Toxic effect of Lead on earth's life

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***Abstract*- Lead (Pb) is a heavy metal that is found to be present naturally in the earth crust but nowadays it is spreader widely in our environment due to the man-made activities such as mining, fossil fuel burning etc. Lead is also becoming a part of our life as it presents in most of the products of our daily basis equipment like power supply batteries. Due to these interactions and widespread presence of the Pb in our life, there is an increase in its amount in the environment that has toxic effect on all the living creatures and cause Lead Poisoning. It's a slow process of accumulation of this heavy metals in our food chain, water resources and body initiate over month or years. Even a minute level exceeds than the 5 µg/d causes severe health problems, deformities and death. Although there are various major steps has been taken to overcome the effect of metal toxicity but still many cases are reported. Lead poisoning is an issue whose impact is seen in different living organisms such as humans, animals, plants, microorganisms in our eco-system.**

***Index terms*- Lead Poisoning, mining, fossil, pollution, environment**

1. INTRODUCTION

Lead (Pb) is one of the most ancient metals discovered by human race. It has some unique properties such as softness, high malleability, ductility, low melting point and resistance to corrosion. These properties results it applicability in different industries such as automobiles, paint, ceramics, plastics etc. Through these industries Pb exposure to the environment has been increases in higher amount that causes poisonous and affects the life on earth. Breathing air, drinking water, eating food or swallowing or touching dirt contaminated by Pb is main source through which it enters the life cycle. Pb is globally abundantly distributed, important but also dangerous environmental chemical [1]. Lead Poisoning is a medical condition caused by increased levels of lead in the body above than5 µg/dl for children and 10µg/dl for adult. Accumulation of Pb in living body or cells has toxic effects on many organs and tissues by interfering the enzymatic activist, irregulating the metabolic pathways, and cause mutation [2]. Toxic effects adults as well as children but the severity and susceptibility in children are more impactful as compare to adults. Lead Poisoning also interferes with the food cycle and through this cycle transfer from micro-organism to macro-organism spread on our eco-system. Thereby both the quantity and quality of life on earth affected drastically.

Besides the toxic effects, the sources or supplier of toxic Pb in our environment is one of the most important issues that we have to consider to overcome this problem. Naturally earth dust or soil contains Pb but man-made products like polymers, paint (Older homes, furniture, toys), cosmetic, food cans, power batteries, radiators, inks etc., are the main sources of lead poisoning. Thus, both the house-hold and industrial products, implements and their byproducts contain Pb and all this litter causes pollution to serious health hazardous. Household products containing lead include such as curtain lead weights, coins, costume, jewellery, and stained glass windows, painting, especially the undercoat layer in older homes, lead solder around plumbing or lead putty).

2. EFFECT OF LEAD POISONING IN HUMANS

Lead is a heavy metal in nature and even in lesser amount it is poisonous to living organism. The poisoning effect of Pb on the human are in various ways such as organ damage i.e., brain and kidney which directly effects the health of an individual and may also results on death [3]. The increasing

concentration of Pb has negative effects on pregnant women results the miscarriage and in males it could results in reducing the fertility [4]. However, in case of children significantly higher cases of Pb toxicity that affects the internal and external organs as their organs are much softeners and sensitive than adults body, and results learning defects, behavioral problems and deformities [5].Prolonged exposure of heavy affects the neurological system, haematopooetic, hepatic and renal functions and high blood pressure [6-7].

3. EFFECT OF LEAD POISONING ON PLANTS

Lead is one of the most widespread heavy metal contaminant in soil. As the plants are dependent on soil for obtaining essential nutrients such as Nitrogen (N), Phosphorus (P) and Potassium (K), they can easily uptake the Pb from the soil. The soil contamination with Pb is major pathway through which along with other nutrients lead will also uptake by plants and cause lead poisoning in plants. Thereby the permeability of cell membrane affects, inhibition of ATP production, liquid peroxidation and sequencing damage of DNA by producing high amount of ROS is shown in plants [8].In many cases Lead Poisoning also affects the plants roots by inhibiting their growth and inhibition of cell division in root tip region [9]. The metabolic pathways like photosynthesis drastically affected by Lead Poisoning, plants show decline in the rate of photosynthesis due to the partial chloroplast ultra-structure, restrained synthesis of chlorophyll, plastoquinone and carotenoids obstructed electron transport, inhibited activities of Calvin cycle enzymes as well as deficiency of CO2[10]. Thus the crop yield, productivity and the quality of the plants product such as fruits reduced and they will become the source of Pb transformation in our food chain [11].

4. EFFECT OF LEAD POISONING IN ANIMALS

Lead is considered as one of the most hazardous and harmful environmental pollutants that affect all biological system through it exposure in air and water sources. Sources of Pb exposure in our fauna or animals can be the same as those that present health threats to humans by sharing the polluted environment such as paint, and pets toy etc.[12].

Initially symptoms of Pb toxicity at lower concentration shows symptoms like sublethal effects such as damage to tissue and organ ,damage to immune system, damage to reproductive system, high blood pressure, neurological impairment. However, at higher level the Pb toxicity causes damage to nervous system paralysis and death [13]. In our environment the exposure of Pb through contaminated water, air, soil and food by the discarded lead acid batteries are the most common source of lead poisoning in ruminants [14]. Besides that there are many other sources including plumping solder, lead shot, grease, etc. are the potential sources for the Cattle and poultry animals. They are more at risk of Pd poisoning due to the lack of inquisitive and commonly taste new finds. Affected cattle shows sign of central nervous system damage like cease grazing, appear dull and unresponsive, walk aimlessly, or blindness.

