CASE REPORT

LEAD TOXICITY AS A RESULT OF HERBAL MEDICATION

Ravi Raja A, Vishal Babu G N, Geraldine Menezes and Venkatesh T

Department of Biochemistry and Biophysics, St. John's Medical College, Koramangala, Bangalore, Karnataka-560034.India.

ABSTRACT

Awareness about the toxic effects of non-essential metals is still lacking in developing countries. Lead is one among them, which ranks second in the Agency for Toxic Substances and Disease Registry's top 20 lists of toxic metals. Some of the herbal medicines prepared from certain roots and leaves are known to contain this toxic metal at alarming levels. We have a case of a person who suffered from the toxic effects of lead such as vomiting and colicky abdominal pain after consuming a herbal remedy for Jaundice treatment. This went unrecognized initially because of the presence of multiple problems like Malaria and Renal calculi. Lead poisoning as causative factor for anemia, vomiting and colic were confirmed only when blood lead concentration was estimated. A combination of chelation therapy and nutritional supplementation was found to be useful in reducing the body lead burden.

KEY WORDS

Lead Toxicity, Herbal medicine, Jaundice, Abdominal Pain

INTRODUCTION

Lead poisoning is an environmental disease and is also a well-known disease of lifestyle (1). Lead is a ubiquitous and versatile toxic heavy metal, which has been used by mankind for over 6500 years. As a result of human activities it is continuously contaminating the environment and is one of the most widely distributed toxins in the environment today (2). The combination of physical and chemical properties has made it a very useful metal (3).

Lead enters the body by routes such as inhalation, ingestion or by dermal contact, undergoes cumulative storage and it has no known biological functions (4). Major organs and systems like Nervous system, Hematopoietic system, Digestive system, Cardiovascular system, Reproductive system, Skeletal system, Immunological system and Renal system are effected by lead (5)

Address for Correspondence :

Mr. Raviraja A

St. John's Medical College

Koramangala, Bangalore, Karnataka- 560034 India.

9342042598 (Mobile)

E-mail: raviraj_po@rediff.com, raviraj.po@gmail.com

Humans are exposed to lead from different environmental sources such as air, soil, food, drinking water or from different occupational & recreational sources and also occasionally from sources like folk remedies, cosmetics, moonshine whisky and gasoline huffing. Folk and herbal remedies from the Indian subcontinent are a significant unrecognized source of lead toxicity (6).

A Case of Lead poisoning: A 39year old male patient from a village in Goa, India was referred to National Referral center for lead poisoning in India (NRCLPI), for the evaluation of Lead poisoning. History revealed his habitual consumption of herbal medicines-for any kind of illness. This time he had consulted a traditional practitioner for the treatment of jaundice in his village, who gave him a syrup called **Kadda** (in local language). After consuming 10 to15ml of Kadda everyday morning on empty stomach, for a period of 10 days, the patient experienced vomiting and severe abdominal pain. As the syrup did not cure jaundice he was admitted to Government Hospital for the treatment, twice- on two occasions within a short period of two weeks. All possible investigations including HbSag & HIV were carried out. Results of Biochemical investigations showed all normal except for mild elevation of total serum bilirubin -1.6 mg/dl (normal-0.2 to 1.0mg/dl) and Unconjugated bilirubin -1.3mg/dl (normal-0.2 to 0.6 mg/dl) suggestive of

hemolytic jaundice. An abdominal CT scan revealed the presence of a 3mm calculus on the left kidney.

With persisting Vomiting and severe abdominal pain, he was referred to a super speciality private hospital in his place. At the time of admission - blood pressure was 130/90 mm of Hg; pulse rate was 76/minute & had no history of diabetes mellitus and hypertension. Laboratory investigations showed a decrease in Hemoglobin-7.8g%. Repeat CT scan confirmed the presence of left renal calculus (Picture-1). Endoscopy was normal. A barium meal & follow through study did not reveal any abnormality in the small bowel. Two days later after the admission the patient suffered from fever with chills. So test for malaria along with ICT, WIDAL, tests for *Leptospira*, *Brucella*, & dengue were carried out. All tests were negative. Emperic Falcigo (antimalarial) and ceftriaxone were started. A surgical opinion was sought because of the persistent abdominal pain and fever. Urine examination, which was normal initially, had shown 10-12 WBCs on repeat examination. During this time as a work up for anemia, a rectic count was done which was raised and suspected a possibility of hemolytic anemia; the entire work up for hemolytic anemia included sickle test, hemoglobin variant analysis, Indirect Coomb's Test, Osmotic fragility, Sucrose lysis test for Paroxysmal nocturnal hemoglobinuria cells and Ham's test and were found to be negative.

