

# Blood lead level among fuel station workers, Ganesh idol painters, persons with routine daily application lead containing black pigment to eyes and Garage workers

Himmatrao Saluba Bawaskar<sup>1</sup>, Pramodini H. Bawaskar<sup>1</sup>

<sup>1</sup>Bawaskar Hospital and Clinical Research Center, Mahad, Raigad, Maharashtra, India

## ABSTRACT

**Background and Aims:** The aim of this study is to determine the lead level in blood, workers expose to lead. **Methods:** 42 subjects blood was analyzes for Lead. 21,14,2,5 persons are from fuel station workers, idol painters, application of lead containing pigment to eyes and garage workers respectively. Studied from January 2012 to 2017. Analysis blood by method of inductivity coupled atomic emission spectroscopy. **Results:** 21 fuel outlet works 11 (45.83%) Lead levels in blood were from 35.4 to 190 (mean 72.77) mcg/dl, remaining 10 lead levels were <10 mcg/dl. Out of 14 idol painters 9 (64.28%) persons blood Lead levels were 10.06 to 18.57 (12.57) mcg/dl, remaining 5 it was <10 mcg/dl. 2 Surma application to eyes their Lead levels were 29.22 and 10.93 respectively. 5 garage workers Lead levels were 13.54 to 46.75 (mean23.52) mcg/dl. **Conclusion:** Occupation exposure to lead containing fuel, paints, surma and garage workers blood levels of lead is significant.

**Keywords:** Fuel station, Ganesh idol painters, garage workers, lead, surma

## Introduction

Lead is one of the oldest known and most widely studied occupational and environmental toxins.<sup>[1-3]</sup> Fuel station workers are constantly exposed to leaded gasoline products. Lead at the fuel station release from emissions in the form of fine particles that are inhaled and absorbed through the lungs parenchyma, by ingestion and through the skin exposure.<sup>[4]</sup> Clinical or subclinical toxic effects of lead can manifest below the limit of 50 ug/dl in the whole blood.<sup>[5]</sup> Determining and controlling lead exposure amongst the risk workers is very important. Lead is toxic to many organs and tissues including heart kidney, intestine, blood, bones, reproductive and nervous system. Common manifestations of toxic levels of Lead include abdominal colic, headache, anemia,

irritability, neuropathy, convulsions, coma and death. Occupation exposure is common cause of lead intoxication. Exposure to lead-containing paints is another cause of lead toxicity. Indian paints contain high and unacceptable amount of lead. Lead in paints has been indicted for being a silent epidemic of lower IQ in children.<sup>[6]</sup> We report blood lead levels in fuel station workers, painters, surma applicants and Garage workers.

## Methods

### Index case - 1

How we became interested in this study. A 62 year old man reported in outpatient department with history recurrent pain in abdomen, constipations, weakness and recurrent breathlessness. He was examined by nine doctors and prescribed vitamins, cathartic and antispasmodic. He gave history of working at fuel station since last 35 years. Irrespective of regular consumption of cathartic, there was no complete evacuation of bowel. He

**Address for correspondence:** Dr. Himmatrao Saluba Bawaskar, Bawaskar Hospital and Clinical Research Center, Mahad, Raigad - 402 301, Maharashtra, India. E-mail: himmabawaskar@rediffmail.com

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was non smoker. On examination, his blood pressure was 160/100 mmhg, ECG showed peaked *P* waves. There were rales and broncho-spasms. SPO<sub>2</sub> 95% at ambient air. He was confused and his accompanied son complained that his memory of remembering recent and past incidences is reduced. Ankle reflexes were absent. There was no wrist or foot drop. His hemoglobin was 11 mg/dl. No basophilic stippling seen in peripheral blood. Thyroids function tests were normal. No blue lead line over gum seen. Skin over the dorsum hands were discolors. His serum lead level was 190 mcg/dl. He denied further investigation and treatment. His knee X-ray showed loose line and osteoporosis.

### Insert Figure 1

With this index case we decided to study the fuel workers and investigate them for blood lead level. Initially details oral discussion was done with the managers of fuel stations. Written consent was obtained from each worker for blood investigations such as *haemogram*, ECG, blood pressure and blood Lead level. A total of 21 workers working at fuel station were investigated. Details is given in Table 1.

### Index cases 2

A 59-year-old male working in two wheeled vehicles repairing garage since last 23 years. Complained of recurrent constipation, pain in abdomen and loss of appetite since last 2.5 years. He denied history of smoking and alcohol consumption. He complained of recurrent cough and breathlessness. He was a non-smoker. He was examined by many doctors and prescribed him cathartic and antispasmodic and anti-anemic. His blood pressure was 140/100 mm hg. Laboratory investigations showed, hemoglobin 9.1 gm/dl, raised serum lipid levels [serum cholesterol 232 mg/dl, triglyceride 1138 mg/dl, VLDL 228 mg/dl, blood sugar fasting 161.1 mg/dl/(normal 70-110 mg/dl), post lunch blood sugar was 243.9 mg/dl (normal 70-140 mg/dl), serum creatinine was 1.05 (normal 0.5 to 1.4 mg/dl), TSH was 1.64 uIU/ml (normal 0.2-5), vitamin D3 13.7 (normal 30-60 ng/ml). Blood lead level

was 46.76 ug/dl (normal 0-9). He denied advice to leave the job. He was advised strictly to use routine face mask while working at garage. Diabetes and blood sugar was controlled with oral drugs. He was followed every month and there was clinical improvement in form of reduction the attack of abdominal colic, reduced breathlessness, improved appetite. At end of six months with regular use of face mask at work. He was investigated for blood lead level and it was 8.6 ug/dl. He was symptom free. We investigated the remaining four workers from same garage details of these cases shown in Table 1. We studied in details the lead sources in routine occupation. In the coastal region Ganesh (god of respect) idols made of mud and then painted it with various color paints. Such 14 worker from Ganesh idol painting were investigated and their details are given in Table 1. Surma, a black pigment containing lead, are routinely applied to eyelids as source to keep the eyes cool myth. Details of two people of routine use of Surma [Figure 2] [see Table 1].

