Health Assessment Of Lead Fusion Workers In Baghdad

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ABSTRACT

Two locations of leads fusion factories in Baghdad (Altaji and Jiflic) have been selected as a high polluted area with leads; due to melting leads plates extracted from the old batteries vehicles. Samples of blood and urine have been taken from about 30 workers of each of the aforementioned locations. These samples has been divided into two different category, the first category is of age 8-18 years and the second category of age 20-60 years, taking into consideration the time they have spent working at these locations. Blood and urine samples was also collected from about 30 male pioneer donors of age range18-60 living in different parts of Baghdad and far away from the polluted factories locations that considered as control group. The results show high level of lead in the blood of the first category age 55.23 μg/dl in comparison with the second category age 56.53 μg/dl, whilst in urine tests the second category shows 564.83 μg/L which surmount on the first category 551.8 μg/L. Blood and urine samples of control group reflecting the leads pollution status to the environment of Iraq which requires taking some precaution procedures in this regard.

Keywords: Lead, Environment, pollution, Health, Factory workers, Ecology.

1. Introduction

Lead is one of the major contributing agents to ever-increasing environmental pollution (Narayana and Al-Bader,2011).Lead (Pb) is a neurotoxic heavy metal and children in the development stage are particularly susceptible to toxic effects of lead exposure (Ponnusamy et al.,2008). The increase risk of environmental pollution by lead is a legitimate cause for worry (Allouche et al., 2009). Human and animal exposure to lead remains a serious public health problem (King, 1982; Landrigan et al., 2000; Al-sultan et al., 2011). Heavy metal industry like Iron, Cobalt and manufacturing rubbers as well as paints industry (Sanderson,1986), agricultural industry, battery industry, also cosmetics among the causative hazardous who played important role in pollution of lead in the environment (Waldron,1978; Atiah, 1997). Recent situation in Iraq promote for many leads fusion factories to work in a primitive and non conventional methods to recycle old materials as resources for leads. Most
of the lead formed in the air are tiny fractures of light mass which dimensioned to one micron that contains 10:1 of organic/non-organic leads; whereas the non-organic leads of industrial metal pollution represent 90% of the environment of industrial cities which mainly caused by fuel combustion (Ecology Improvement Directorate, 1998). The above-mentioned reasons are seriously endangering the environment of industrial cities to the hazard of toxic leads throughout water, air, and soil; which are eventually affecting the public health as well as the animals and plants. The main concern in this research is to determine the source and locations of leads pollution and specify their hazardous to human health in particular.

2. Methodology

2.2 Materials and methods

Determining the source of pollution and location: Two main locations of leads fusion factories in Altaji and Jifliic, which are significantly using the plates of old vehicles batteries on daily basis has been allocated.

Method of Samples collection and Testing: Blood and urine samples from labours working in the primitive leads fusion factories spread-out in Altaji and Jifliic areas at the suburban district of Baghdad has been collected from two different age categories. The first category are thirty male drivers from age 8-18 years old, who are working in the primitive leads fusion factories for the period not less than 6 months and not more than 25 months. The second category is thirty workers from age 20-60 years old, all males and all smokers and non-alcoholic. Samples of blood and urine for control test purposes were collected randomly from males of age between 18-60 years old and live in different localities at Baghdad province. Those pioneers are chosen as non alcoholic and non smokers.

Laboratory device: The Atomic absorption spectrophotometer device Model No. Buck 210 VGP is used to measure the level of toxic leads in the samples of blood and urine.

3. Results

The values of lead in blood and urine from the pioneers (control group) presented in (Fig.1) is reflecting the leads pollution status to the environment of Iraq and considered to be almost a high percentages (21-15μg/dl) when compared to the permitted values allowed for safety measures issued by Centre of Disease Control in 1998 (Table.1) (Burtis and Ashood, 1999).

The main diagnostic criteria in the level of lead pollution is the measurement of lead value in the blood which considered being the first proof of diagnosis of lead toxicity (Ewers,1985) as the maximum level of leads in the blood must not exceed 70μg/dl. The blood and urine in the first category age group workers (children) (Fig.2) indicate a high level of lead which prove the pollution of lead in the blood at its highest limit> 80μg/dl, the range of all blood test lead values ranged from 35 –80μg/dl.

