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 dusihivisha in the form of lead. Hence it is need to removed first aavaran then the vatavyadyhiis to be treated. Petisweda, vamana and virechna may plays a major role to remove out this dusihivishajanayaaavran, the yogabasti may play a major role to control and cure the vatavyadyhi 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
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

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
Vermilion-Absorption of vermilion applied to scalp.

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Disease</th>
<th>Sign &amp; Symptoms</th>
<th>Dosha</th>
<th>Sarota</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Anemia</td>
<td>Fatigue, skin pallor, shortness of breath, dizziness or a fast heartbeat</td>
<td>Vata</td>
<td>Ras-vaha</td>
</tr>
<tr>
<td>2</td>
<td>Facial pallor</td>
<td>Due to vasospasm and produced by contraction of the capillaries at the arterial side</td>
<td>Vata</td>
<td>Pran-vaha</td>
</tr>
</tbody>
</table>

Table 2 Dosha and Sarotavikriti in Neurological manifestation due to Chronic Lead Toxicity

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

Table 3 Dosha and Sarotavikriti in Gastro-intestinal manifestation due to Chronic Lead Toxicity

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Disease</th>
<th>Sign &amp; symptoms</th>
<th>Dosha</th>
<th>Srotas</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Colic</td>
<td>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.</td>
<td>Vata</td>
<td>Purish-vaha</td>
</tr>
<tr>
<td>2</td>
<td>Constipation</td>
<td>Common feature and usually precedes colic. During pain, there is a desire for defecation.</td>
<td>Vata</td>
<td>Purish-vaha</td>
</tr>
<tr>
<td>3</td>
<td>Effect on Liver</td>
<td>Acute or chronic degeneration leading to dyspepsia, anorexia, emaciation general weakness.</td>
<td>Vata-pitta</td>
<td>Anna-vaha</td>
</tr>
</tbody>
</table>

Table 4 Dosha and Sarotavikriti in other systemic manifestation due to Chronic Lead Toxicity

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Disease</th>
<th>Sign &amp; symptoms</th>
<th>Dosha</th>
<th>Srotas</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Effects on circulatory system</td>
<td>Lead causes vascular constriction leading to hypertension and arteriolar degeneration.</td>
<td>Vata</td>
<td>Pran-vaha</td>
</tr>
<tr>
<td>2</td>
<td>Lead osteopathy</td>
<td>In children and young adults, lead is deposited beyond the epiphysis of growing long bones.</td>
<td>Vata</td>
<td>Asthivaha</td>
</tr>
</tbody>
</table>
| 3      | Atherosclerotic nephritis and interstitial nephritis | • Pain in the pelvis.  
• Pain or a burning sensation while urinating.  
• A frequent need to urinate.  
• Blood or pus in the urine.  
• Pain in the kidney area or abdomen.  
• Swelling of the body, commonly in face, legs, and feet. | 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*

Diagnosis of lead poisoning is based on: 1) Laboratory Tests (a) Coproporphyrin in urine (CPU): Measurement of CPU is a
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:
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/pittado/shavamana 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.

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
the morning after sudation to remove srotogat lead toxin by means of purgation.  

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 8th day.

Table 5: Management of toxicity according to symptoms  

<table>
<thead>
<tr>
<th>Sr. no</th>
<th>Symptoms</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Anemia</td>
<td>Punarnamandur - 250mg BD</td>
</tr>
<tr>
<td>2</td>
<td>Lead palsy</td>
<td>Yogabasti - as per schedule</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nirgundiswaras-12</td>
</tr>
<tr>
<td>3</td>
<td>Optic atrophy</td>
<td>Tarpan - as per Ayurvedicophamologist</td>
</tr>
<tr>
<td>4</td>
<td>Colic</td>
<td>Ajwayansata</td>
</tr>
<tr>
<td>5</td>
<td>Constipation</td>
<td>Eranda oil- 10ml at bed time</td>
</tr>
<tr>
<td>6</td>
<td>Atherosclerotic nephritis and interstitial nephritis</td>
<td>Punarnavaquawtha-20ml BD</td>
</tr>
<tr>
<td>7</td>
<td>Effect on Liver- Acute or chronic degeneration leading to dyspepsia, anorexia, emaciation general weakness.</td>
<td>Bhuamalakiswaras-15ml BD</td>
</tr>
</tbody>
</table>

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, asthvaha, sukavaha, aartavaha, and mutarvahasrotas. Presence of lead in blood and urine, basophilic stippling of RBC and Radiopaque 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 dusshivisha 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 bonds17. 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 dusshivisha hence there is a need to remove this accumulated lead by using principle of management of dusshivisha for dusshivishaaavarnjanyasampraptibhang (destruction of pathogenesis).

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

Vaman (indused 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-vyadhi18 hence yogabasti which is given by anuvasan and niruha alternative will play a major role to control and cure vatavyadhi induced by lead. Ones the dusshivishjanayaavran 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 punarvamandur,
yogabasti, bhriatvatchintamani, nirgundisavrasa, tarpana, ajwaiyansatv, eranda oil, 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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