ISSN 2348-375X

Unique Journal of Engineering and Advanced Sciences

Available online: www.ujconline.net

Research Article

IMPACT OF LEAD POISONING IN HUMAN: A SURVEY

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Received: 08-01-2016; Revised: 06-02-2016; Accepted: 04-03-2016

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ABSTRACT

Lead is a recent ecological metal that is conferred everyplace and lead poisoning is a vital health issue in several countries within the world. Medical analysis has shown that Lead (Pb) metal could be extremely harmful element to human. The exposure to metallic element Pb can cause severe physiological or neurologic effects even at low level, especially for youngsters. In kids, the foremost vulnerable population, mental development of children health effects is of the greatest influence. This review presents a summary of the origins and transport pathways of Pb in the surroundings.

Keywords: Lead, Lead Poisoning, Toxicity of Lead Poisoning, Pollution.

INTRODUCTION

Lead is one type of metal found in the earth, and it is harmful poison. For years, lead was utilized in paint, gasoline, plumbing and plenty of alternative things. Lead will still be found in some merchandise sold-out nowadays[1]. As these items are used or get exhausted, the lead they contain will spread. Lead Poisoning could be a form of metal poisoning and a medical condition in humans and alternative vertebrates caused by raised levels of the significant metal lead within the body. Lead interferes with a range of body processes and is harmful to several organs and tissues including heart, bones, kidneys, and reproductive systems. It interferes with the development of the system and is thus significantly toxic to youngsters, inflicting probably permanent learning and behavior disorders.

Routes of exposure to lead embrace contaminated air, water, soil, food, and client product. Occupational exposure could be a common explanation for sickness in adults. Consistent with estimates created by the National Institute of Occupational Safety and Health (NIOSH), Moreover three million employees within the US are probably exposed to lead within the geographic point[2,5]. One in every of the biggest threats to children is lead paint that exists in many of the homes, particularly older ones; so youngsters in older housing with chip paint or lead mud from transportable window frames with lead paint are at bigger risk. Interference of lead exposure will vary from individual efforts (e.g., removing lead-containing things like piping or blinds from the home) to nationwide policies (e.g., laws that ban lead in merchandise, cut back allowable levels in water or soil, or give for cleanup and mitigation of contaminated soil, etc.)

Signs and Symptoms of Lead Poisoning

Lead poisoning will cause a range of symptoms and signs that vary betting on the individual and therefore the period of lead exposure[3,4]. Symptoms typically develop over weeks to months as lead builds up within the body throughout a chronic exposure; however acute symptoms from transient, intense exposures additionally occur. Symptoms could also be totally different in adults and children; the main symptoms in adults are headache, weight loss, abdominal pain, loss, kidney, male procreative issues, and weakness, pain, or tingling within the extremities, confusion, headache, anemia, irritability, and in severe cases seizures, coma, fast pulse rate, irritability, restlessness, problem in sleeping, headache, reduced memory, depression, fatigue, abdominal pain, diarrhea, Nausea, vomiting, impotence and menstrual disturbances (Figure 1).

Sources of Lead Exposure

The sources of lead exposure vary among countries. Industrial lead exposure is a crucial health issue and mine employees, workers of paint factories, employees of repetition centers, drivers, and tile creating factories are in higher risk of lead toxicity. The most sources of Lead exposures are Lead paint and drinking water[8].

Lead paint is a primary supply of lead exposure and also the major supply of lead toxicity in kids. The U.S. Department of Housing and Urban Development presently estimates that thirty eight million homes within the US contain lead paint. Of

those, twenty four million are thought of to contain important lead-based paint hazards, as well as deteriorating paint and/or contaminated dust or soil outside the house. As lead paint deteriorates and airborne lead settles, it contaminates dust and soil. Exposure to soil that contains particulate lead has been shown to be considerably venturesome for kids, who are unremarkably exposed by intake of house dirt or soil than by paint chips. Blood lead levels are a lot of closely associated with indoor mud exposure than to out of doors soil exposure.

