

## Estimation of Lead (Pb) in the Blood of Road Shopkeeper of KPK, Pakistan

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**Abstract:** The aim of this study was to investigate the content of Lead(Pb) in the blood of road side shopkeeper facing environmental pollution every day. Ten samples of blood were collected from the people belonging to different area of the province of Khyber pukhtunkhwa, Pakistan. The results were analyzed for lead content in the given samples, which showed the concentration in the range of 227.5± 25.4 µg/dl, 270.5± 40.5 µg/dl, 271.5± 48.9 µg/dl, 288.4± 62.9 µg/dl, 299.6± 68.8 µg/dl, 315.1± 12.1 µg/dl, 321.3± 50.4 µg/dl, 339.7± 85.3 µg/dl, 376.1± 05.1 µg/dl and 381.1± 55.5 µg/dl respectively. The blood samples collected from Karak, Lakki, Nowshehra, Charsada and Mansehra contained the lead content above 300µg/dl, while the blood samples collected from Hangu, D.I Khan, Kohat, Peshawar and Mardan contained the lead content below 300µg/dl. These results clearly indicated that the people belonging to Karak, Lakki, Nowshehra, Charsada and Mansehra are facing more pollution of lead than the rest one.

**Key words:** Environmental Pollution • Lead • Concentration

### INTRODUCTION

Lead poisoning effect has been known since ancient times. In 200 BC the Greek physician Dioscorides observed that “lead makes the mind give way.” But in the beginning of the 19<sup>th</sup> century, lead poisoning was founded largely as an occupational disease of adults. Lead poisoning is now well documented and persists as a major public health problem throughout the world. Clinical features of severe lead poisoning include abdominal pain, headache and confusion. Sometime renal failure and convulsions can occur and extremely high levels may lead to coma and death [1, 2]. Lead is a toxic and a cumulative metal whose extensive use has created foremost environmental contagion and health problems worldwide. It is estimated that, every year 143000 deaths occurs due to Human exposure to lead and 0.5-0.8% of the global burden of disease. Lead also affects multiple body systems, including the hematological, neurological, gastrointestinal, cardiovascular and renal systems [3, 4]. Lead is widely used in Pakistan, because of its easy

availability and resistance to corrosion. Research studies on lead detection in human blood have so far been conducted in Pakistan which reveals that blood lead levels of both general populations as well as of industrial workers are much above the internationally acceptable limits (40µg/dl). The Lead content can be fully controlled by removing it from the industry [5]. Lead is moved as small particulate in food chain, ingested in food and water, which absorbed through lungs and gastrointestinal tract, as a result cumulated in bones and soft tissues. This absorption, storage and excretion of lead, modify the blood lead concentration in the body and therefore, its effects. Few studies have conducted on lead detection in blood of general men and traffic police in Pakistan have shown high blood lead levels. Previous study has been shown that traffic police perform their duty at various traffic control stations in Karachi who were regularly exposed to vehicle exhaust fumes in controlling traffic, had alarmingly higher blood lead levels as compared to common men [6-8]. The use of leaded eye cosmetics has been observed to be strongly correlated with elevated

blood lead levels. Common sources of lead in children and adults include industrial, paint, water, soil, air, dust, food, ethnic folk remedies, trinkets, cosmetics and mining activities. The absorption of lead are affected by an individual's nutritional status, health and age [9]. This study was conducted to determine the blood lead levels in shopkeepers working in different area of Khyber pukhtunkhwa (Karak, Lakki, Nowshehra, Charsada, Mansehra, Hangu, D.I Khan, Kohat, Peshawar and Mardan) in order to assess the effects of environmental pollution on the levels of lead metal in blood.

### MATERIAL AND METHODS

Blood samples were collected from Ten shopkeepers Performed their duties in different areas of Khyber Pakhtunkhwa, Pakistan. The subjects were 19 to 45 years old and performed 12-14 hours duty every day. Approximately 5 ml blood was collected from each subject through sterilized syringes which was quickly transferred to test tubes already containing EDTA (Ethylene diamine tetra acetic acid). For extract 1ml of blood with 0.5 ml of  $\text{HNO}_3$  was taken in volumetric flask and was dried on hot plate for three hours at 30 °C until the powder was obtained and then it was mixed with distilled water and then filtered and transferred to conical flask and made the volume upto 50 ml [8].

Amount of Blood: 1ml

No. of Digests: 10(5 outdoor subjects and 5 indoor subjects)

Acid:  $\text{HNO}_3$

Metal: Lead (Pb)

### RESULTS AND DISCUSSION

Ten blood samples were analyzed to investigate the lead content. The sample analyzed show that Lead was detected in all samples of blood with different concentrations, as given in table 1. The concentration of Lead was in the range of 381.1 $\mu\text{g}/\text{dl}$  (Mansehra), 376.1 $\mu\text{g}/\text{dl}$  (Charsada), 339.7 $\mu\text{g}/\text{dl}$  (Karak), 321.3 $\mu\text{g}/\text{dl}$  (Nowshehra), 315.1 $\mu\text{g}/\text{dl}$  (Lakki), 299.6 $\mu\text{g}/\text{dl}$  (Hangu), 288.4 $\mu\text{g}/\text{dl}$  (DI Khan), 271.5 $\mu\text{g}/\text{dl}$  (Mardan), 270.5 $\mu\text{g}/\text{dl}$  (Kohat) and 227.5 $\mu\text{g}/\text{dl}$  (Peshawar) respectively.

