



Mini Review

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Lead (Pb): Health Effects and Assailable Populations

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Lead (Pb) an Environmental Pollutant

Lead is a soft, dull silver-grey metal found in galena mineral ore made up of lead sulfide and can be in combination with copper, zinc, and silver. This 37th most abundant metal is hazardous and affects humans and the environment. It is a widespread and persistent contaminant found in many occupational and environmental sources (Table 1) [1-7]. Environmental lead can be found in various forms, including metallic lead, lead salts, and organic lead-containing carbon [8]. Exposure to lead can cause illness that has catastrophic consequences on the human body. While the use of lead has been limited to a level in developed nations but in developing countries like Pakistan, it continues to be used vigorously. Lead has unique physical and chemical characteristics that make it ideal for many uses. People have taken advantage of the historical period and therefore become a frequent contaminant of the environment [9,10].

Environmental Sources of Lead and Risk Factors for Exposure

- a. Household paints containing lead (Pb) Especially prevalent in housing Pakistan properties Solvent-based paints (which are extensively used in Pakistan) Glass window making (Stained).
- b. Toy jewelry, old toys (especially the recycled ones that may include lead and lead-based paints).
- c. Household dust (which may be due to decay of lead-based paint), renovating old houses.
- d. Water: Tanks polluted with Lead, e.g., from roofs and wastes.
- e. Early houses containing lead pipes or valves containing lead that leak directly in water (In Pakistan, plumbing pipes were not replaced by reticulated water systems).
- f. Soil (Mining and industrial activities, decay, and removal of lead-based paints).
- g. Machines: Certain devices containing lead-based parts, e.g., car radiators, batteries, and recycled parts.
- h. Cosmetics: All lip products, i.e., Lipsticks and numerous externally applied cosmetics, including eye shadows, blushes, mascaras, foundations, compact powder, shaving creams, body lotions, face masks, and shampoos.
- i. Ammunition: supplying bullets and shells.
- j. Manufacturing of fishing sinkers.
- k. Traditional medicines: Ayurvedic remedies, traditional Chinese medicines, herbal compound products
- l. Stored Food: Lead contamination may be at the workplace and environment where foods are stored.
- m. Glazed pottery making and its use.
- n. Metal recycling.
- o. Pica: Eating disorder when one or more non-food objects like ice, mud, paper, ash, or dirt are obsessively taken up by a human.
- p. Computer screen sheets for radiation protection.

Health Effects Associated with Lead Exposure

Lead is well-documented for its toxicity. Lead affects to different degrees all organs and bodily processes. This metal is thought to have no favorable properties in the human body. On the other hand, it can harm every system in the human body, particularly the renal, neurological, reproductive, and hematopoietic systems. Lead exposure has been linked to various behavioral, biochemical, and physiological problems. The frequency and severity of the symptoms among exposed persons depend on exposure time and route (Table 2). highlights several of the significant health consequences caused by lead [7,11-15].

Neurological Effects

- a. Impaired concentration
- b. Peripheral neuropathy
- c. Seizures
- d. Encephalopathy
- e. Hearing loss
- f. Fatigue/Irritability
- g. Cognitive impairment
- h. Brain injury
- i. Central nervous system and brain development in children
- j. Attention-deficit/hyperactivity disorder (ADHD) in children
- k. Reduced intelligence
- l. Peripheral nerve damage

Gastrointestinal Effects

- a. Colic/Abdominal pain
- b. Constipation
- c. Dyspepsia
- d. Nausea
- e. Burton's line

Renal Effects

- a. Hypertension
- b. Chronic kidney disease with tubular damage Reproductive effects
- c. Reduced sperm count and motility
- d. Miscarriages/stillbirths

- e. Abnormal sperm
- f. Reduced fetal growth and lower birth weight

Heme Synthesis

- a. Anemia
- b. Elevation of erythrocyte protoporphyrin
- c. Inhibition of d-aminolevulinic acid dehydratase (ALAD)
- d. Inhibition of ferrochelatase (FECH)

Lead Effects and Assailable Populations:

Lead toxicity is a well-known environmental health issue affecting all populations, especially children and pregnant women. Exposure to lead in children is hazardous. Children under age six are at high risk of lead exposure. Furthermore, lead exposure can have various effects on a child's development and behavior. Many of the impacts are long-lasting. Blood lead levels of 10 g/dL or less are connected with increased behavioral impacts, impairment in hearing, cognitive function, puberty delays, and postnatal growth effects. Blood lead levels of less than 5 g/dL have been linked to adverse health consequences. Such consequences may include lower IQ and academic success and increased behavioral difficulties and attention-related behaviors [16,17].