There are several places during a home that might place babies and kids in peril of lead poisoning. Lead paint was employed in several homes engineered before 1978. The older the houses, probably those windows, cupboards, doors, porches, and out of doors surfaces contain lead paint. Kids are most frequently poisoned by lead dirt and lead paint in older homes. Lead dirt will come back from heavy areas with lead paint, gap and shutting windows, and through traditional wear and tear of painted areas. Lead dirt falls to the ground and gets on children's hands and toys. It enters their bodies once they place their hands or toys into their mouths (Figure 2).

Drinking water is additionally a significant supply of lead exposure, calculable to be to blame for around 20 % of the entire daily exposure practiced by the majority of the U.S. population. The 1986 amendments to the federal Safe Drinking Water Act banned the utilization of lead solder and leaded pipes from public water system systems. Leaded plumbing parts still employed in colleges and childcare centers, however, and cause a major contribution to lead in drinking water in these buildings.

The water quality testing facility believed that leaded brass fixtures within the new systems might have contributed to guide contamination within the water. Lead contamination of municipal water provides could also be associate under-reported downside. There are probably several public water provides during this country wherever water is not being tested, or if it is tested wherever the data is not promptly or totally communicated to shoppers, and wherever applicable actions are not being taken.

Different merchandise manufactured with soft vinyl, specifically children's lunchboxes, is found to contain over 90 times the legal limit for lead in paint. Herbal remedies from India, China, and different elements of Asia could also be potential sources of lead exposure. Certain Ayurvedic herbal products factory-made in South Asia were found to be contaminated with lead starting from 5-37,000 µg/g[9].

Workers in bound occupations also are exposed to high levels of lead. Lead exposure happens throughout the manufacture of ammunition, batteries, sheet lead, some brass and bronze plumbing, ceramic glazes, caulking, radiation shields, circuit boards, military instrumentation, blood vessel pumps, craniates monitors, solder, and a few surgical instrumentation. Construction employees are glorious to possess a high risk for lead exposure. Lead is in some children's jewellery and charms, and recent painted toys and furnishings. Avoid using merchandise that might have lead in them. Lead has been found in some ancient medication, herbs, spices, and cosmetics from different countries[5-8]. Be further careful with jobs or hobbies that involve operating with lead, like building restoration, plumbing, glass work, or victimization lead bullets, lead fishing sinkers, some craft paint, some forms of pottery glaze, and lead solder (Figure 3).

Toxicology of Lead

Lead is exclusive in this synthetic sources contribute nearly only to exposure within the post-industrial era. Kids with lead dirt or soil dirt exposure will have blood lead levels as high as 90µg/dL. Bone levels in pre-industrial skeletal remains indicate that current body lead burdens are 500-1,000 times bigger than in people with pre-industrial exposure to lead[13].

Lead exposure happens mainly through the metabolic process and gastrointestinal (GI) tracts. Around 30-40 % of indrawn lead is absorbed into the blood. Gastrointestinal absorption varies counting on organic process standing and age. Iron is believed to impair lead uptake within the gut, whereas iron deficiency is related to augmented blood lead concentrations in kids. Calcium supplementation studies demonstrate that augmented dietary calcium in animals, infants, and kids lead to consistent decreases within the absorption of lead.

Increased in-takes of metal, phosphate, alcohol, and dietary fat have conjointly been shown to decrease duct absorption of lead. GI absorption of lead is greatest in infancy; infants will absorb up to 50% of lead eaten from food, water, contaminated dirt, or soil, whereas adults absorb solely 10-15%. Inorganic lead (food, water, paint, toys, and vinyl products) is minimally absorbed through the skin, however tetraethyl-or alkyl-lead (leaded gasoline), that remains legally allowed in craft, watercraft, and farm machinery, is well absorbed through the skin.