The aboveresults clearly indicated that the blood sample collected from Mansehra contained more concentration of lead (381.1 $\mu\text{g}/\text{dl}$ ). Similarly the blood sample collected from Charsada also contained nearly the same value of lead (376.1 $\mu\text{g}/\text{dl}$ ), as calculated for Mansehra. The concentration of Lead in the blood sample of Karak, Nowshehra and Lakki were found in the range of 339.7 $\mu\text{g}/\text{dl}$ , 321.3 $\mu\text{g}/\text{dl}$  and 315.1  $\mu\text{g}/\text{dl}$ . The blood sample collected from Peshawar showed less concentration of leads *i.e.* 227.5 $\mu\text{g}/\text{dl}$ . Similarly other blood samples were found in the range of 270.5 $\mu\text{g}/\text{dl}$  (Kohat), 271.5 $\mu\text{g}/\text{dl}$  (Mardan), 288.4 $\mu\text{g}/\text{dl}$  (DI Khan) and 299.6 $\mu\text{g}/\text{dl}$  (Hangu) respectively.

The results given in table1 showed that Mansehra, Charsada were found more polluted area because of their higher lead level, while Peshawar was considered less polluted area due to small content of lead. The blood lead levels ranged from 227.5  $\pm$  381.1  $\mu\text{g}/\text{dl}$  with mean values 309.08  $\pm$  45.49  $\mu\text{g}/\text{dl}$  among shopkeepers. The result obtained for the blood Lead levels (309.08  $\pm$  45.49  $\mu\text{g}/\text{dl}$ ) for shopkeepers belonging to different area was higher than controls (40  $\mu\text{g}/\text{dl}$ ). These differences may be due to exposure to air, which contains dust particles rich in lead.

In the present study the mean value for blood lead levels (309.08  $\pm$  45.49  $\mu\text{g}/\text{dl}$ ) when compared with the study conducted in Karachi (47.8 $\pm$  15.8  $\mu\text{g}/\text{dl}$ ), it was found that mean lead level in blood of shopkeeper in the recent study was much higher than traffic police constable in Karachi. The similar study conducted in traffic police constable of Islamabad when compared with the present study and with the values of Karachi, it was found that the mean lead level (27.27 $\pm$  4.04  $\mu\text{g}/\text{dl}$ ) in traffic constable of Islamabad was lower than Karachi and much lower than the present study. This may because shopkeeper performed more duties in their shops range from 12 to 14 hrs every day. Another similar study was conducted in Traffic Controllers of Alexandria, Egypt, Road Intersections and reported a high blood lead levels (68 $\pm$ 13  $\mu\text{g}/\text{dl}$ ). Probably Alexandria the most highly populated city and the traffic police that control traffic lights at road manually, therefore the high blood lead levels could be attributed to lead emissions from motor vehicles.

In the present study it has been shown that shopkeeper are regularly exposed to lead toxicity because air near road side are totally contain a high percentage of lead. Also, it has proved that even low quantity of lead exposure can effect body parts and can cause significant oxidative stress, genotoxicity and cellular level damage.

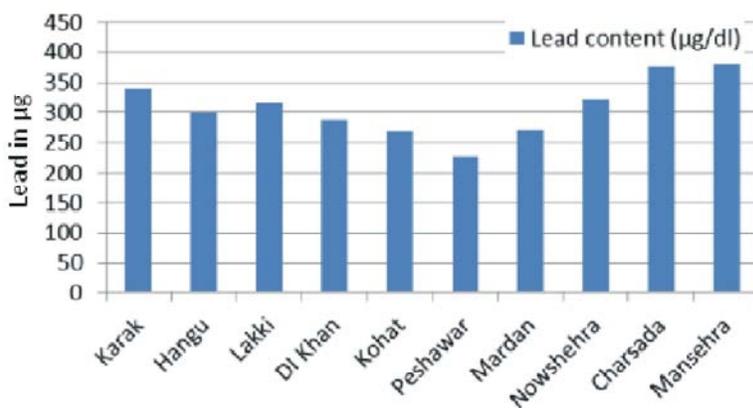


Fig. 1: Lead content in the blood samples of shopkeeper Belong to different area of Khyber pukhtunkhwa.

Table 1: Lead content in Blood sample of shopkeepers from different location of Khyber Pukhtunkhwa.

S.No	Location of Blood sample	Lead content (µg/dl)
1	Karak	339.7± 85.3
2	Hangu	299.6± 68.8
3	Lakki	315.1± 12.1
4	DI Khan	288.4± 62.9
5	Kohat	270.5± 40.5
6	Peshawar	227.5± 25.4
7	Mardan	271.5± 48.9
8	Nowshehra	321.3± 50.4
9	Charsada	376.1± 05.1
10	Mansehra	381.1± 55.5

**CONCLUSION**

The Lead content in the air in developing countries is a serious threat to the general population. It has been estimated by WHO that 120 million people had blood lead levels above the acceptable limit (40µg /dl). Approximately 98% of the children have blood lead levels above20 µg/dl. Severe actions to minimize the use of lead in industry and to develop standard management protocols for lead intoxication should be adopted by the Pakistan as are being practiced by the developed world.

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