Pediatr. 19: 435–437 (1980).
24. Ali, A. R., Smales, O. R. C., and Aslam, M. Surma and lead poisoning. Br. Med. J. 2: 915 (1978).
25. Klineman, A. Patients and Healers in the Context of Culture. University of California Press, Berkeley, CA, 1980.