Lead Level in Pregnant Women Suffering from Pre-Eclampsia in Baghdad City- Iraq

Assala G. H. Al-Shammery
Department of Biology, College of Science, Mustansiriyah University, IRAQ
*Email: Jolanar_2002007@yahoo.com

Abstract
This study was conducted on the number of pregnant women suffering from symptoms of preeclampsia who live in different areas in Baghdad city. These areas were suffering from air pollution by different pollutants in high rates and it was chosen from among these pollutants lead which is a high percentage of air pollution where it was observed by measuring the level of lead in blood serum which taken from pregnant women by 40 pregnant women suffering from symptoms of preeclampsia and 20 pregnant women don't suffering from any abnormal symptoms during pregnancy period and classified as control group , so we found marked a significant rise in lead level in comparison with control group which 14.56 mg/d+ ± 2.50 mg/d, this increase may refer to the amount of lead which found in the air and in excess of the normal limit which exposed pregnant women like all people through the overcrowding of roads and use fuel non-environmentally friendly through breathing which effect on pregnant women health, it has been shown on symptoms of preeclampsia from measuring systolic and diastolic blood pressure and measuring of urea in blood, T-test was used at possibility (0.001) to see the difference between infected samples and control group, therefore this study suggested that a lead is one of the causes of preeclampsia because live in polluted and unhealthy environment.

Keywords: lead, pollution, preeclampsia, symptoms.

Introduction
Lead is toxic and induces abroad range of harmful effects on various organs including the reproductive system [1] [2] [3]. Lead as a neurotoxic can carry a lethal legacy. Young women who live in Lead –contaminated housing or who were lead-poisoned themselves as youngsters can be passed lead on their unborn fetuses [4]. Lead poisoning remains an urgent public health problem in both developed and developing countries [4].

The main target for lead toxicity is the nervous system, both in adults and children [5] [6]. Long –term exposure during pregnancy to even low concentrations of toxic metals , which have the ability to accumulate, often leads to irreversible damage to fetal developments and maternal morbidities including pre-eclampsia [1] [2] [3]. Environment pollution by lead is worldwide public problem, such as elevated blood level among people living in the polluted areas [7] [8].
Lead is a heavy metal and is highly toxic to plants and cumulative poison to mammals so an important symptoms of lead toxicity is causing central nervous system disorder leading to insomnia like disease which are caused due to the discursive of hemoglobin [7].

Lead is one of the heavy metals people most commonly exposed to in the environment. Lead is not biodegradable and the conference for eco-toxicity of lead are increasing [7] [8]. There are innumerable sources of lead in our environment such as paint, plumbing and water supplies from lead pipes or lead- soldered joints, dust and pint chips from older houses having lead paints, air and soil pollution from leaded gasoline, cooking in leaded pots, newsprint and many other sources [7] [8] [9].

Preeclampsia, the most common medical complication of pregnancy, is associated with oxidative stress with lead elements [7]. Long – term exposure during pregnancy to low concentration of toxic metals, such as lead which have the ability to accumulate, often leads to irreversible damage to fetal and maternal morbidities including pre - eclampsia [7] [9].

**Materials and Methods**

The study was conducted in several areas, it is choked with traffic throughout the day, and it suffers from air pollution in various pollutants emanating from vehicle exhausts in Baghdad city.

Venous blood samples (5 ml) were taken from each pregnant woman (40 women) does not suffer from any abnormal symptoms during different periods of pregnancy and ranked in the control group.

Twenty pregnant women suffering from symptoms such as high blood pressure continues to rise during the six – hour up to 160/10mmHg during the day. And high proportions of urea in the blood which are less than 50 mg during 24 hours.

The ages of all samples (patients and controls) are converged from (23 - 44) years with periods of pregnancy to every one. All of the samples did not suffer from other overlaps intervention such as heart disease, diabetes and kidney. The systolic blood pressure and diastolics for pregnant women was measured using a standard mercury sphygmomanometer (Accoson, Essex, UK).

The study also included a measurement of the proportion of protein in the blood urea. The samples were taken for pregnant women who completed 22 weeks of gestation at least 5 ml of urine from each pregnant woman in this study after centrifugation for 5 minutes at 3000 rpm for the testing of the present of albumin in urine, 5ml of blood sample was collected from the cubital veins.

