

Lead Poisoning and the Challenge of Global Healthy Living: A Call for Extra Vigilance and Attitudinal Change

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ABSTRACT

Lead (Pb) an element of long-standing historical importance to humanity still has several electrical, mechanical and chemical engineering benefits. The element has however been associated with several diseases in both adults and children causing several deaths across the globe which often go unnoticed. This editorial in a bird's-eye view, looks at the impacts of Pb poisoning across the globe, the sources of poisoning with advice on how to control this silent global epidemic. It is observed that Pb poisoning is still a global problem and the common sources of contamination and poisoning include human activities such as: emissions from high vehicular traffic density; illegal burning and processing of fossil fuels leading to soil, underground water and atmospheric pollution. Other sources include: industrial activities such as recycling Pb acid batteries, Pb water pipes, Pb paints, Pb creams, Pb toys, atmospheric emissions from Pb factories, Pb solder in food cans, Pb containing gasoline, and Pb cosmetics among others. Strict measures should therefore be put in place to limit the contamination of Pb and subsequent poisoning of our air, soil, water and food, and associated diseases so as to guarantee a healthier global population.

Keywords: Contamination, Global, Heavy Metal, Lead, Toxicity.

INTRODUCTION

Lead (Pb) is generally believed to be one of the oldest metals to have formed on earth whose origin is buried in antiquity and dates several billions of years ago. It is silvery-white or greyish, soft and occupies group 14 (IVa) of the periodic table. It has an atomic number and atomic mass of 82 and 207.2

respectively. Lead is a poor conductor of electricity and it is ductile, dense and also very malleable. Nutritionally, Pb has no nutritional value and is not useful for any metabolic activity in the body either for energy generation, transfer, enzymatic activity, transport of molecules, or any anabolic or catabolic



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activity. It has gained its global prominence as a potent heavy metal pollutant because of man's growing pressure on the environment. Pb is called a heavy metal because of its density of 11.29 which is higher than 5 and its ability to cause toxicity at low concentrations in the body¹⁻⁴.

Importance of Pb

The ancient people freely used lead element in their various social and economic activities such as: the Babylonians used it as tablets for recordings, the Romans used it for coins, plates, water pipes and cooking utensils. The poisonous nature of Pb was discovered during the reign of Augustus Ceaser (63BC-14AD) and classified presently among non-carcinogenic heavy metals unlike Arsenic (As), cadmium (Cd), chromium (Cr), and nickel (Ni) which are carcinogenic. Pb is presently used in car batteries, ammunition, pigments, cable sheathing, to store corrosive liquids among others. Pb accumulation and eventual toxicity in the human body leads to several organic diseases such as liver and kidney failure, anaemia, high blood pressure and cardiac failure among others⁵⁻⁸.

Pb ranging from trace amounts to toxicity levels (as recommended by WHO, FAO, and Nigeria's NAFDAC) has continued to be found in atmospheric dust, soil, ground and surface waters, raw, processed and semi-processed foods sold in open markets, shops and supermarkets across the globe^{9,10}. This makes Pb an element of serious public health importance and its level of contamination in the foods and drinks sold also^{11,12}.

Pb Toxicity

Several studies across the globe indicate that both the air, soil, water, crops, drinks and processed foods for human consumption could be heavily contaminated with Pb: In Thailand findings from a study on Pb contamination among other heavy metals in soil, surface water, and crops in Uthai District, Ayutthaya

