



CHRONIC CUMULATIVE LEAD TOXICITY AND ITS AYURVEDIC MANAGEMENT

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ABSTRACT

Lead is the most abundant of the heavy metals in the Earth's crust. It has been used since prehistoric times, and has become widely distributed and mobilized in the environment. In this article the chronic cumulative lead toxicity will can be diagnose by using history of exposure lead added to petrol, lead from an active industry, such as

mining, lead-based paints and pigments, lead solder in food cans, ceramic glazes, drinking-water systems with lead solder and lead pipes, lead in products, such as herbal and traditional medicines, folk remedies, cosmetics and toys clinical manifestations As the toxicogenesis of chronic lead poisoning mentioned in Ayurved. Hence the chikitsa will be applied for the management of Chronic lead toxicity of such toxicant. Vaman (induce emesis) by dhamardav and, Virechan (induce purgation) by snuhi will help to remove chronic cumulative lead toxicity along with vitiated doshas. Drugs likes Ajeet Agad, Kalyanak sarpi, Sankhpushpi will be beneficial in the management of chronic cumulative lead toxicity. Thus the diagnostic protocol and ayurvedic management may play important role to cure the chronic cumulative lead toxicity as per current aspect.

KEYWORDS: ead sources, Chronic lead toxicity signs and symptoms, Ayurvedic management.

1. INTRODUCTION

Lead has been mined and used by mankind for 6,000 years, and the history of lead poisoning is nearly 2,500 years old. Summarizing such a long story in a few pages in a balanced way is impossible. The older history of lead poisoning has been reviewed many times in articles, book chapters, and textbooks. This review focuses on Sign and symptoms of chronic lead poisoning diagnosis and ayurvedic management of chronic lead poisoning. Chronic lead poisoning remain problems of enormous importance for human health and development worldwide. Lead has no essential role in the human body, and lead poisoning accounts for about 0.6% of the global burden of disease.^[1] Lead are a heavy metal which causes the acute as well as chronic cumulative toxicity to human being. Due to industrialization the emission of lead has being increased which produces the long term hazards to the human beings. Ayurveda is an ancient science and the lead, its therapeutic preparation its acute and chronic toxicity has found in details. The therapeutic utilization of lead has increased after Nagarjun^[2] Kal who is the father of Ras Shastra. Thought its acute /chronic toxicity and its management is also found in Ayurveda, but subject matter is scattered. Diagnostic methods and its ayurvedic management has been evaluated, elaborated and discussed in this original, fundamental research article on chronic lead toxicity.

2. Sources of Lead

2.1 According to morden^[3]

The major sources of exposure to lead are.

1. lead added to petrol
2. lead from an active industry, such as mining (especially in soils)
3. lead-based paints and pigments
4. lead solder in food cans
5. ceramic glazes
6. drinking-water systems with lead solder and lead pipes
7. lead in products, such as herbal and traditional medicines, folk remedies, cosmetics and toys
8. lead released by incineration of lead-containing waste
9. lead in products, such as herbal and traditional medicines, folk remedies, cosmetics and toys (e-waste)
10. lead in the food chain, via contaminated soil
11. lead contamination as a legacy of historical contamination from former industrial sites.

2.2 According to Ayurved^[4]

Lead Acetate ($\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_2 \cdot 3\text{H}_2\text{O}$):- lead acetate is commonly called sugar of lead or salt of Saturn. It occurs in white masses of acicular crystals, slightly efflorescent and having a sweet, astringent taste. It desolvuff adule in water, forming an acid solution.

Lead Subacetate ($\text{Pb}_2\text{O}(\text{C}_2\text{H}_3\text{O}_2)_2$):- Lead subacetate is the chief constituent of Gouldard's extract, which is a colourless liquid with a sweet, astringent taste and an alkaline reaction. The extract contains about 42.5 per cent of lead subacetate.

Lead Carbonate (PbCO_3):- Lead carbonate is a white, crystalline power, almost insoluble in water, but soluble in dilute acids. In the form of a basic carbonate or white lead, $(\text{PbCO}_3)_2\text{PbH}_2\text{O}$, it is extensively used as a pigment in oil painting. It is also used as an ointment. Children who suck and bite painted toys with white lead suffer from poisoning.

Lead Nitrate (PbNO_3):- Lead nitrate is a crystalline, poisonous salt, soluble in water, and is used in calico printing.

Lead sulphate (PbSO_4):- Lead sulphate is a heavy, white power, insoluble in water and is therefore supposed to be non- poisonous, but cases of poisoning have occurred from sucking yarn which has been coloured white with this salt.