As the fever was not coming down, the smear for malaria was repeated including the indirect Coomb's test that was positive this time and Chloroquine was given. It was also noted that the W.B.C count was progressively coming down and showed leucopenia on the blood picture and a possibility of drug-induced cause was found out. Chloroquine was stopped and Piperacillin-Tazobactam was started.

The fever and vomiting gradually subsided but not the abdominal pain. A bone marrow examination revealed Microcytic Blood picture. Diagnosis was made as a case of Vivax Malaria with Microcytic hypochromic anemia with renal stone. For renal stones treatment was advised at a later stage and in view of the persistent abdominal pain, doctors suspected lead Poisoning and the patient was sent for Blood Lead analysis to the NRCLPI at Bangalore. He presented with extreme weakness of both lower limbs and abdominal pain. His Blood Pressure was 132/86 mm Hg, Heart rate 84/min. Blue lines on gums were not detected on routine examination.

MATERIALS AND METHODS

Blood was collected by venipuncture into dipotassium EDTA

& plain vacutainer for blood lead estimation and for other parameters respectively.

For blood lead estimation 100µl of blood was mixed with 2.9ml of metexchange reagent, allowed to stand for 24 hours. Blood lead was estimated by Anodic Stripping Voltammetry using ESA-3010B lead analyzer. Analysis of other Biochemical parameters was carried out by Excel-300 ERBA analyzer. Hb% was estimated by Drabkins method & δ -aminolevulinic acid dehydratase by Berlin & Schaller's method. Both Internal quality control and external quality control -Interlab comparison were carried out and the results were satisfactory.

RESULTS AND DISCUSSION

Results of investigations carried out at NRCLPI are given in Table 1

Table 1 : Blood lead and other Biochemical Investigations of the Patients

Name of the Investigation	Result	Normal Range
Blood Lead (µg/dl)	57.3	Safe level- < 9 As per CDC & OSHA
Hemoglobin (g/dl)	8.8	13.5-18
δ -Aminolevulinic (U) acid dehydratase	23.6	54.5±9.8
Random Blood Sugar (mg/dl)	89	70-160
Blood Urea (mg/dl)	27	10-45
Serum Creatinine (mg/dl)	0.9	0.5-1.5
Serum Uric Acid (mg/dl)	6.8	3-7.5
Serum Bilirubin - Total (mg/dl)	1.4	0.1-1.2
- Direct (mg/dl)	0.2	0.0-0.3
- Indirect (mg/dl)	1.2	0.2-0.8
Serum Aspartate Transaminase (U/L)	27	0.0-37
Serum Alanine Transaminase (U/L)	32	0.0-40
Serum Alkaline Phosphatase (U/L)	90	40-170
Serum Lactate dehydrogenase (U/L)	340	239-460
Serum Gamma Glutamyl (U/L) Transpeptidase	36	0-40
Serum Total Proteins (g/dl)	6.6	6.0-8.0
Albumin (g/dl)	3.8	3.5-5.0
Globulin (g/dl)	2.8	1.8-3.6
A/G Ratio	1.35	1.2:1
Serum Calcium (mg/dl)	8.6	9-11
Serum Phosphorous (mg/dl)	4.2	2.5-4.5

a Plain

b Contrast

Picture 1 : CT Scan picture showing renal stone of 3 mm in the left kidney

All Biochemical parameters were found to be within normal limits except for a decrease in hemoglobin and a slight decrease in calcium levels. Most significant findings were- elevated blood lead level and elevated systolic and diastolic blood pressure. Basophilic stippling was not noted in the peripheral smear. Liver enzymes and the renal parameters were within normal limits indicating that the liver and kidneys were not affected at this blood lead level.