Toxic Effects of Lead in Finger Nails of Human

Interestingly, the fingernails speak lots regarding the general health. Healthy nails have a homogenous coloring and appear smooth. As time passes and individual ages, the nails might become a bit a lot of brittle and should develop vertical ridges. Typically, there is nothing to fret regarding as a result of this can be a harmless incidence. If you happen to note some spots caused by some injury on your nails, this could grow out while not inflicting any additional problem.

The abnormalities that may occur on the nails need a more in-depth look. The nail separation, discoloration and spots will be a silent sign of infections, viral warts, and medications because the ones used for chemotherapy[11,14]. The lead affected person's nail sounds like the subsequent condition: Yellow Nail Syndrome, White Nails, Green Nails, White Dots, bluish Nails, Chewed Nails, Nail Beading or Vertical Ridging, Nail Pitting, Dark Lines below the Nail, Nail symptom, Spoon formed Nails, Cracked or Split Nails, very little Brown Streaks, Rippled Nails, Nail Ridges.

Blood Lead Levels in Children & Adults: Screening, Toxicity, and Treatment

The toxicity level of the Lead affects the central nerve system and peripheral nerve systems, renal perform, and the system. To determine the quantity of lead in the body, a blood sample is taken. Blood lead levels are measured in micrograms per deciliter (µg/dL)[10,15]. As levels increase, an additional severe symptom is also determined. Chelation is one possibility for treatment of considerably elevated levels. Table 1 show that the Blood lead level and result on youngsters. Patients with

high blood lead levels might present with severe, wild pain, motor clumsiness, clouded consciousness, weakness, and paralysis. Lead has adverse effects on each male and female reproduction[12].

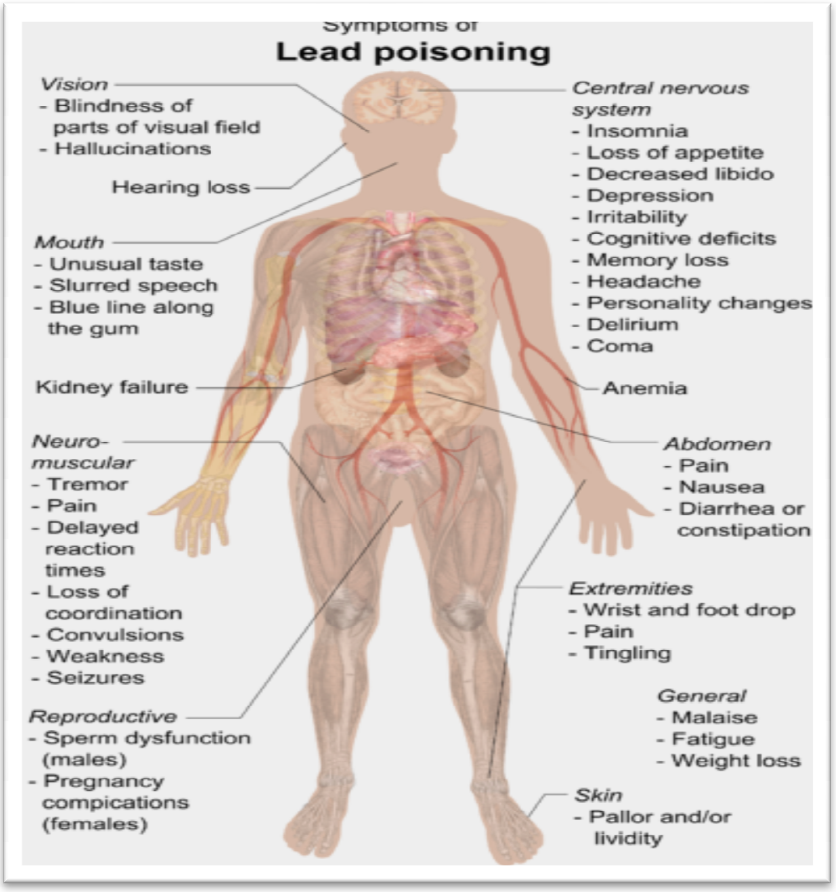

Figure 1: Symptoms of Lead Poisoning
****Image Courtesy of [Wikipedia] at https://en.wikipedia.org/wiki/Lead_poisoning#Classification**

