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## Ayurvedic Method of Diagnosis and Management of Chronic Lead Toxicity

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### ABSTRACT

Chronic toxicity of lead, its chemical component and its metabolites has been on rapid growth, due to utilizations and exposures of leads or its chemical component from natural sources such as water and soil, lead pipes, industrial sources and contaminated air, dust, food, leadpaints, vermilion etc. The persistent exposure of lead for prolong period cause accumulation of lead within bone, liver, and produces toxic blood.

It has been clinically manifested that the chronic lead poison vitiation of *vata* predominance and *vata-pitta* occasionally occur along with *rasvaha*, *pran-vaha*, *vatavaha*, *purish-vaha*, *mutr-vahavikriti*. Though the clinical manifestation shows the *vata-dosha* and *vata-vahasrotasvikrati* predominantly but it may be produced due to *aavran* of *dushivisha* in the form of lead. Hence it is need to removed first *aavaran* then the *vatavyadhi*s to be treated. *Petisweda*, *vamana* and *virechna* may plays a major role to remove out this *dushivishajanayaaavran*, the *yogabasti* may play a major role to control and cure the *vatavyadhi* produced by lead along with other symptomatic management. Thus Ayurveda may play a major role to manage the chronic lead toxicity.

### KEYWORDS

*Dushivisha, YogaBasti, AavranajanyVataVyadhi*



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## INTRODUCTION

Lead is ubiquitous in human environment, because of its excellent physico-chemical properties, low cost and easy workability and is widely used in industrial and domestic activities. The lead dispersed through gasoline exhausts, smelter emission, peeling paint, etc, never disappear completely from our environment. Human exposure to lead is from numerous sources including air, food, dust, soil, and water. Exposure of the general population to lead mostly occurs through the ingestion of contaminated food and drinking water, and by the inhalation of particulate lead in ambient air. Exposure can also occur due to high lead levels in dust and soil in residential areas near high-density traffic, smelters or refineries, and the consumption of vegetable, fruit and grains grown on high lead soils or near sources of lead emissions containing lead in excess as a result of direct deposition of lead into plant surfaces apart from plant uptake of lead from soils.

### 1) Diagnosis of chronic Lead Toxicity<sup>123</sup>

#### History of exposure (Source):-

*Occupational exposure to Lead-* workers are also exposed to lead in many occupations such as motor vehicle assembly, panel beating, battery manufacture and recovery, soldering, lead

mining and smelting, lead alloy production and in the glass, plastics and printing industries. Other occupations include ceramic and paint workers, automobile radiator repairs, petrol attendants and petroleum refining workers as well as welding, pottery and ceramic ware production and the production of jewellery.

#### Environmental Exposure of Lead-

**Water:-** Drinking water is also an important source of lead exposure. Previous almost universal use of lead compounds in plumbing fittings and as solder in water-distribution systems resulted in significant lead exposure from drinking water.

**Food:-** Food can be contaminated by lead in water, air or food containers. Use of ghee stored in brass or copper vessels lined inside with tin in brass or copper vessels in which oleate of lead is formed and also by taking food cooked in tinned vessels.

**Lead paint:-** Lead paint dust is the most common source of lead exposure for children. Children <3 years are at the most risk for lead poisoning as they more likely to put things containing lead into their mouth. Deteriorating lead paint and lead-containing household dust are the main causes of chronic lead poisoning. Even a small amount of a lead-containing product such as a paint chip can contain tens or hundreds of milligrams of lead.

#### Others

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**Vermilion**-Absorption of vermilion applied

## 2) Clinical Diagnosis of Lead Toxicity<sup>1,4</sup>

to scalp.

**Table 1** Dosha and Sarotas Vikriti in Haematological manifestation due to Chronic Lead Toxicity

Sr. No	Disease	Sign & Symptoms	Dosha	Sarotas
1	Anemia	Fatigue, skin pallor, shortness of breath, dizziness or a fast heartbeat	Vata	Ras-vaha
2	Facial pallor	Due to vasospasm and produced by contraction of the capillaries at the arterial side	Vata	Pran-vaha

**Table 2** Dosha and Sarotas Vikriti in Neurological manifestation due to Chronic Lead Toxicity

Sr. No	Disease	Sign & symptoms	Dosha	Srotas
1	Lead palsy	There may be tremors, numbness, cramps, hyperesthesia, later the extensor muscle of wrist and deltoid, biceps, anterior tibial muscles are affected.	Vata	Vatavaha
2	Lead encephalopathy	Commonly present in children. Symptoms- hyperkinetic, aggressive behaviour, mental dullness, learning disorder, insomnia, vomiting, hallucination, ataxia, convulsions	Vata	Vatavaha
3	Optic atrophy	Blurred vision, decrease in visual function, and pale optic disc.	Vata	Vatavaha

