# LEAD EXPOSURE AMONG THE GENERAL POPULATION

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**Summary**

The degree of lead exposure among the general population of Baghdad city was investigated in 1044 subjects (530 children and 514 adults) from different areas of the city. The mean values of blood lead level (Pb-B) and Delta-aminolevulinic acid dehydratase (ALAD) activity (biologocal indicator of lead absorption) were 14.1± 4.2 ug/100ml and 190±40 unit/ml RBc respectively. Values of less than 30 ug lead/100ml blood (Australian level of concern) were reported in 99.1 % of children and in 98% of the adult group. A significant increase was recorded in blood lead($P<0.01$)of the adult group in comparison to the children group. There was a statistically significant difference in pb-B level by sex, cigarette smoking and alcohol drinking.

Exposure of the general population of Baghdad city to lead is still within the recommended acceptable limit.

**الملخص**

لقد تم التحري عن مدى التعرض لمادة الرصاص بين سكان مدينة بغداد من خلال دراسة عينة مكونة من ١٠٤٤ شخص، (٥٣٠ من الاطفال و ٥١٤ من البالغين) يقطنون مناطق مختلفة من المدينة.

اظهرت الدراسة ان معدل تركيز الرصاص في دم العينة ١٤٫١ مايكروغرام / ١٠٠ مل وبمتغير ثابت قدره ٤٫٢ مايكرو غرام / ١٠٠ مل، ومعدل فعالية انزيم (ALAD) كان ١٩٠ وبمتغير ثابت قدره ٤٠ وحدة / مل كرية دم حمراء. ان مستوى الرصاص في دم ٩٩٫١٪ من الاطفال و ١٨/ من البالغين كان اقل من ٣٠ مايكروغرام / ١٠٠ مل (المعيار الاسترالي المعتمد). يوجد فرق احصائي واضح في زيادة تركيز الرصاص في دم البالغين مقارنة بالاطفال (اقل من ٠٫٠١). كما يوجد فرق احصائي

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exposure to lead, or those living close to local lead smelting or refining operation were not included in the study. The study also excluded those living in the rural area of Baghdad Governorate.

Alcohol drinking subjects were defined as those who drink more than 40 g alcohol/day. Gigarette smokers were those who smoke more than 10 cigarettes/day.

Blood samples taken for determination of lead were collected in lead-free heparinized containers and sent immediately for analysis using an extraction procedure described by Westerlund-Helmerson[5]. For this purpose, atomic absorption Spectrophometer (Pye Unicamp, series No. 2900, UK) was used. ALAD activity in whole blood was determined by the method of Burch and Siegel[6]. Student's t-test was used for analysing the statistical differences between of the group means.

| Subjects (number) | Pd-B * (ug/100ml) (range) | ALAD * (unit/ml RBS) (range) |
|---|---|---|
| Children (n-530) | 13.3± 3.9 (5)35) | 190.0± 45 (140-240) |
| Adults (n-514) | 15.0± 4.7 (5-40) | 189.8± 25 (150-235) |
| P | < 0 .01 | NS |
| Total (n+ 1044) | 14.1± 4.8 (5-40) | 190.0± 40 (140-240) |

Table 3. Blood lead (pb-B) level and delta - aminolevulinic acid dehydratase (ALAD) activity in male and female subjects.

| Subjects | Number | Pb-B * (ug/100ml) | ALAD * (unit/ml RBC) |
|---|---|---|---|
| children | | | |
| Male | 280 | 13.8± 4.5 | 188.0± 45 |
| Female | 250 | 1206± 3.7 | 195.6± 46 |
| Female | | 0 .01 | NS |
| P | | < 0 .01 | NS |
| Adults | | | |
| Male | 471 | 15.4± 4.7 | 188.7± 24 |
| Female | 43 | 1303± 4.4 | 199.3± 32 |
| P | | << 0 .01 | < 0 .01 |

Significance: Male VS. Female P < 0.01.
*Values expressed as mean ± standared deviation.

Table 4. Blood lead (pb-B) level and delta-aminolevulinic acid dehydratase (ALAD) activity for adult subjects according to alcohol consumption and smoking habit.

| Subjects | Number | Pb-B * (ug/100ml) | ALAD * (unit/ml RBC) |
|---|---|---|---|
| Drinkers | 70 | 17.7± 5.6 | 189.7± 35 |
| Non drinkers | 268 | 14.3± 5.7 | 199.0± 22 |
| P | | < 0 .01 | < 0 .01 |
| Smokers | 137 | 17.4± 5.6 | 186.0± 30 |
| Non smokers | 211 | 14.6± 5.2 | 195.8± 30 |
| P | | < 0 .01 | < 0 .01 |

Significance: Drinkers vs. Non drinkers P < 0.01
Smokers vs. Non smokers P < 0.01
*Values expressed as mean ± standared deviation.

**Discussion**

The toxic effect of chronic low-level exposure is still the subject of general debate, the main concern being the possibillty of impaired development of the central nervous system[7-8].

exposure. In other words, exclusion of smoker and drinker subjects from the total adult subjects will reduce blood lead to a level identical to that in children (n=307, Pb-B 13.3±4.5 ug/100ml). So, the level of blood lead in general population will also reduced (n=837, Pb-B 13.3± 5.0 ug/100 ml).

Results from this study showed that males had somewhat higher blood lead values than females, which confirm the results from the previous report[14]. This difference could be attributed partly to the lower haemoglobin levels in women than in the men, as most lead is absorbed to the red blood cells[15].

Depression of ALAD activity in erythrocytes following lead absorption has been observed in many studies [16-17]. The inhibition of ALAD activity is correleted to the concentration of lead in blood and a concentration of 10 ug Pb/100ml blood is considered as the inhibition level of ALAD[18]. The results of this study also shows a statistically significant difference in erythrocytes ALAD activity in accordance with blood lead levels. This partial inhibition of ALAD activity indicates certain degree of lead absorption[19].

It is apparent from the above discussion that most of us are exposed to some degree of lead pollution. The variability in lead exposure as indicated by the levels of blood lead and ALAD activity, could be attributed to some social factors. Neverthless, the level of blood lead is still within the recommeded accepatable limit.

Because the health risk, especially, for children with low blood level values remains uncertain, we therefore, suggest a need of continuous preventive measures to reduce lead exposure of the environment and to keep it as low as possible. An effective health education

program to minimize the prevalence of smoking and drinking alcohol is needed, since they are considered as the most confounding factors of lead absorption.

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