Figure 2: Lead Paint

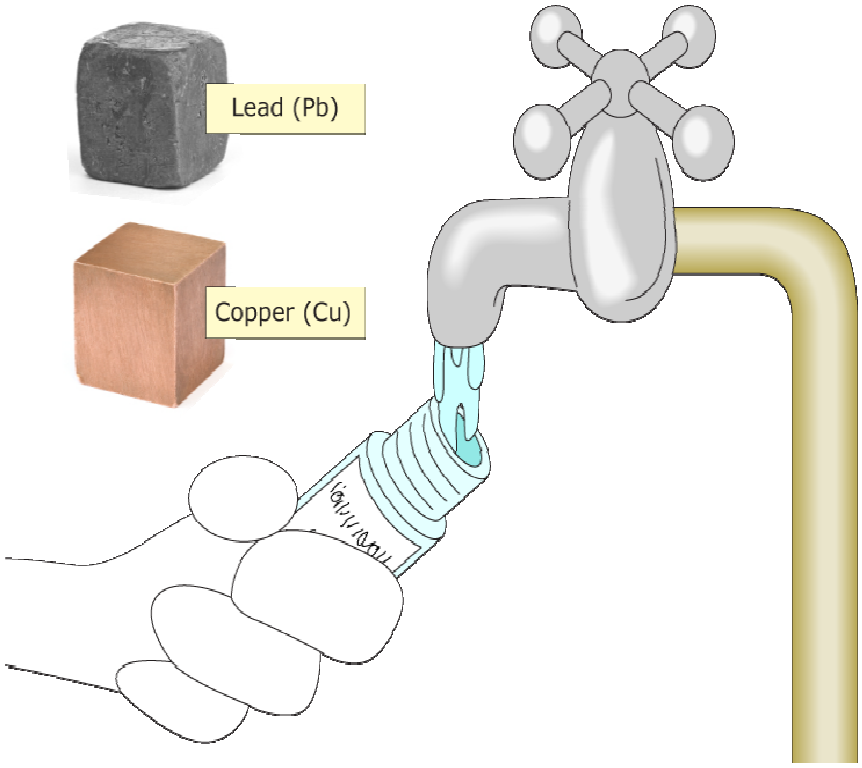

Figure 3: Drinking Water affected by Lead
****Image Courtesy of [Lead Poisoning & Lead-Safe Rules from the EPA] at http://www.hometipsforwomen.com/lead-poisoning-lead-safe-rules-epa &**

Figure 4: Lead affected Fingernails of Human
****Image Courtesy of [Healthy Life Land, The Land Of Healthy Life] at http://www.healthylifeland.com/what-fingernail-abnormalities-say-about-your-health/**

Table 1: Blood Levels & that Effect on Children

Blood Lead Level (ug/dl)	Effect on Children
>380	Convulsions, coma, & death
100-150	Encephalopathy
>70	Anemia with acute poisoning
>40	Decrease hemoglobin synthesis
>20	Delayed nerve conduction
>10	Slow cognitive and behavioral development
<10	Stunt bone growth as a consequence of decreased Vitamin D metabolism

****Image Courtesy of [United Nations System, Standing Committee on Nutrition] at www.unsystem.org0**

Understanding Lead Toxicity & Prevention Techniques

Ultimately, preventing childhood lead poisoning could need removing the lead in an exceedingly child's surroundings. This can be the simplest way to forestall lead poisoning, and it is very important for kids who already are poisoned. In adults about 80-95 % of preserved lead is hold on within the bone, whereas in kids about 70 % is hold on in bone, leading to additional soft tissue lead in kids compared to adults[16-18]. Lead is hold on in bone for extended periods of time, with half-life estimates of 20-30 years. Even with the bone turnover that happens in childhood and adolescence, there is proof to counsel that by the seventh decade of life; more than one-third of bone mass contains lead no heritable in childhood and adolescence. Owing to Infobahn slow turnover and unharnessed of lead from bone, lead in bone seems to extend considerably with age.