Lead can harm maternal and child health in various ways; developing fetuses and nursing babies may be more sensitive. Lead can be passed on from a woman to her unborn child. The good news is that lead poisoning can be avoided. Now is the moment to protect your child against lead poisoning. Lead in the bones of a pregnant woman exposed to lead for an extended period or who has had high lead levels in her blood before can be released into the bloodstream during pregnancy. Lead levels in a woman's blood are likely to increase during pregnancy. Any time a pregnant woman is exposed to lead, her baby is also at risk. As a result of elevated blood levels of lead during pregnancy, miscarriage risk increases. The baby will be born too early or too tiny because of it. The baby's brain, kidneys, and nervous system will be damaged, inducing learning or behavioral issues in the kid. (CDC, 2010) (CDC, 2021).

Concluding Remarks

Because of its stability at polluted sites and the intricacy of the mechanism in biological toxicity, lead is one of the most prevalent heavy metals, and its toxic effects cause environmental and health concerns. The lead (Pb) health hazard effects affect men, women, and children. In response to the adverse effects of lead on the environment and humans, various researchers conducted the lead-related study described above in the literature review.

References

1. (2019) World Health Organization (WHO) Lead poisoning and health. Fact Sheet.
2. Lebrón A M W, Torres I R, Valencia E, Dominguez M L, Garcia Sanchez D G (2019) The state of public health lead policies: Implications for urban health inequities and recommendations for health equity. *Int J Environ Res Public Health* 16(6): 1-28.
3. Lead in cosmetics
4. Lead Toys
5. Ahangar H, Karimdoost A, Salimi A, Akhgari M, Phillips S, et al. (2021) Environmental assessment of pediatric Lead exposure in Tehran; a prospective cross-sectional study. *BMC Public Health* 21(1): 1437.
6. (2021) Diseases Lead absorption notification levels have reduced. 1-7.
7. Briffa J, Sinagra E, Blundell R (2020) Heavy metal pollution in the environment and their toxicological effects on humans. *Heliyon* 6(9): e04691.
8. Assi MA, Hezmee MNM, Haron AW, Sabri MYM, Rajion MA (2016) The detrimental effects of lead on human and animal health *Vet World* 9(6): 660-671.
9. Khalid I S, Brosché S (2017) Pakistan lead in Solvent-Based Paints for Home use in Pakistan.
10. Wani AL, Ara A, Usmani JA (2015) Lead toxicity: A review. *Interdiscip Toxicol* 8(2): 55-64.
11. Begovic V, Nozic D, Kupresanin S, Tarabar D (2008) Extreme gastric dilation caused by chronic lead poisoning: A case report. *World J Gastroenterol* 14(16): 2599-2601.
12. Nakhaee S, Amirabadizadeh A, Brent J, Mehrpour O (2019) Impact of chronic lead exposure on liver and kidney function and haematologic parameters. *Basic Clin Pharmacol Toxicol* 124(5): 621-628.
13. Hu H, Téllez Rojo MM, Bellinger D, Smith D, Ettinger AS, et al. (2006) Fetal lead exposure at each stage of pregnancy as a predictor of infant mental development. *Environ. Health Perspect* 114(11): 1730-1735.
14. ASTDR
15. Gomes M da M, Quinhones MS, Engelhardt E, Lerner RM, Andrés A, et al. (2013) We are Intech Open, the world's leading publisher of Open Access books Built by scientists, for scientists TOP 1%. Intech 15, 13.
16. (2020) Zealand, I.N. Lead absorption notifications. 1-16.
17. Markowitz M (2021) Lead poisoning: An update. *Pediatr Rev* 42(6): 302-313.