Lead chromate (PbCrO_4):- lead chromate, a bright yellow, insoluble powder, known as chrome yellow is used as a pigment. Fatal cases of poisoning have occurred from the use of sweetmeats coloured with this salt. Joseph Uttar also reports three cases of chronic poisoning from the use of tobacco suff adulterated with lead chromate as a colouring agent.

Lead chloride (PbCl_2):- Lead Chloride occurs as white, needle –shaped crystals, sparingly soluble in cold water, but more so in boilih water. When heated in contract with air, it is converted into an oxychloride, which is employed as awhite pigment, known as Pattison's white lead. The yellow oxychloride obtained by heating lead oxide and ammonium chloride is known as cassel yellow which is used as a pigment.

Lead Iodide (PbI_2):- Lead iodide is a tasteless, odourless, bright yellow power, slightly soluble in cold water, but readily soluble in boiling water.

Lead Sulphide (Galena) (PbS):- lead sulphine is naturally found in the form of cubic crysrals, but is sold in the bazaar in powder from as surma in place of sulphide of antimony which is used as a collyrium for the eyes.

Lead Monoxide (litharge, Masicot, Mudrasang) (PbO):- lead monoxide is a pale brick-red or pale orange scaly massvery slightly soluble in water, but readily soluble in nitric and acrtic acids. It is S a constituent of emplastrum plumb(diachylon plaster). Quacks use

monoxide as a remedy for syphilis. It is also commonly used by painters and glaziers, and a constituent of certain hair dyes.

Lead tetraoxide (Red Lead, Minium, sindur or metia sindur) (Pb_3O_4):- lead tetroxide is a scarlet, crystalline powder which varies in colour according to its mode of preparation and is employed as a pigment. It is insoluble in water but is partially soluble in nitric acid.

Lead tetra ethyl $Pb(C_2H_5)_4$:- Lead tetra-ethyl is a readily absorbing, highly toxic, liquid soluble, heavy, oily liquid, somewhat volatile at ordinary temperature.

3. Ayurvedic Properties of lead^[5]

Ras- Tikta, katu, madhur,

Gun- Usna, Laghu, Snidha, Guru, sar

Virya- Usna

R.T- Ras tarangini, **R.R.S-** Ras Ratan Samuchhya, **A.P-** Ayurveda Prakasha.

4. Chronic toxicity of lead poisoning Sign and Symptoms^[6]

Facial pallor, Anaemia, Basophilic stippling of red cells, Blue lines in gums, Retinal stippling, Colic and Constipation, Palsy, Encephalopathy, Disturbance of genito- urinary and cardiovascular system, Osteopathy, Sterility.

5. Diagnosis protocol of Chronic toxicity of lead poisoning

5.1 Blood investigation^[7]

Normal range of level of lead is -0-50 μ g/dl.(adult).

Normal range of level of lead is-> 55 μ g/dl(Children).

5.2 Urine investigation^[8]

Normal range of level of lead is- 80-100mg/lt

5.3 Calcium EDTA mobilisation test- $CaNa_2EDTA$ is administered at a dose of 500mg/m² in 5% dextrose infused over an hour. Urine volume over the next 8 hours should be measured for lead. The total urinary excretion of lead (mg) is divided by the amount of $CaNa_2EDTA$ chelation provocative test. An 8 hour $CaNa_2EDTA$ chelation provocative test is considered positive if the lead excretion ratio is more than 0.6.

5.4 X ray examination

An abdominal X-ray can demonstrate flecks of lead paint.

An X ray of the long bones may show 'lead lines' that are bands of increased density and can occur within a matter of days following ingestion.

6. Ayurvedic management of chronic cumulative lead poisoning.

6.1 Sanshodhan

6.1.1 Vaman^[9]

Pradhankarma- Vaman(Induced emesis)- After proper physical examinations patient is asked to complete shauch vidhi before the procedure of vaman will start in the early morning. Then vamnopag drav (assistant drugs for vomiting) will be given in the dose of 2-3 liters than Dhamargav(*Luffa cylindrica*) Mushti praman 10gram will be liked for inducing emesis. Vaman veg will be noted and counted and recorded. Emetic material will be collected in transparent glass water measure and observed for any abnormality effect. The adverse effect or any complications will be noted and managed.