The blood was separated after centerfugation for 5 minutes at 3000 rpm and the plasma were storted frozen at 200 C°. Untel analysis was carried out for lead estimation by atomic absorption spectrophotometer model 200A (Buck scientific, East Norwalk, UK) with detection limit of 1 mg /dl was employed for blood lead determination, as described by welz [10]. The digested samples analyzed in duplicates by the atomic absorption spectrophotometer methodology using wavelength of 283 nm, the mean value computed.

**Statistical analysis:**

Mean ± standard error were calculated for all treatment. Mean of tests and controls were compared using t – test (using a program of statistic for epidemiology) and p – values were obtained. P value was regarded significant if it is less or equal (0.05). Repeated analyses of standard solution confirmed the methods precision.

**Results and Discussion**

We found in this research significant increase (p = 0.001) in systolic and diastolic blood pressure for 24 hrs with a significant increase (p = 0.001) in blood lead level in the serum in the preeclamptic women as compared to normal pregnant women as found in Table 1.

Our results are in keeping with the results of Motawei *et al.* [1][2][3] who found same results of correlation between lead level in serum and symptoms of preeclampsia, systolic and diastolic blood pressure in women suffering from preeclampsia in Egypt.

As well our results agree with kasper, *et al* [11] [12] [13] who they found that the lead level in the serum was positively associated with systolic and diastolic blood pressure.
Table 1: Preeclamptic women as compared to the normal pregnant women.

| Parameter           | Preclamptic women | Normal pregnant | p-value |
|---------------------|-------------------|-----------------|---------|
| Urea 24 hrs (mg/dl) | 40±23             | 8 ±7.10         | 0.001   |
| Lead (mg/dl)        | 38.44±3.0         | 14.56±2.5       | 0.001   |
| Systolic blood pressure (mmHg) | 180.3±9.2       | 117.8±8.9       | 0.001   |
| Diastolic blood pressure (mmHg) | 20.19±7.90     | 8.50±7.90       | 0.001   |

Mean ± SD

Figure 1: Serum concentration of lead in normal and preclamptic women.

Meanwhile explained Rothenberg et al and Mitra et al. [14][15] found significant positive association between lead level and blood pressure in pregnant women. This is what was said kasper, et al. [11] [12] [13] as explained the pregnant women exposure to lead from breathing the air contaminated by leaded gasoline which found in the roads. Exposure to excess toxic elements such as lead in the environmental that increases the production of free radicals, leads to decrease the availability of bioelements necessary for antioxidant defense mechanisms, So acute and chronic low- level lead exposure has been shown to result in adverse health effects [16] [17]. As well our results agree with Line ,et al. who explained the elevated lead level observed in some rural areas by the fact that some villages are polluted with high concentration of lead in soil and household dust that subsequently carry lead exposure to the population there causing elevated lead level [18] [19] [20].

Air polluted by oxides and minerals more dangerous on human health where through breathing pollutants move by one hundred percent to human blood and features Baghdad city like all cities abundance cars which use fuel have dangerous toxic which include lead which effects significantly on the patients , elderly and pregnant women posing a risk to fetuses ,High lead level in the blood causes anemia and lakes of hemoglobin in the blood this may lead to liver kidney and brain damage and it was up to the central nervous system [21].

Conclusions
Through tests conducted in this study and compare with similar studies,it is clear to us that lead which found in high rates in the polluted and unhealthy environment may be a reason of preeclampsia which constitutes a danger on the pregnant woman this lead to the possibility of abortion or may be effect in future on the fetus health.

References
[1] S. Motawei, S. Attalla, H. Gouda, M. El-Harouny, and A. El-Mansoury, "Lead level in pregnant women suffering from preeclampsia in Dakahlia, Egypt," International Journal of Occupational & Environmental Medicine, vol.4, 2013.
[2] M. Bradbury and R. Deane, "Permeability of the blood-brain barrier to lead," Neurotoxicology, vol.14, pp.131-136, 1993.
[3] A. B. Caughey, N. E. Stotland, A. E. Washington, and G. J. Escobar, "Maternal ethnicity, paternal ethnicity, and parental ethnic discordance: predictors of preeclampsia," Obstetrics & Gynecology, vol.106, pp.156-161, 2005.
[4] L. C. Kenny and D. B. Kell, "Immunological tolerance, pregnancy and pre-eclampsia: the roles of semen microbes and the father," bioRxiv, p.198796, 2017.
[5] O. Akinloye, O. Oyewale, and O. O. Oguntibeju, "Evaluation of trace elements
in pregnant women with pre-eclampsia," *African Journal of Biotechnology*, vol.9, pp.5196-5202, 2010.