**Table 3** Dosha and Sarotas Vikriti in Gastro-intestinal manifestation due to Chronic Lead Toxicity

Sr.no	Disease	Sign & symptoms	Dosha	Srotas
1	Colic	It is usually a late symptom, involving both large and small intestines, ureters and blood vessels. The pain is spasmodic, paroxysmal, occurs at night, the abdomen is tense.	Vata	Purish- vaha
2	Constipation	Common feature and usually precedes colic. During pain, there is a desire for defecation.	Vata	Purish- vaha
3	Effect on Liver	Acute or chronic degeneration leading to dyspepsia, anorexia, emaciation general weakness.	Vata-pitta	Anna-vaha

**Table 4** Dosha and Sarotas Vikriti in other systemic manifestation due to Chronic Lead Toxicity

Sr. No	Disease	Sign & symptoms	Dosha	Srotas
1	Effects on circulatory system	Lead causes vascular constriction leading to hypertension and arteriolar degeneration.	Vata	Pran-vaha
2	Lead osteopathy	In children and young adults, lead is deposited beyond the epiphysis of growing long bones.	Vata	Asthivaha
3	Atherosclerotic nephritis and interstitial nephritis	<ul style="list-style-type: none"><li>•Pain in the pelvis.</li><li>•Pain or a burning sensation while urinating.</li><li>•A frequent need to urinate.</li><li>•Blood or pus in the urine.</li><li>•Pain in the kidney area or abdomen.</li><li>•Swelling of the body, commonly in face, legs, and feet.</li></ul>	Vata -pitta	Mutra-vaha
4	Effect on reproductive system-	Sterility in both male and female patients. In male- loss of libido and erectile dysfunction In female- infertility, menstrual irregularities, such as amenorrhea, dysmenorrhoea and menorrhagia.	Vata	Sukar-vaha & Aartav-vaha

## Pathological Diagnosis of Lead Toxicity<sup>5-</sup>

Diagnosis of lead poisoning is based on:

1) Laboratory Tests (a) Coproporphyrin in urine (CPU):- Measurement of CPU is a

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useful screening test. In non-exposed persons, it is less than 150 mg / liter.

(b) Amino levulinic acid in urine (ALAU):- If it exceeds 5 mg/ liter, it indicates clearly lead absorption.

(c) Lead in blood and urine: - Measurement of lead in blood or urine requires refined laboratory techniques. They provide quantitative indicators of exposure. Lead in urine of over 0.8 mg /liter (normal is 0.2 to 0.8 mg) indicates lead exposure and lead absorption. A blood level of 70 µg/100 ml is associated with clinical symptoms.

(d) Basophilic stippling of RBC: - It is a sensitive parameter of the hematological response.

(e) Urine lead level:- urine lead level >80µg/dl in 24 hour sample.

(f) X-ray:- Radio- opaque bands or 'lead lines' at the metaphysical plate of long bones are seen in children.

### **Management of Lead chronic poisoning:-**

#### **Prevention of Lead poisoning<sup>6</sup>:-**

1) Substitution- that is, where possible lead compounds should be substituted by less toxic materials.

2) Isolation – All process which give rise to harmful concentration of lead dust or fumes should be enclosed and segregated.

3) Personal protection- Workers should be protected by approved respirators.

4) Local exhaust ventilation- There should be adequate local exhaust ventilation system to remove fumes and dust promptly.

5) Good house-keeping- Good house - keeping is essential where lead dust is not present.

### **Management of Chronic Lead Poisoning according Ayurveda –**

*Ayurveda* treatment is beneficial for cases of chronic exposure to low levels of lead.

1. *NidanParivarjan*:-*Nidanparivarjan* is an integral parts of treatment of any disease from any *pathya* including *Ayurveda* .

2. *SamshodhanChikitsa* (Purification procedure):- Removal of accumulated lead and its chemical constitution and bio product will be achieved by doing either induced emesis or induced purgation or both as per clinical manifestation of *kapha / pittadoshavamana* or *virechana* it should be need to give *petisweda* ( sudation) to achieve and release of *kaphaanubandhi* accumulated poison in the *srotas*.

2.1 *Vaman* ( Induced Emesis)- At the day after *petisweda* juice of *LagenariaSiceraria* ( Bitter bottleguard) root 20ml with goat milk about 3 liter should be given in the morning to remove accumulated *srotoagat* lead posion by means of emesis<sup>7</sup>.

2.2 *Virechan* ( Induced Purgation)- Milky juice of *Euphoria nerrifolia* ( *Snuhi*) 125 ml dried in rock salt mixed with 500 ml *Triphala* decoction should be given early in

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the morning after sudation to remove *srotogat* lead toxin by means of purgation<sup>8</sup>.

2.3 *Yoga Basti*- *Yoga basti* may produce positive results to calm down the *vata-vyadhi* induced by lead toxicity. In *yoga basti*, the *Anuvasnbasti* should be given on the 1st day then *Aasthapan* and *Anuvasan* should be given on alternative day upto 8<sup>th</sup> day<sup>9</sup>.

*Anuvasanbasti*- *Anuvasanbasti* should be given by 100ml warm *nirgundi* oil after mixing 5gm *sandhavnamak*.