Sansarjan Kram-The sansargen kram will be followed as per indicated in panchkarma (kashinath shastri2011). Patient should be given liquid light diet (peya) in first day evening, second day morning and evening followed by semisolid liquid diet. Third day (velepi) and 5th day morning. Then Mung dal water (Soup) up to seventh day.

6.1.2 Verechan(Induced purgation)^[10]- After proper examination of the patient the procedure of virechan started early in the morning. Snuhi (*Euphorbia nerifolia*) in 4gram will be given mixed with trivrit kwath 100ml which prepared by using its therapeutic dose 3-6masha. The virechan vegas will be countered and recorded(kashinath shastri 2011).

Sansarjan Kram:- The sansargen kram will be followed as per indicated in vaman karm (kashinath shastri2011).

6.1.3 Basti:- Yog basti havig vat nashak anuvasan basti^[11] and pakwashaya shodhak niruh basti^[12] should be used to pacify to prakopak vat due to chronic Hg toxicity. It should be given alternate in manner means first anuvasan than niruha(1:3:3:1) vat nasak anuvasn basti contening Bael, Artni, sonapatha, Gambhari, and Patala should be given in 120ml in quantity after meal. Pakwashaya shodhak basti contening kwath of madan phal, Devdali, tillaouki ke beej, Dhamargav, Indrayav these drugs prepared with cow's urine should be given 400ml empty stomach.

6. 2 Sanshaman^[13]

Antidote:- According to anupaan manjari – Triphla churna.

Symptomatic:- Ajit agad^[14], Kalayank sarpi^[15], Sankh pushpin^[16] should helpful in anorexia, and anemia respectively, psychological symptoms respectively.

DISCUSSION

The chronic toxicity of lead has been increased all over the world including India. The main sources of exposure of lead are Industrial processes, petrol, paints and pigments, ceramic glazes, drinking-water systems with lead solder and lead pipes, electronic waste, food chain, via contaminated soil. Ayurvedic Lead Acetate ($\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_2 \cdot 3\text{H}_2\text{O}$), Lead Subacetate ($\text{Pb}_2\text{O}(\text{C}_2\text{H}_3\text{O}_2)_2$), Lead Carbonate (PbCO_3), $(\text{PbCO}_3)_2\text{Pb} \cdot \text{H}_2\text{O}$, Lead Nitrate (PbNO_3)₂, Lead sulphate (PbSO_4), Lead chromate (PbCrO_4), Lead chloride (PbCl_2), Lead Iodide (PbI_2), Lead Sulphide (Galena) (PbS), Lead Monoxide (litharge, Masicot, Mudrasang) (PbO)^[17] Which causes excessive emission of lead. Though the poorer lead in metallic state not produced the toxicity but the toxic compound like $\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_2 \cdot 3\text{H}_2\text{O}$, $\text{Pb}_2\text{O}(\text{C}_2\text{H}_3\text{O}_2)_2$, PbCO_3 , $(\text{PbCO}_3)_2\text{Pb} \cdot \text{H}_2\text{O}$, $(\text{PbNO}_3)_2$, PbSO_4 , PbCrO_4 , PbCl_2 , PbI_2 , PbS , PbO produces the toxicity in human beings. Ayurveda has describe the long term of Hazardous of ingestion of lead like Facial pallor, Anaemia, Basophilic stippling of red cells, Blue lines in gums, Retinal stippling, Colic and Constipation, Palsy, Encephalopathy, Disturbance of genito-urinary and cardiovascular system, Osteopathy, Sterility.^[18] Which is somewhat similar to non specific signs mention in modern science. The confirm diagnosis should be done by evaluating the lead level in blood and urine. After confirmations of chronic lead toxicity patient should be subjected for induce emesis, induce purgation and yog basti in periodic interval. To 2-3 lt of kwath of 10gm of Dhamargav should be given for emesis. After sansargan karm 4gm snuhi mixed with 100ml .3gm of trivit kwath should be given. Yog basti should be subjected by using vat nasak anuvasan basti and pakwashya should be given in alternate manner after proper sanshodhan the ayurvedic anti dote containing triphala to passify the accumulated. The lead not completely removed by sanshodhan karm. Ajit agad, Kalayank sarpi, brahami should be given respectively.

CONCLUSION

Chronic cumulative lead toxicity is a global health challenge including India. Induce emesis by Dhamargav (*Luffa cylindrica*), induce purgation by snuhi (*Euphorbia nerifolia*) and yog basti should be given to remove the accumulative lead and its metabolites which helpful to manage chronic cumulative toxicity of lead along with ayurvedic antidote and symptomatic management.

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