Blood lead level investigation- five cc of blood is collected in a sterile glass tube and airlifted in cold storage (ice packs) to Amrita institute of medical sciences and research centre (an ISO 90001 certified hospital) Department of analytical toxicology and poison information centre (WHO –authorized poison control centre Cochin. Limit of detection for lead (Pb) by ICS-AES is 3 mcg/dl.

### Discussion

Lead is one of the toxic substance one of the oldest known work and environmental hazards. It can affect the functions of various organs including brain, blood, bone and gastrointestinal. Various occupation involved lead containing substance such fuel, paints, Surma and Garage<sup>[7]</sup> lead is consumed by humans by ingestion and inhalation. Chronic lead exposure in adults can result in hypertension noted in 6 (14%) persons of present study. loss of memory accompanied significant chronic rise in Lead level (see case 1). Most of the oil based enamel paints contained lead above 5000 ppm. Analysis blood for lead level has been presently accepted the most reliable biomarker.<sup>[8]</sup> The result of present showed that 52% of fuel, 64% painters,



Figure 1: Loose metaphyseal line



Figure 2: Surma a black pigment applied to eyelids

**Table 1: Showing details of investigated cases for blood lead level**

Clinical	Fuel outlet workers Total 21	Painting of Ganesh Idols Total -14	Surma Applications Total 2	Garage Workers N-5
Lead level mcg/dl	35.4-190 (mean 72.77)	<10	10.06to 18.57 (12.57)	<10
Total	11	10	9	5
Age in years (mean)	34-65 (38)	20-58 (37)	19-60 (32)	23-62 (40)
Weakness (%)	7 (64)	1 (10)	2 (25)	1 (20)
Abdominal pain	5 (45)	-	-	-
Parasthesias (tingling and numbness)	8 (73)	-	1 (12.5)	-
Constipation	10 (91)	2 (20)	5 (63)	1 (20)
Anemia	3 (28)	2 (20)	-	-
Headache	6 (55)	1 (10)	2 (25)	-
Giddiness	5 (45)	-	2 (25)	1 (20)
Anorexia	6 (55)	1 (10)	2 (25)	-
Hypertension	2 (18)	-	2 (25)	-
Skin changes	5 (45)	2 (20)	2 (20)	-
Tendon reflexes absent	11 (100)	2 (20)	1 (12.5)	-
Years of exposure	3 months to 41 years (17)	2-17 (10)	9-30 (14)	12-40 (18)
			20	10
				5 male
				25to59 (39.8)
				+4
				+2
				+3
				2
				1
				2
				2
				-
				yes
				>20 years

and all the five from garage works blood lead levels are higher. Moreover higher levels of lead found in those workers exposed to lead fumes for long duration [Table 1]. Irrespective of similar exposure of fuel workers the lead level varies [Table 1]. Lead toxicity and individual s depend upon the ratio of delta-aminolevulinic acid dehydrates (ALAD) to restored ALAD. Workers who are heterogeneous or homogenous for ALDA-2 have blood lead levels higher than those of similar exposed workers who are homogenous for ALDA-1.<sup>[9]</sup>

World health organization task Group confirmed that prolonged lead exposure with blood lead levels greater than 70 ug/dl may result in chronic irreversible nephropathy<sup>[10]</sup> Early symptoms of lead poisoning are nonspecific includes depression, intermittent abdominal colic, constipation, weakness, anorexia and fatigue. In this study constipation (91%) parasthesia (73%) and absent of tendon reflexes (100%). Symptoms are chronic and persist for long duration, the half-life of lead in bone is estimated to be 10 to 30 years.<sup>[11]</sup> During routine general practice these poor people working at fuel station, garage workers, paint workers and others expose to lead fumes are usually attend to family physician with vague symptoms, unless one keep in mind the possibility of lead toxicity and its clinical effects such as chronic abdominal pain with constipation, anemia, motor neuropathy such as foot drops, and encephalopathy one may miss the treatable emergency.

Lead is widely studied environmental contaminants. Interactions between lead and water chemistry influence lead bioavailability.<sup>[12]</sup> At Workers at fuel stations exposed to benzene vapors and exhausts during duties, benzene vapors exposure induced significant increased serum lead levels.<sup>[13]</sup> Exposure to lead glazed ceramics remains a public health problem<sup>[14]</sup>

There is no safe threshold for lead exposure has been discovered. Thus there is no known amount of lead that is too little affecting

the body. The world health organization state that blood level of 10 ug/dl or above is need close monitoring Various control measures to prevent accumulation lead in the blood of workers can be achieved by reduce duration of exposure by shift duties or off duties. Face mask and gloves (case 2). Personal hygienic such care full washing of hands and expose part, healthy food, avoiding smoking and drinking.<sup>[15]</sup> Periodic screening and significant rise in lead levels victim should be removal from exposure and chelating therapy.

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient (s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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### Conflicts of interest

There are no conflicts of interest.

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