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## POISONING OF TRAFFIC POLICEMEN BY LEAD AND EFFECT OF HEMOGLOBIN CONCENTRATION

**Abstract:** The major source of environmental lead contamination is attributed to burning of leaded petrol. Other sources of environmental lead exposure are burning of paper products, discarded rubber, battery casings and painted wood for cooking and heating, releases from industries involved in iron and steel production, lead-acid-battery manufacturing, burning of solid lead-containing waste, plastics and cigarette smoke. Due to the severe hazardous influences of lead (Pb<sup>2+</sup>) on human the study was carried out to determine the levels of serum lead in traffic policemen in comparison to normal men. The study consisted of 97 men divided into two groups, 35 was ordinary men group as control, and 62 was traffic policemen group. The serum levels of lead were estimated by atomic absorption spectrometry. We found that the mean value of serum lead was 2.78±0.30, 2.79±0.20 µg/dl in control and traffic policemen group respectively. The levels of Pb were found no significant change (P < 0.05) in traffic policemen group compared to control.

Because there are negative relation between lead level and hemoglobin concentration, so have been studied in this article. The results show that the mean value of serum lead was 13.95±0.20 g/dl in traffic policemen group, while

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14.27±0.14 g/dl in control group, and were statistically significant ( $P < 0.05$ ), where was no significant change in levels of Hb when traffic policemen group was compared to Control.

**Key words:** Lead, Hemoglobin, Traffic Policemen Poisoning.

**Language:** English

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### Introduction

During the preindustrial period of human civilization, a heavy load of toxic metals being discharged into the biosphere was generally typical for endemic regions only. Currently the majority of the world's population is exposed to toxic chemical elements from increasing anthropogenic pollution. Toxic metals present a health threat for occupationally exposed employees and populations living near hazardous industrial objects (1). An analysis of work-related health disorders in the Russian Federation performed at the Institute of Toxicology, Federal Medico- Biological Agency, during the last decade showed that the frequent cases of metal-induced intoxication are related to lead (Pb) exposure. A valid assessment of human health status, both for professionally exposed workers and the unexposed population, can be accomplished only by complex analytical investigation. Toxicologists, hygienists, and specialists in work-related diseases should choose a representative medium for clinical diagnostics and interpret the results. Analysts, in turn, should choose an appropriate analytical method and ensure validity of the measurements. According to the published data regarding the majority of trace elements, blood is considered a good medium for the evaluation of toxic metal exposure (2).

The major source of environmental lead contamination is attributed to burning of leaded petrol, the environmental laws in Iraq obviously do not have any small print that says they are not allowed to add lead into fuel. They are not the only country that still use gasoline with lead added. Countries such as: Algeria, Yemen, Myanmar and North Korea all still have gasoline with lead included available. Other sources of environmental lead exposure are burning of paper products, discarded rubber, battery casings and painted wood for cooking and heating, releases from industries involved in iron and steel production, lead-acid-battery manufacturing, burning of solid lead-containing waste, plastics and cigarette smoke (3). Environmental lead is absorbed either through the gastrointestinal tract or through the lungs into the blood. Recently, the center for disease control (CDC) has cut down the lead allowable threshold level from 25 µg/dL of blood to 10 µg/dL (4). Blood lead concentration is the primary biomarker used for monitoring exposure levels, and reflects an individual's current body lead burden (5). The use of most of these chemicals is declining with the gradual

demise of the use of lead in petrol. although the production of lead alkyls (now only tetra-ethyl lead) is rapidly declining with the increasing world usage of lead-free petrol, organic lead poisoning is still occasionally seen in tank cleaners who clean petrol storage tanks that have contained leaded petrol. lead workers have found inconclusive evidence of an association between lead exposure and the incidence of cancer (6,7). A recent study from Sweden has suggested a slight excess of lung cancer in certain lead workers in a foundry but, to date, has not been able to determine whether this was due to the confounding effect of arsenic, which is a potent inducer of lung cancer (8). There are therefore at present insufficient data for suggesting that lead compounds are carcinogenic in humans (9). It is important to remember that the toxicological profile of tetra-ethyl lead is totally different to that of inorganic lead and its compounds (10,11). It is essentially a central nervous system toxin that produces an acute toxic psychosis. The early signs and symptoms are subtle and non-specific and may be easily missed, but in those with continuing exposure or after a massive single exposure, florid symptoms of a toxic psychosis or even coma and death may occur. It is not recognized by the International Agency for Research on Cancer as a potential human carcinogen, but there is a published paper suggesting an excess of rectal cancers among production workers (12). Tetra-ethyl lead is metabolized in the liver to soluble alkyl lead chlorides and excreted in the urine. It is pathognomonic of organic lead poisoning that the blood lead level may be only moderately elevated whilst the urinary lead level may be extremely elevated with figures of several hundred micrograms of lead per gram of creatinine (13). In suspicious cases the urinary lead level must always be measured or the diagnosis may be missed. Unlike inorganic lead and its compounds, where chelating agents may be used in the case of poisoning, there is no specific antidote for organic lead poisoning other than supportive treatment and sedation. Lead industries in the USA introduced a voluntary programme for reducing blood lead levels to <40 µg/100 ml. This has been extremely successful and the initiative has been followed by some European lead industries. It is particularly interesting that legislation is increasingly reflecting the long-held opinion within the industry that lead in air levels is not of particular significance and that the major factor determining an individual's blood lead levels is