*Niruhabasti*- 400ml *Nirgundiquatha* after mixing 50gm *madhu*, 10gm *sandhavnamak* and 20gm *prajhpakadravya* should be given empty stomach.

**Table 5** Management of toxicity according to symptoms

Sr. no	Symptoms	Treatment
1	Anemia	<i>Punarnvmandur</i> -250mg BD <sup>10</sup>
2	Lead palsy	<i>Yogabasti</i> - as per schedule <sup>9</sup> <i>Brahatvatachintamani</i> -125mg <sup>11</sup> <i>Nirgundiswaras</i> <sup>12</sup>
3	Optic atrophy	<i>Tarpan</i> - as per Ayurvedicophthamologist
4	Colic	<i>Ajwayansatv</i> <sup>13</sup>
5	Constipation	<i>Eranda</i> oil- 10ml at bed time <sup>14</sup>
6	Atherosclerotic nephritis and interstitial nephritis	<i>Punarnavaquawitha</i> -20ml BD <sup>15</sup>
7	Effect on Liver- Acute or chronic degeneration leading to dyspepsia, anorexia, emaciation general weakness.	<i>Bhuaamalakiswaras</i> -15ml BD <sup>16</sup>

## DISCUSSION

Chronic toxicity of lead is one of leading health issue as it is affects various systems. It affects those persons who work at as motor vehicle assembly, panel beating, battery manufacture and recovery, lead mining and smelting, lead alloy production and in the glass, plastics and printing industries. Other occupations include ceramic and paint workers, automobile radiator repairs, and petroleum refining workers as well as welding, pottery and ceramic ware production and the production of jewellery.

Other than occupational exposure it also effects the human beings by the lead pipe's supplied water, through lead contaminated food, lead paints, vermilion applied to scalp. Clinically, lead produces toxicity in hematological system in the form of Anemia and facial pallor; toxicity of neurological in the form of lead palsy, lead encephalopathy and lead atrophy; toxicity of gastro-intestinal tract in the form of colic, constipation and degenerative liver disease. It also causes chronic toxicity of circulatory system, reproductive and renal systems.

The Ayurvedic evaluation of *srotavikriti* given to chronic lead toxicity indicates the *srotovikriti* in the form of *rasvaha*, *pranvaha*, *vatavaha*, *purishvaha*, *annavaha*, *asthivaha*, *sukarvaha*, *aartavvaha*, and *mutarvahasrotas*. Presence of lead in blood and urine, basophilic stippling of RBC and Radio-opaque bands or 'lead lines' at the metaphysical plate of long bones these are the pathological and radiological presentation of chronic lead toxicity. Substitution, Isolation, personal protection, Local exhaust ventilation and good housekeeping will help the patient to prevent the lead toxicity. Ayurveda has also stated the principle for prevention of any disease in the form of *nidanparivarjan*. Persistent, continuous, prolong exposure of lead causes accumulation within the various tissues of human beings which produce the chronic toxicity, the *dushivisha* also causes accumulation of inanimate poison (vegetable or metal or both), inanimate poison or artificial poison or combination of two or three above poison when its exposed continuously for prolong period and not removed from the body accumulate in the form of hydrophilic bonds<sup>17</sup>. Study shows that lead also accumulate within the cells especially bone, cartilage, bone marrow, hepatic tissue and nervous tissue due to persistent exposure for

prolong period, where rate of exposure than excretion of lead. Thus accumulation of lead may be one of the causes for *dushivisha* hence there is a need to remove this accumulated lead by using principle of management of *dushivisha* for *dushivishaaavarnjanyasampraptibhang* (destruction of pathogenesis).

Sudation- At first box sudation (*petisweda*) should be done after acknowledging the proper indication and examination of patient. Box sudation helps to liquefy the *dushivisha* in the form of accumulated lead and bring out it from cellular to intracellular spaces.

*Vaman* (induced emesis) or *virechna* or both play a major role in order to remove out this type of accumulated lead and its metabolites from human body. *Basti* is the half of treatment any *vata-vyadhi*<sup>18</sup> hence *yogabasti* which is given by *anuvasan* and *niruha* alternative will play a major role to control and cure *vatavyadhi* induced by lead. Once the *dushivishjanayaavran* is extracted from *vata*, there is need to give *sansamnachikitsa* (palliative treatment) for vitiation of *vata* and *vatavyadhi* produced due to lead toxicity.

The remaining symptoms like Anemia, Lead palsy, Optic atrophy, Colic, Constipation, Atherosclerotic nephritis and Interstitial nephritis, Effect on Liver will be managed by given *punarvvamandur*,



*yogabasti, bhriatvatachintamani,*  
*nirgundisavrasa, tarpana, ajwaiyansatv,*  
*erandaoil, punarvvaqwath* and  
*bhuaamalkisavrasa* , respectively.

Thus Ayurveda may play a major role in the management of chronic Lead toxicity.

## CONCLUSION

As per the above discussion we seen that lead toxicity can be treat easily with the help of Ayurveda principles and its root level.



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