*International Research Journal of Environment Sciences*_____ ISSN 2319–1414
Vol. **1(4),** 84-86, December **(2012)** *Int. Res. J. Environment Sci.*

Short Communication

Lead Pollution -An Overview

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Available online at: www.isca.in
Received 10th November 2012, revised 25th November 2012, accepted 15th December 2012

Abstract

Environment pollution by lead is worldwide public problem, exemplified by an elevated blood levels among people living in the polluted areas. Lead poisoning has adverse health. It is required to study the lead level in the developing city like Bhopal, which is situated in the heart of the country and capital of Madhya Pradesh. Millions of Peoples from all over the State and country and from abroad visit this place every year. Due to this transportation of people, environment is contaminated by lead from automobile emissions. Another thing, there are lots of industries. They release huge amount of gaseous as well as metallic pollutants, it is also a source of lead accumulation. In this paper it is intended to present the review of some aspects of lead pollution.

Keywords: Automobile emission, Environment pollution, lead, pollutants

Introduction

There are 35 metals that concern us because of occupational or residential exposure; 23 of these are the heavy elements or "heavy metals": antimony, arsenic, bismuth, cadmium, cerium, chromium, cobalt, copper, gallium, gold, iron, lead, manganese, mercury, nickel, platinum, silver, tellurium, thallium, tin, uranium, vanadium, and zinc, which affect adversely if their level increases[1,2,3and4]. Interestingly, small amounts of these elements are common in our environment and diet and are actually necessary for good health, but large amounts of any of them may cause acute or chronic toxicity (poisoning). Heavy metal toxicity can result in damaged or reduced mental and central nervous function, lower energy levels, and damage to blood composition, lungs, kidneys, liver, and other vital organs[5]. Long-term exposure may result in slowly progressing physical, muscular, and neurological degenerative processes that mimic Alzheimer's disease, Parkinson's disease, muscular dystrophy, and multiple sclerosis. Allergies are not uncommon and repeated long-term contact with some metals or their compounds may even cause cancer[6].

Today world is facing serious challenge to save its environment from pollution due to fast industrialization and modernization[7and8]. Accumulation of lead in an organ is essentially a detoxication step. The toxic action of lead in the body is traced in part to the enzyme (ALAD) inhibition by the Pb^{++} ion. Lead is a neurotoxin and the overt toxic effects of lead have been known for many century.

Lead occurs naturally in the environment[9,10and11]. However, most lead concentrations that are found in the environment are a result of human activities[12,13]. Due to the application of lead in gasoline an unnatural lead cycle has consisted. In car engines lead is burned, so that lead salts (chlorines, bromines, oxides) will originate[14]. Lead is one out of four metals that have the most damaging effects on human health. It can enter the human body through uptake of food (65%) water (20%) and air (15%).

Lead accounts for most of the cases of pediatric heavy metal poisoning[3and15]. It is a very soft metal and was used in pipes, drains, and soldering materials for many years. Millions of homes built before 1940 still contain lead (e.g., in painted surfaces), leading to chronic exposure from weathering, flaking, chalking, and dust. Every year, industry produces about 2.5 million tons of lead throughout the world. Most of this lead is used for batteries. The remainder is used for cable coverings, plumbing, ammunition, and fuel additives. Other uses are as paint pigments and in PVC plastics, x-ray shielding, crystal glass production, and pesticides. Target organs are the bones, brain, blood, kidneys, and thyroid gland[6].

A Brief Review of the Work already done in this field

Lead is a heavy metal and is highly toxic to plants and cumulative poison to mammals. An important symptom of lead toxicity is disorder of central nervous system leading to insomnia like diseases, which are caused due to the discursive synthesis of hemoglobin. Lead is omni-present in various environmental matrices, including air, water, soil and plants. It is widely distributed in the environment primarily because of its use as an antiknock additive in gasoline.

