

## CASE REPORT

# Lead Toxicity Following a Novel Method of Consumption as a Tea Preparation Using Vermillion for Arthralgia: A Case Report

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## Abstract

**Introduction:** In remote areas of India, folk medicine by local unregistered practitioners is quite common. Such practitioners use Sindoor or Vermillion, or Kumkum in their medicinal preparations to cure chronic ailments like joint pain, infertility, asthenia, impotence, and immunological disorders. Traditional Indian Vermillion is prepared using lime (calcium component) mixed with various natural ingredients like camphor, oil, agar, sandalwood paste, and turmeric. However, modern-day commercial Vermillion contains Lead tetroxide. The use of such lustrous synthetic Vermillion that contains Lead salts in folk medicine may cause Lead intoxication among the consumer tribal population.

**Case Report:** The case of a 51-year-old male admitted to our tertiary care institute with colicky abdominal pain and quadriplegia and a history of chronic tea intake containing synthetic Vermillion and turmeric as prescribed by local folk medicine practitioners is presented.

**Discussion:** People in remote areas of the tribal-state of Chhattisgarh (India) often consult a local traditional healer first and report to a modern health facility when things go out of hand. The instant case presented after development of quadriplegia, dysphagia, and dysphonia. He was diagnosed as a case of Lead toxicity based on clinical suspicion corroborated by blood Lead levels and was conservatively managed with BAL leading to satisfactory recovery.

**Conclusion:** In the case of Lead toxicity, early diagnosis, careful evaluation of complications, and immediate treatment are very important. As a preventive measure, medical systems need to educate and collaborate with traditional practitioners in the best interest of tribal people residing in remote areas of India.

**Keywords:** Synthetic Vermillion, Sindoor, Lead intoxication, Indian folk medicine; B.A.L.

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## INTRODUCTION

Traditionally, Vermillion (sindoor) is prepared from turmeric powder and alum mixed with lime powder moistened with water, alum, iodine, camphor, oil. It is also prepared from red sandalwood mixed with musk or saffron. This traditionally prepared Vermillion is rich in calcium salts and has anti-inflammatory and antioxidant properties. It has traditionally been used in therapeutic preparations of folk medicine to treat arthralgias and other chronic inflammatory diseases(1). Nowadays, in India, commercially manufactured cosmetic Vermillion is available and relatively inexpensive compared to the traditional Vermillion. Such commercially available Vermillion is made from synthetic dyes containing salts of Lead and Mercury to add lustrous red shades (2-4). Few folk practitioners in this tribal state of India use synthetically prepared Sindoor as a part of their therapeutic preparations. Their patients later pay the price by subsequent Lead or Mercury intoxication, depending upon the substance.

We present a rare case and analysis of chronic Lead intoxication due to consumption of tea mixed with compound of Lead as a part of therapeutic folk medicine.

## CASE REPORT

A 51-year-old male patient, with occasional history of alcohol consumption, reported to a tertiary care institute with complaints of nausea, abdominal colic, generalised weakness, breathlessness, insomnia, pedal oedema, and knee pain with reduced appetite for four weeks. He was prescribed antispasmodic drugs, vitamin supplements, and also advised routine blood investigation with the advice of regular weekly follow up.

Within a few days, he presented to the hospital with chief complaints of not being able to speak, and difficulty in swallowing associated with weakness of all four limbs (muscle atrophy). The patient stated that he was apparently alright, eighteen months back when he developed dull aching pain on his left leg that gradually increased over the year. He

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approached a local traditional practitioner of folk medicine in his village situated in a remote location of Chhattisgarh, a predominantly tribal state of India. He was advised to take a medicinal tea containing commercially available Sindoor (Vermillion) mixed with turmeric once daily for twenty days. Subsequently, he developed nausea, decreased appetite, changes in voice, weakness and breathlessness. He later sought treatment from an allopathic local private practitioner of a nearby village for the next five days. His condition improved due to abstinence from the folk medicine and symptomatic management. After discharge from the hospital, he resumed taking a pinch of Sindoor daily in raw form for the next ten weeks. His leg pain and pedal oedema did not improve; instead, his condition started deteriorating. He visited the outpatient department (OPD) of a tertiary care hospital for pain management but did not reveal the history of use of the folk medicine. After a few days of OPD visit, he was admitted to our hospital for worsening abdominal colic, muscle atrophy, pedal oedema, and inability to speak. Based on the symptoms and presence of bluish line on the gums of upper jaw (Figure 1); and the history of traditional folk medication revealed by his wife, the treating physician raised a strong suspicion of chronic Lead poisoning.



Figure 1. Lead line on gums

The investigation reports were positive for Lead intoxication and laboratory findings are summarised in Table 1. Blood investigations revealed normocytic normochromic anaemia with basophilic stippling. Chelation was started with British Anti Lewisite (B.A.L.) with a dose of 5mg/kg i.m for five days and was followed by oral chelation therapy with d-Penicillamine 250 mg tablets for next 10 days. Symptomatic

management of his symptoms was instituted. He recovered with partial muscle paresis and was discharged with Lead levels of 37.33 micrograms/ dl and advised periodic follow up every week. He continued weekly physiotherapy for muscle weakness. He gradually gained muscle strength over four weeks, and also his voice recovered to normal after four weeks of management.