5. EFFECT OF LEAD POISONING IN BIRDS

In case of birds reduction of the red blood cells, neural damage, blindness and head tilting or a wing droop or leg paralysis indicates Pb poisoning. The presence of blood in the droppings, which is not actually blood but the breakdown product of blood, bird just may not ‘look’ well, sitting quietly with fluffed feathers. Birds shows weakness and depression, loss of control and coordination of its body movements, constant thirst regurgitation of water, frequent runny green droppings, seizures, muscle tremors and finally death [15]. Wild birds can be poisoned by the lead pellets found in the wetlands, ingestion of lead fishing weights and contaminated prey animals. Chronic low grade lead exposure originates from contaminated soil, plant and water and high grade exposure is from ingesting pieces of lead. Improper disposal of man-made wastes like wine bottles foil tops, lead gunshot pellets can be poisoned the wild birds and cause death. [16]

6. EFFECT OF LEAD POISONING IN MICRO ORGANISMS

The first organisms in the biosphere to be affected by Pb poisioning are the microorganisms. It was demonstrated that the community of rhizosphere microorganisms could be a more sensitive indicator

of lead pollution than the non-rhizosphere microbial community. The values of the auxotrophy index (the ratio between the μm values upon the growth on glucose and yeast extract) demonstrated a tendency towards a decrease in the metabolic diversity of the soil microbial community under the impact of lead [17].

Pollution with metals can affect different organisms in the environment, such as microorganisms, plants and animals, but the degree of toxicity depends on the species. Microorganisms have different mechanisms of coping with a variety of toxic metals. Large number of metals is essential for growth of microorganisms, but some can be very harmful too. This is happening because heavy metals have the ability to form complexes with proteins and make them inactive, for example, inactivation on enzymes. Many heavy metals are detrimental to microorganisms even at very low concentrations. We have investigated the resistance of lead as heavy metal on microorganism populations living on soil contaminated with heavy metals. Resistance to soluble lead was investigated in two different bacteria Pseudomonas marginalis and Bacillus megaterium. The population of microorganisms showed different response to the heavy metal. [18]

7. LEAD POISONING PREVENTION AND DIAGNOSIS

Prevention is better than cure, therefore to overcome the environmental toxicity of heavy metal certain majors has been taken such ad dust free environment, testing of drinking water, purification using highly equipped eco-friendly filtration system, use of Pb free paints, Eat healthy diet as a regular meals and good nutrition might help in lowering the concentration of lead. Children especially need enough Calcium, Vitamins C and iron in their diets to help keep lead from being absorbed. Once metal toxicity is suspected, a simple blood test can determine the levels of lead in the blood for a definitive diagnosis, and x-ray technology may be used to view any pieces of metal that may have been swallowed.

Lead toxicity can be diagnosed by testing whole blood lead levels [19]. Blood lead level testing is widely available through veterinary diagnostic laboratories. Most laboratories accept whole blood samples as small as 20 mcL (0.2 mL) in any anticoagulant. Serum and plasma are not appropriate samples for measurement of lead levels because 90% of circulating lead is in red blood cells. Whole blood levels >0.2 ppm suggests lead toxicity. Whole blood levels >0.4 to 0.6 ppm are considered diagnostic for lead toxicity. In addition, a chemistry panel is likely to reveal elevations of lactate dehydrogenase, aspartate aminotransferase, and creatine phosphokinase as a result of liver and neuronal damage caused by circulating lead [20]. Effected bird can be treated successfully. There are many steps to the diagnosis depending on the severity of the poisoning. Fluid therapy will be used to protect the vital internal organs from further damage, then to help flush the toxin out of the body. Firstly veterinarian will then use a metal chelating agent calcium EDTA to surround and trap the lead which will result in it being filtered it out through the kidneys or intestines. This drug is often injected twice per day until your bird shows signs of improvement. Oral D -penicillamine is also used as an oral medication.

Moreover, antibiotics will need to be administered to prevent infection setting in, and crop feeding is essential to add fluids and calories to aid recovery. It has been shown that Vitamin B complex and Thiamine is useful in preventing the deposit of the metal into tissues, and it also helps nerve repair. If bird is having seizures, an anticonvulsant will need to be given to aid your pet. Larger pieces of metal may be removed surgically if they are not passing through your bird's system while smaller pieces can be assisted to travel through by flushing warm fluids under general anesthetic. Bulking agents added to the diet or crop fed will speed up the removal of the metal particles through the gastrointestinal system [20].

8. CONCLUSION

The exposure of lead in the Environment is increasing in a daily basis and which is creating havoc in the environment. As it is having bad impact on every living creature and on those things which are very beneficial. The huge amount of lead in the environment is responsible for spreading Poisoning which is responsible for different types of disease that have hazardous effects on the body of organisms and could even cause death. So some types of

parameters should taken for preventing the formation of excessive amount of lead in environment due to this there comes a decrement in the limits of Lead Poisoning in environment.

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