The second category age group show the results in (Fig.3). The quantity of leads in blood and urine according to the statistical values (average) indicate that the level of leads reaches to 40-85μg/dl in blood in both categories with a distinction of second category (20 – 60 years), which represent the adultery age, as the blood pollution averaged (55μg/dl). These results were predictable to the old people due to their exposure to high fumes of toxic leads
resulted by melting plates of old vehicles’ batteries. This high-value requires urgent remedial measures as well as a comprehensive study to the work-place environment.

Fig. 1: measurement of lead values in the blood and urine samples of male pioneers not exposed directly to lead in factories deal with lead manufacturing or industry.

Blood $\bar{X} = 10.2$ (µg/dl) SE ± 14.2)

Fig. 1: measurement of lead values in the blood and urine samples of male pioneers

Table 1: Shows the blood levels of leads and their impact on public health as published by (CDC, 1998)

<table>
<thead>
<tr>
<th>Level of Leads in Blood (µg/dl)</th>
<th>Signs &amp; Procedures</th>
</tr>
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<tbody>
<tr>
<td>1 10 &gt;</td>
<td>It doesn’t consider to be a pollution case</td>
</tr>
<tr>
<td>2 10 –14</td>
<td>It is considered to be a pollution case for children</td>
</tr>
<tr>
<td>3 15 –19</td>
<td>Precautions and care should be taken with this level</td>
</tr>
<tr>
<td>4 20 – 69</td>
<td>A general medical assessment should be taken and a study of the work place as well as physical and Anaemia tests</td>
</tr>
<tr>
<td>5 70 &lt;</td>
<td>Urgent medical procedures should be taken by the specialist of this field</td>
</tr>
</tbody>
</table>
Fig. 2: Blood and urine tests for the workers of first category age between 8-18 years

\[ \bar{X} = 55.23 \mu g/dl \ SE \pm 9 \] blood

\[ \bar{X} = 551.8 \mu g/L \ SE \pm 23 \] Urine

Fig. 3: Blood and urine samples of the second category age (20 – 60 years)

\[ \bar{X} = 53.56 \mu g/dl \ SE \pm 17 \] Blood

\[ \text{Urine } \bar{X} = 564.83 \ SE \pm 26.2 \]
4. Discussion

One of the main problems of environmental pollution in the industrial sector is the random primitive fusion leads factories and is increasing due to the use of vehicles batteries’ plates that emit more toxic leads in the air. The accumulated leads in the human body cause many diseases such as respiratory and nervous as well as the drastic effect on the public health in general (Aheids, 2003). The study shows high level of pollution of lead with the workers aged below 20 years, which require to take more precautionary procedures in this regard, as the normal and accepted level of lead in the air is suppose to be $5 \times 10^{-5}$ μg/m$^3$. This level may be a result of the natural activities of human and can be measured by different adopted methods. This acceptable level may increase and concentrated due to the high activity exerted in human communities at civilian areas to reach the level of 0.5 μg/m$^3$; while in the rural area reach to (0.1-0.3) μg/m$^3$ (Aheids, 2003). The concentration of leads pollution in the air, which was assessed by so many authors (MwanL, 2005), is escalating in the mean time by the increasing number of transport vehicles on the roads. Currently, the pollution of leads in the air in the developing countries at the high populated areas reaches to the level of 0.1-0.5 μg/m$^3$ based on annual average; and there are studies and recommendations advising to reduce the percentage of leads in the fuel in order to eventually reduce the pollution in the air (Chisolm, 2007). The size of leads particles play an important role in the dissemination of pollution. The concentration of leads inside the closing places is less than outside (such as flats or houses); especially when there are closing ventilation air-conditioners or the doors and windows are closed during the season of winter (Facchetti and Geiss, 2005). In this regard, the continuation of leads pollution in the air depends on several factors, as the Size of leads particles, air ventilation, the fall of rain and finally, the increase or decreases in the emission of leads source. Hence it is recommended to empower the role of Environmental and Health Regulation entities to limit and control the increasing problem of random fusion leads factories. Set-up periodic supervisions for the works inside these factories to ensure a safe and hygienic atmosphere to the labors as well as people living nearby.

5. Conclusion

The problem of health workers pollution at lead fusion factories with lead proved to be an occupational hazardous disease in Iraq that is encouraging studies and researches specialized in finding scientific and practical solutions for executing the leads environmental pollution in particular.

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