## DISCUSSION

Several studies have reported Lead intoxication due to ingestion among children, whereas inhalational occupational exposure is common among adults. Recently, new forms of nonoccupational Lead poisoning are also reported (5-9). The measurement of blood Lead level (BLL) is the most common method for detecting and confirming Lead in the body (10). Symptoms usually arise when the BLL exceeds 60 micrograms/dl in adults (10). Lead poisoning often presents with a variety of non-specific major and minor signs and symptoms based on the interval of exposure, characteristics of the individual exposed, form of Lead, and route of exposure (10, 11). Chronic exposure to Lead imbalances the blood homeostasis and also cause brain dysfunction, motor impairment, and cognitive dysfunction (11-14). In the case of Lead toxicity, early diagnosis, careful evaluation of complications, and immediate treatment are very important. A study conducted by Manthali P. Shah & Dereck G Shendell et al. on various Vermillion (Sindoor) samples collected from Indian markets of Mumbai and Delhi found that commercial Sindoor contains Lead. However, it contains less than the US FDA limit of 20 micrograms per gram; still, it poses a health hazard because Lead has no known safe exposure level (3). In our case, a middle-aged male distressed by unresolved knee arthralgia landed up in unintentional chronic Lead poisoning due to Lead laced tea consumption using Sindoor and turmeric, as prescribed by a local folk medicine practitioner. The patient reported to our institution with severe quadriplegia with the inability to walk and speak, with serum Lead levels of 119 ug/dl but after conservative management of four months recovered satisfactorily. In a case report by Mehdi Mesri et al (15). A patient with complete quadriplegia and sensory impairment due to chronic Lead intoxication due to the habit of keeping Lead bullets in mouth, reported with serum Lead level of 150 ug/ dl. Still, recovery from quadriplegia took over one year (15). Beig Mohammadi et al (16). reported one case of consumption of Lead-contaminated opium over two months, followed by quadriplegia with respiratory paralysis with BLL of 200

Table 1. Summary of laboratory data of patient.

Sl. No.	Parameters	Day 1	Day 5	Day 12	Day 24
1	Blood lead levels (Atomic absorption spectroscopy) (microgram/dL)	119.10	66.51	52.27	37.33
2	Hemoglobin (Hb) (g/dL)	7.0	9.5	10.4	12.3
3	Serum Urea (mg/dL)	47	27	28	32
4	Serum Creatinine (mg/dL)	1.18	0.79	1.03	0.89
5	Total Bilirubin (mg/dL)	1.64	-	0.23	-

µg/dL. With treatment, though the respiratory symptoms resolved, quadriplegia persisted (16). Our case perhaps had less exposure with Lead levels of 119 µg/dL and hence completely recovered in seven months. Beattie A D et al also reported a case of quadriplegia as result of intravenous injection of opium suspension contaminated with Lead and BLL of 202 µg/dL at admission. The patient eventually succumbed after 2 weeks (17). Overt neuropathy is usually reported in individuals with blood Lead concentrations greater than 100 µg/dl (16). However Farzaneh E et al reported a case of chronic oral opium abuser with BLL of 88.8 µg/dL with quadriplegia and completely recovered in 4 weeks with chelation therapy (18). Shobha N et al reported a case of BLL 55.8 µg/dL and neuropathy with muscle weakness in upper limbs. Only 50% recovery was seen after four months of chelation therapy (19). Razmeh S et al reported a case of chronic opioid abuser adult male, reported with progressive flaccid quadriplegia and dysarthria. On admission his BLL was 256 µg/dL, and later recovered with within eight weeks of chelation therapy. Relationships between blood Lead concentrations, clinical findings, and recovery period have generally been based on the amount of Lead consumption and period of exposure. Faith of the tribal and rural people in herbal and traditional medicine is strong and the popular belief is that these medicines do not have any adverse effects. People in remote areas of the tribal-state of Chhattisgarh mostly consult a traditional healer first and after either deterioration or no relief, they decide to go to a medical facility. These traditional practitioners, being the first contact persons for medical solutions of the tribal population, need to be educated about the adulteration of chemically manufactured products they usually use as an adjuvant in preparing traditional medicines. We should also acknowledge the role and importance of context, including socio-culture beliefs, practices, and traditions to explore the possibility of different medical systems to work collaboratively. This will then help in fostering the inclusive form of medical therapy and preventing such exposures in the best interest of the people residing in tribal and remote areas.

## CONCLUSION

One must have a high index of suspicion for heavy metal poisoning and recognize the constellation of signs and symptoms. However, they must also take a thorough and probing history from the patients coming from remote areas or tribal belts, asking specifically about the consumption of local therapeutic medication. There is a strong need for widespread education and awareness related to the sources of Lead intoxication and its hazards available in local languages. Primary prevention can be achieved by banning or restricting the use of such Lead-containing cosmetic products in any preparation for human consumption. This involves eliminating Lead-adulterated Sindoor from stores, substituting other ingredients determined to be safer than Lead, and conducting premarket testing of powders used for cosmetic purposes in India. Current medical systems need to educate and collaborate with traditional practitioners in the

best interest of people residing in remote areas of tribal states in India.

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