Numerous reports are available on environmental contamination by lead from automobile emission[5, 16and17]. The distribution of lead in roadside soil and vegetation is reported to follow a

double exponential function[18]. The first exponent is associated with large particulate that settle out rapidly usually within five meters on the high way and the second with smaller particle that settle out more slowly within about hundred meters of the source. Other sources of lead pollution are lead in paints, atmospheric emission from industries and lead plumbing. Through ingestion and inhalation, the human body acquires small but measurable concentration of lead, which gradually accumulates. Elevated levels of this metal are, therefore, observed in some tissues and have been used to discriminate between groups of individuals, subjected to different degrees of lead exposure.

Inorganic lead is transported in blood stream attached to red blood cells and inhibits hemoglobin synthesis. This may not be the only toxic effect; the lead retained in the body from both, air and dietary sources accumulates predominantly in the skeleton. Evidence obtained from animal experiment reveals that here has been continuous turnover of lead in the body. An unpleasant aspect, it may get remobilized and sent to other parts of the body long after the initial absorption. This remobilization can take place during feverish illness, because of cartisone treatment and because of old age. The biological half-life in the tissue is about 10 year but turnover of lead in the blood stream and soft tissue is rapid and response quite quickly to changes in lead in take and exposure. According to Sugawara et. al[19], presence of lead (Pb) as well as other base metals in esthetic restorative materials especially dental cements, is detectable by colour shift which is useful for the determination of the lead content in the teeth. According to Cibulka[3], the made source lead contamination are transportation, smelting works, application of waste water treatment sludge to soil, rain, hail and others. Neumann et al.[6] found that approximately 98% of lead in the atmosphere originate from human activities

Strmiskova[15] reported that lead is a microelement naturally present in trace amounts in all biological materials, i.e. in soil, water, plants and animals. Further it was studied the effect of cadmium and lead pollution on human and animal health[15]. It was found that all food of animal origin with the exception of milk contains lead in higher concentration than that of in plant origin. Golub[20] reported that heavy metals are important in many respects of man, especially in the manufacturing of certain important products of human use, such as accumulator (Pb), mercury- arch lamos and thermometers (Hg),utensils (Al) and a wide range of other products.but the biotoxic effects, when unduly exposed to them could be potentially life threatening hence, cannot be neglected. While these metals are in many ways indispensable, good precaution and adequate occupation hygiene should be taken in handling them. Although heavy metal poisoning could be clinically diagnosed and heavy metal pollution and the subsequent human poisoning factors could be studied.

Makoha et al.[1] found that lead contamination in tape water, and some vegetables was above the WHO [2] maximum limits and may pose a risk for lead poisoning to consumers. The lead content in soil samples from near the roadside was consistently higher than that obtained further from the roadside, indicating motor vehicle pollution is a source poses risk for lead poisoning, particularly to children who play in such soils. The lead content was also higher in vegetables grown near roadside in comparison to that motor vehicle pollution is a source a lead contamination in foods.

Patel et. al.[21] reported that Lead is a well known non-biodegradable toxic metal in the environment and now, it has become a global health issue. More than 15 million children in developing countries are suffering permanent neurological damage due to Pb poisoning[12]. Lead toxicity in children causes serious health hazards i.e. permanent brain damage, causing learning disabilities, hearing loss, and behavioral abnormalities and in adults causes hypertension, blood pressure problems, heart disease, etc. The elevated levels of Pb in blood of children (200 $\mu g\ l^{-1}$) and dogs (250 $\mu g\ l^{-1}$) of Indian megacities were reported. Khan et al.[22] reported that the motor vehicle resulted in deposition of lead as particular matter and also the road side surface soil, highest concentration of lead metal varying from place to place. Road near junctions petrol pumps and bus stops were more polluted. It was also reported that the lead level increased with increasing traffic intensity.

Le[23] investigated lead pollution near the road side soil. The results indicate that concentration of lead in road side soils range from 23-90 mg/kg with an average value of 37.11mg/kg, exceeded environmental background value.

Looking to the effect of the lead in the environment, it is required to study the lead level in the city. Atomic absorption spectrometer can be used to evaluate the lead level[24].

Conclusion

From the review of literature, it is found that there is a need to work in the field of lead, affecting the human body by analyzing the soil in the area, teeth and blood of human in different age group so that proper preventive measures can be taken up for the benefit of the society in the fast developing and growing city like Bhopal. Atomic absorption spectrometer is useful to determine the lead contents.

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