Bone lead will contribute to elevated blood lead levels long when the exposure no longer exists. Things that increase bone turnover, like maternity, lactation, postmenopausal osteoporosis, thyrotoxicosis, and cisplatin therapy, are shown to extend blood lead levels as results of the mobilization of bone stores. Bone lead is additionally promptly transferred to the fetal skeleton throughout maternity. By using Digital Image Processing with computational algorithms, the Lead components can be easily separated. Especially using Adaptive Neuro Fuzzy Interference System algorithm with image process, the effective output will be achieved[20-29].

Lead poisoning can often be prevented by steps such as the following:

- Give your children foods high in calcium and iron and low in fat.
- To help reduce hand-to-mouth transfer of contaminated dust or soil, wash your children's hands after outdoor play, before eating and at bedtime. And wash their toys regularly.
- Regular meals and good nutrition may help lower lead absorption. Children especially need enough calcium and iron in their diets.
- Avoid using containers, cookware, or tableware to store or cook foods or liquids that are not shown to be lead free.
- If you have older plumbing containing lead pipes or fittings, run your cold water for at least a minute before using. Don't use hot tap water to make baby formula or for cooking.
- Don't scrape, sand, or burn painted wood.
- At least twice a week, mop floors and wipe windowsills and other surfaces on which children might chew. Use a solution of powdered dishwasher detergent in warm water.
- Have household tap water tested to find out if it contains lead.
- Use water only from the cold-water tap for drinking, cooking, and making baby formula. Water from the hot-water tap tends to contain higher levels of lead.

CONCLUSION

Nowadays, Lead is becoming very harmful one to the children and youngsters. In this review paper, we reviewed about the signs and symptoms of lead poisoning, sources of lead exposure, and toxicology effects of lead in human finger nails. Due to the presence of Pb in multiple sources, the sources responsible for lead pollution may be difficult to identify. The table shows that, the toxicity level of lead and blood lead levels of the lead poisoned people. Adults and children should take care of their health from the lead poisoning.

REFERENCES

1. Lyn Patrick et al., Lead Toxicity, A Review of the Literature.Part I: Exposure, Evaluation, and Treatment, Alternative Medicine Review u Volume 11, Number 1 u 2006
2. Brannvall et al., The Medieval Metal Industry Was the Cradle of Modern Large-Scale Atmospheric Lead Pollution in Northern Europe, Environ. Sci. Technol. 1999; 33: 4391-4395
3. Flora et al., Toxicity of lead:A review with recent updates, Interdiscip Toxicol. 2012; 5(2): 47–58.
4. Hernberg et al., "Lead Poisoning in a Historical Perspective", American Journal of Industrial Medicine, 2000; 38: 244-254.
5. Renberg I et al., "Stable lead isotopes and lake sediments—a useful combination for the study of atmospheric lead pollution history", The Science of the Total Environment, 2002; 292: 45–54
6. Bollhofer et al., Isotopic source signatures for atmospheric lead: The Northern Hemisphere, Geochimica et Cosmochimica Acta, 2001; 65(11): 1727–1740.
7. Karen et al., Mediaeval Lead Pollution in the River Ouse at York, England", Journal of Archaeological Science, 1999; 26: 809–819.
8. Karrari et al., A systematic review on status of lead pollutionand toxicity in Iran; Guidance for preventive measures, DARU Journal of Pharmaceutical Sciences 2012; 20: 2.
9. Kosnett, M.J. "Lead". In Olson, K.R. Poisoning and Drug Overdose (5th ed.). McGraw-Hill Professional. p. 2006.
10. Cheng et al., "Lead (Pb) isotopic fingerprinting and its applications in lead pollution studies in China: A review", Environmental Pollution, 2010; 158: 1134–1146.
11. Vojtech Ettler et al., "ICP-MS measurements of lead isotopic ratios in soils heavily contaminated by lead smelting: tracing the sources of pollution", Anal Bioanal Chem, 2004; 378: 311–317.
12. Xiaolin I et al. Atmospheric lead pollution in fine particulate matter in Shanghai, China. Journal of Environmental Sciences, 2009; 21.8: 1118-1124.
13. Merrill, JC, Morton, JJP.; Soileau, SD. "Metals". In Hayes, A.W. Principles and Methods of Toxicology (5th ed.) 2007. CRC Press.
14. Casarett, LJ; Klaassen, CD; Doull, J, ed. (2007). "Toxic effects of metals". Casarett and Doull's Toxicology: The Basic Science of Poisons (7th ed.). McGraw-Hill Professional, 2007.