Province showed that the Total Hazard Quotients (THQ) and Hazard Indices (HI) of Pb along with As, Cd, Cu, Hg, and Zn tested were all greater than one, signifying toxicity¹³. Similarly, in Mexico, Pb contamination of municipal domestic water supplies along with water from wells and storage tanks was evaluated in the northern part of the country. And Pb was found to be high in both samples above the maximum threshold recommended by WHO/FAO¹⁴. In Spain Pb along with other heavy metals such as copper (Cu), cadmium (Cd), and mercury (Hg) were found to accumulate heavily in the livers of Anguilla Anguilla and Salmo trutta caught from two wild Spanish rivers making them toxic for human consumption¹⁵; and in Australia, vegetables grown at 46 different agricultural sites in New South Whales were assessed for Pb contamination among other heavy metals. It was found that at least 63% of the vegetables had their Pb levels along with other heavy metals exceeded for safe human consumption¹⁶. Findings from Canada on analysis of Pb accumulation in whales and dolphins of coast of Canada showed heavy Pb accumulation in the kidney and muscles of dolphins compared to the whales¹⁷; and in Peru, samples of grains and processed products from 18 districts analysed showed significantly high levels of Pb and other heavy metal accumulation unfit for human consumption¹⁸. Similar findings of Pb toxicity were reported in USA¹⁹, Brazil where Pb was found to be high in cow's milk²⁰ and Iraq²¹ among others.

Raw, fresh and processed foods and drinks from African continent appear most heavily contaminated as findings from Sudan's four regions (Khartoum, Nahr, Elnile and Sinnar) showed high Pb contamination of fishes²². Also, an analysis of Pb and other heavy metal contamination of raw foods sold at open markets in Kinshasa in Democratic Republic of Congo and Johannesburg in South Africa showed that the Target Hazard Quotient (THQ) for virtually all the samples were greater than 1 indicating high toxicity and unsuitable for human consumption as weighed on the FAO/WHO scale²³.

In Nigeria, an analysis of Pb concentration in smoked fishes sold in Abeokuta highway showed an increase in Pb concentration by over 33 folds due to impacts of vehicular traffic density of the areas²⁴. In another similar study on different legumes, tubers and cereals sold in different parts of the city also found detectable Pb levels along with other heavy metals though within tolerable limits²⁵. And findings from Port Harcourt had slight contamination of processed cassava flour (garri) with high pollution by other heavy metals which were traceable to automobile exhaust emissions, industrial and commercial activities²⁶.

Sources of Pb Pollution

Sources associated with Pb pollution as has been shown across the world are both anthropogenic and non-anthropogenic with anthropogenic sources dominating. The anthropogenic sources include accumulated automobile exhaust emissions from high vehicular traffic density; illegal burning and processing of fossil fuels leading to soil, atmospheric, biota (flora and fauna), and water (surface and ground water) pollution. Others include: industrial activities: recycling of Pb acid batteries, Pb water pipes, Pb paints, Pb creams, Pb toys, atmospheric emissions from Pb factories, Pb solder in food cans, Pb containing gasoline, cosmetics among others²⁷⁻²⁹.

CONCLUSION

Pb pollution is a global environmental challenge which has been going on so much unnoticed, contaminating virtually all foods sold in open markets and contributing to several diseases and deaths among children both in industrialised and non-industrialised parts of the world. Health risks associated to Pb across the globe are due to compartments' interaction known as air-soil-water-biota relationship. The dissemination of Pb in agricultural soils, solid wastes dump sites, surface and ground water, biota and atmosphere are principally traced to human activities. When all the

associated risk factors for some organic diseases in both adults and children such as hypertension, diabetes, liver and kidney diseases are ruled out in patients, the probability of Pb poisoning could as well be considered. While the levels found in some foods are in very trace quantities and within tolerable limits, prolonged bio-accumulation may lead to eventual toxicity in the long run since Pb, a heavy metal is non-biodegradable.

Recommendation

In order to reduce Pb pollution in our environments, human activities such indiscriminate burning of fossil products, recycling of lead batteries, cultivation of food crops and vegetables on open solid wastes dump sites and land reclaimed from dump sites should be prohibited. Factories producing Pb contaminated products such as paints, creams, cosmetics and toys should be sanctioned for strict compliance with zero Pb products to the open markets. There should be strict environmental laws to regulate industries dealing with lead and its products to prevent its emission from factories. Also, workers of factories where Pb is processed should adhere to the standard operating protocol to prevent carrying Pb on their bodies, hair and clothes home to contaminate their children and the aged which are more vulnerable to Pb toxicity.

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