[6] S. Klitzman, A. Sharma, L. Nicaj, R. Vitkevich, and J. Leighton, "Lead poisoning among pregnant women in New York City: risk factors and screening practices," *Journal of Urban Health*, vol.79, pp.225-237, 2002.

[7] N. A. Jameil, H. Tabassum, H. A. Mayouf, L. A. Otay, A. A. A. Shenefy, and F. A. Khan, "Identification of predictive marker of prerenal damage in pregnant women with Preeclampsia and women at high risk- A Prospective study conducted in Riyadh, Saudi Arabia," 2014.

[8] N. Al Jameil, "Maternal serum lead levels and risk of preeclampsia in pregnant women: a cohort study in a maternity hospital, Riyadh, Saudi Arabia," *International journal of clinical and experimental pathology*, vol.7, p.3182, 2014.

[9] P. Pathak and U. Kapil, "Role of trace elements zinc, copper and magnesium during pregnancy and its outcome," *The Indian Journal of Pediatrics*, vol.71, pp.1003-1005, 2004.

[10] B. Welz, "Atomic absorption spectrophotometry [English translation by Christopher Skegg].2nd comp. rev. ed," ed: Weinheim, Germany, 1985.

[11] S. Kasperczyk, J. Kasperczyk, A. Ostalowska, J. Zalejska-Fiolka, T. Wielkoszyński, E. Świętochowska, *et al*., "The role of the antioxidant enzymes in erythrocytes in the development of arterial hypertension among humans exposed to lead," *Biological trace element research*, vol.130, p.95, 2009.

[12] C. Mosby, W. Glanze, and K. Anderson, "Mosby Medical Encyclopedia, The Signet: Revised Edition," *St. Louis*, 1996.

[13] J. Neumann, J. Lopuchovsky, and O. Zapletal, "Chemisation, agriculture, pharmacology and toxicology," ed: SZN Praha, 1990.

[14] S. J. Rothenberg, M. Manalo, J. Jiang, R. Cuellar, S. Reyes, M. Sanchez, *et al*., "Blood lead level and blood pressure during pregnancy in South Central Los Angeles," *Archives of Environmental Health: An International Journal*, vol.54, pp.382-389, 1999.

[15] A. K. Mitra, A. Haque, M. Islam, and S. Bashar, "Lead poisoning: an alarming public health problem in Bangladesh," *International journal of environmental research and public health*, vol.6, pp.84-95, 2009.

[16] A. S. Ettinger and A. M. Wengrovitz, "Guidelines for the identification and management of lead exposure in pregnant and lactating women," 2010.

[17] A. J. McMichael, G. V. Vimpani, E. F. Robertson, P. A. Baghurst, and P. D. Clark, "The Port Pirie cohort study: maternal blood lead and pregnancy outcome," *Journal of Epidemiology & Community Health*, vol.40, pp.18-25, 1986.

[18] S. Lin, X. Wang, I. T. S. Yu, W. Tang, J. Miao, J. Li, *et al*., "Environmental lead pollution and elevated blood lead levels among children in a rural area of China," *American journal of public health*, vol.101, pp.834-841, 2011.

[19] C. Rusterholz, S. Hahn, and W. Holzgreve, "Role of placently produced inflammatory and regulatory cytokines in pregnancy and the etiology of preeclampsia," in *Seminars in immunopathology*, 2007, pp.151-162.

[20] J. Puzas, M. Sickel, and M. Felter, "Osteoblasts and chondrocytes are important target cells for the toxic effects of lead," *Neurotoxicology*, vol.13, pp.783-788, 1992.

[21] G. Zheng, L. Wang, Z. Guo, L. Sun, L. Wang, C. Wang, *et al*., "Association of serum heavy metals and trace element concentrations with reproductive hormone levels and polycystic ovary syndrome in a Chinese population," *Biological trace element research*, vol.167, pp.1-10, 2015.