15. Kosnett, MJ. Heavy metal intoxication and chelators. In Katzung, B.G. Basic and Clinical Pharmacology. McGraw-Hill Professional, 2007.
16. Trevor, AJ, Katzung BG. Masters SB, ed.. "Heavy metals". Katzung & Trevor's Pharmacology: Examination & Board Review (8th ed.). McGraw-Hill Professional, 2007..
17. Chisolm JJ. "Lead poisoning". In Crocetti, M.; Barone, M.A.; Oski, F.A. Oski's Essential Pediatrics (2nd ed.). Lippincott Williams & Wilkins, 2004.
18. Salvato JA. Nemerow NL. Agardy FJ., ed. Noninfectious and noncommunicable diseases and conditions associated with the environment, including air, water, and food. Environmental Engineering (5th ed.). John Wiley and Sons, 2003.
19. Jamcey VP et al. Hessian Analysis in Multiscale Brain Tumor Segmentation." Unique Journal of Engineering and Advanced Sciences, 2014; 2: 2.
20. Dinsha D., et al. "Breast Tumor Segmentation and Classification using SVM and Bayesian from Thermogram Images." Unique Journal of Engineering and Advanced Sciences, 2014; 2: 2.
21. Manikandaprabu N., Pavithra S, and Thilagamani VN. Data Hiding in Color Images." International Journal of Novel Research in Engineering & Pharmaceutical Sciences, 2014; 1: 5.
22. Manikandaprabu N., Thilagamani VN, and Pavithra S. FPGA Implementation of Image Optimization Algorithms-A Review. International Journal of Novel Research in Engineering & Pharmaceutical Sciences, 2014; 1: 5.
23. Manikandaprabu N., et al. "Human Authentication using Retinal Blood Vessels-A Modified Approach." Unique Journal of Engineering and Advanced Sciences, 2014; 2: 1.
24. Shaalini, R, et al. Human Motion Detection and Tracking for Real-Time Security System. International Journal of Advanced Research in Computer Science and Software Engineering, 2013; 3: 12.
25. Lalli G., et al. An ANFIS Based Pattern Recognition Scheme using Retinal Vascular Tree-A Comparison Approach with Red-Green Channels." Journal of Theoretical and Applied Information Technology, 2014; 59(1): 205-212.
26. Prem, P. Geetha, et al. "Ear Segmentation using Differential Box Counting Approach." Unique Journal of Engineering and Advanced Sciences, 2014; 2: 1.
27. Sangeetha, S., et al. "Enhanced Approximated SURF Model For Object Recognition." International Journal of Engineering Research and Applications (IJERA), , 2014; 4: 13-18.
28. Roopa, V. G., et al. "Real Time Visual Tracking of the People using Video Camera with Reduced Time Complexity."Unique Journal of Engineering and Advanced Sciences, 2014; 2: 1.
29. Yuvaraja P., Madhavan P, and Pavithra S. A Review on Concurrent and Non-Concurrent BIST Architecture for Error Detection. Int. J. Novel. Res. Eng & Pharm. Sci., 2.01: 30-33.

Source of support: Nil, Conflict of interest: None Declared