We were unable to estimate the lead content of the syrup – Kadda, because the patient had consumed the entire syrup given to him. Occasional cases of Lead poisoning due to consumption of folk remedies have been described in the past. For example- Mexican traditional remedies-“azarcon”(lead chromate) & “greta”(mixed lead oxides) are known to contain more than 70% of lead and were used in the treatment of “emphaco”, a gastrointestinal disorder (7). A case of lead poisoning due to infertility treatment by herbal medicine was also reported recently from NRCLPI (8).

Lack of awareness of the toxic effects of lead, its exposure routes and its safe handling still persists among people and proper guidance in this subject is required. In this case, the patient went for the treatment of Jaundice by herbal medicine with a belief that herbal medicines are the best and safe remedies. Since the patient had a history of consuming herbal medicines, he might have received lead from medicines treated previously, eventually resulting in shortened life span of erythrocytes leading to jaundice. In addition the syrup Kadda supposedly contained high amount of lead and this gradual chronic intake is responsible for the toxic effects like abdominal pain and vomiting. Increased lead content in herbal medicine

may be either due to increased soil lead levels where the plants or roots used for the preparation of the syrup are grown or due to preparation of these medicines in lead containing vessels or due to the addition of lead salts in these remedies

He was subjected to chelation therapy to lead poisoning with D-Penicillamine-250mg twice a day for a period of one month. He was also advised to take a diet rich in calcium, iron and zinc and to drink more water & other fluids, which can help in the chelation & excretion of lead from the body. The follow up of patient after one month revealed disappearance of

Table 2 : Investigations of Patients carried out two months after stoppage of d-Penicillamine treatment

Name of the Investigation	Result	Normal Range
Blood Pressure (mm Hg)	124/82	120/80
Blood Lead (µg/dl)	23	Safe level- < 9 As per CDC & OSHA
Hemoglobin (g/dl)	13.8	13.5-18
δ-Aminolevulinic acid (U) dehydratase	44	54.5+ 9.8
Serum Bilirubin -Total (mg/dl)	1.28	0.1-1.2
-Direct (mg/dl)	0.25	0.0-0.3
-Indirect (mg/dl)	1.03	0.2-0.8
Serum Aspartate Transaminase (U/L)	27	0.0-37
Serum Alanine Transaminase (U/L)	34	0.0-40
Serum Alkaline Phosphatase (U/L)	105	40-170
Serum Gamma Glutamyl (U/L) Transpeptidase	32	0-40
Serum Calcium (mg/dl)	9.0	9-11

abdominal pain, decreased blood lead level of 32.1µg/dl and an increase in Hemoglobin level of 10.2 g %.

This clearly showed that a combination of drug therapy and nutritional supplement would be useful in rapid improvement of the condition. He was advised to discontinue the chelation therapy. Blood lead, Liver Function Tests & hemoglobin analyzed two months after discontinuing the therapy were found to be normal & the results are given in Table2. Lead poisoning in this adult proved to be treatable.

REFERENCES

1. Abraham M George, editor. "History of lead poisoning in the world". Proceedings of the international conference on lead poisoning prevention & treatment; 1999; February 8-10; Bangalore, India p.17-25.
2. Abraham MG, editor. The impacts of lead poisoning in the workplace and society. Proceedings of the international conference on lead poisoning prevention & treatment; 1999; February 8-10; Bangalore, India p. 41-45.
3. World health organization, Geneva. "Inorganic lead". Environmental health criteria. No.165; 1995: 19-25.
4. Venkatesh T. The effects of environmental lead on human health- a Challenging Scenario. Environmental health focus 2004;2 (1): 8-16.
5. Goldfrank, Flomenbaum, Lewin, weisman, Howland Hoffmann. Goldfrank's Toxicological Emergencies 6th ed. Appleton & Lange, Stanford, Connecticut (USA); 1998: 1277-1309.
6. Smitherman J, Harber P. A case of mistaken identity: Herbal medicine as a cause of -Lead toxicity. Am J Ind Med 1991; 20(6): 795-8.
7. Trotter RT. The cultural parameters of lead poisoning: A medical Anthropologist's view of intervention in environmental lead exposure. Environ Health Perspect 1990; 89:79-84.
8. Geraldine M, D'Souza SH, Venkatesh T. Lead poisoning as a result of infertility treatment using herbal remedies. Arch Gynecol Obstet 2007; 275: 279-81.