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personal hygiene. It is well known that cigarette smokers and nail biters have significantly higher blood lead levels than their fellow workers (14). Iron is an essential trace element and plays an important role in the synthesis of many heme and non-heme metallo-proteins, such as hemoglobin (15). Iron enters the blood circulation and binds to apotransferrin (16). This protein is responsible for transporting iron from the site of absorption to the site of utilization for heme and non-heme protein synthesis (17,18). The last step of heme biosynthesis is associated with the activity of the mitochondrial ferrochelatase enzyme, which catalyzes iron movement across the mitochondrial membrane for heme synthesis (19). This enzyme might be inhibited by some toxic metals (20) and then lead to hypochromic microcytic anemia (21).

control samples and 62 from traffic policemen as study cases. Samples were obtained from traffic policemen in 8 workplaces. Blood samples were collected carefully in serum tube and then centrifuged at 2,000 rpm for 5 min to separate blood cells from serum. 100 µL of serum were mixed with 900 µL of the mixed matrix modifier solution. solution containing 0.1 % v/v, nitric acid, 0.2 % m/v ammonium dihydrogen phosphate and 0.5 % m/v Triton X-100 (22). Serum lead were measured by using Atomic absorption meter (Zamaen) The residual blood was collected separately and prepared for Hemoglobin measurement. Hb was measured by Human hematology analyzer (Huma count model). A One-Way ANOVA in SPSS Statistics was used to analysis the data

### Subjects & Methods

The 97 men taking part in this study with age from 25-40 years, 35 of them were ordinary men as

### Result

**Table (1). Values of Mean± Std. Error for control group compared to traffic policemen group**

group	Values	Lead levels ( µg/dl)	HB (g/dl)
Control Men		2.78±0.30A	13.95±0.20A
Traffic Policemen		2.79±0.20A	14.27±0.14A
P Value		0.037	0.043

-Capital letters denote differences between groups, P<0.05 .

**Table (2). Lead levels of the control men and traffic policemen**

Group	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
ControMen	35	2.7800	1.79145	.30281	2.1646	3.3954	.80	6.20
Traffic Policemen	62	2.7935	1.64046	.20834	2.3769	3.2101	.90	6.40
Total	97	2.6262	1.76352	.17376	2.2816	2.9709	.80	6.40

**Table (3). Hemoglobin levels of the control men and traffic policemen**

Group	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
ControMen	35	13.954	1.20082	.20298	13.5418	14.3668	10.50	16.60
	62	14.272	1.14278	.14513	13.9824	14.5628	11.80	16.40

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Traffic Policemen								
Total	103	13.3330	3.51962	.34680	12.6451	14.0209	.00	16.60

### Discussion

Lead is one of the most extensively studied reproductive toxicants to living things. There is increasing awareness that unintended exposure to environmental or occupational contaminants may adversely affect morbidity and mortality. Acute and chronic low-level lead exposure has been shown to result in adverse health effects (23). In the present study, serum lead levels were measured and compared between the tow groups-control men and traffic policemen. According to perform a One-Way ANOVA in SPSS Statistics we don't observed a significant difference ( $P < 0.05$ ) in levels of lead in control group compared to traffic policemen group. The result has shown that lead levels of the control men and traffic policemen within acceptable limits. There was no significant change between traffic policemen and control group as as tabulated in (1). The highest blood-lead concentration in traffic policemen was equal (6.4 $\mu$ g/dl) and The highest blood-lead concentration in control men was (6.2 $\mu$ g/dl), whereas the low blood-lead concentration in traffic policemen (0.9 $\mu$ g/dl) and the low blood-lead concentration in control men (0.8 $\mu$ g/dl), as shown in Tables (2). Absence significant difference due to exposure ordinary men and traffic policemen to the same environmental conditions, because there are a lot of pollutants which produces lead, such as generators, factories, paint, plumbing, a cooking in leaded pots, newsprint and many other sources, which can be exhibit to a ordinary human.

The table (3) was recorded (16.4 g/dl) as high hemoglobin in traffic policemen, and The low hemoglobin in traffic policemen was recorded (11.8g/dl), while the highest hemoglobin in control men was recorded (16.6 g/dl) and the low hemoglobin in control men was recorded (10.50 g/dl). The result has shown that hemoglobin concentration of the traffic

policemen was within normal limits so we don't observed a significant difference, ( $P < 0.05$ ) in levels of hemoglobine in control group compared to traffic policemen group, see table (1). This confirms that serum lead levels in the tow groups-control men and traffic policemen were within acceptable limits, an another explanation for that, the lead levels don't have effect the hemoglobin concentration, Contrary to what expounded Moshtaghie et al;  $Pb^{2+}$  inhibit any key enzyme in the biosynthesis of hemoglobin, or, alternatively,  $Pb^{2+}$  reduce the production of globin by liver, which is necessary for the production of hemoglobin. Toxic elements may reduce the production of protein by the liver as well (24).

This study has shown that there is not significant exposure to high levels of environmental lead in iraq. can be attributed to the don't use lead in petrol. Although leaded petrol is available in the country, many motorist still prefer leaded petrol against unleaded since availability of the later is only within the urban centres but lack as one goes to the rural areas.

### Conclusion

Despite the wealth of scientific studies carried out over the years on the toxic effects of lead, there are still considerable gaps in our knowledge and uncertainties over the health effects of low-level lead exposure. the result has shown that lead levels of the control men and traffic policemen within acceptable limits. the data suggests that traffic policemen group, have equal levels of serum lead compared to healthy men. Through current study, we conclude that the hemoglobin is an important parameter when determination lead concentration, where don't shown important significant

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