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Research Article

HEAVY METALS IN HUMAN BLOOD IN AL-NAHRAWAN CITY

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Abstract

Limited studies are available concerning the effect of exposure to heavy metals on human health. In the present study, (60) healthy adult men in al Nahrawan region (group A), and group B in which (20) healthy adult men in the Philistine street region in Baghdad were examined. Blood samples were taken for hematology and biochemistry tests. It was found that creatinine, urea, glucose...are higher in group A as compared with control group (B). WBC value increased while RBC, platelets and MCV decreased in samples taken from group (A). The present results indicate that many persons who live in Al Nahrawan region are affected by heavy metals contamination as a result of industrial activities.

Keywords: blood contamination, AAS, heavy metals.

Introduction

Pollution has become a global problem and the results are in high levels of contaminations in plant, animals, and human (1). The environmental contamination from various chemicals, including elements, is publicly criticized in many countries (2). In many recent reports, contamination is the result of multiple elements and not to single ones (3). Atomic absorption spectrophotometer (AAS) is used for the element analysis in various samples (3). It is documented that a variety of metals are of strategic importance to the industrial world (4).

Unfortunately, some metal-processing industries are responsible for various forms of environmental pollution. This results in various impacts on living organisms, including birds. Many researches discussed pollution in Iraq (5). Clinically many disorders and responses were observed due to exposures to heavy metals, especially in hematology, cardiovascular, and respiratory systems. The presence of some selected toxic elements in various environmental samples like particulate matter, water and soil have also been reported (6). Status of toxic metals like Zn, Cr, Co, Ni, Cd, Pb, Hg, Cu, and Mn, in kidneys and gallstone samples of workers of the same

steel plant have been reported (7). Air pollution has a wide range of environmental and human health effects. These effects depend on many factors, which are related with properties and composition of air pollutants as well as a period of exposure.

The impact of air pollutants on human health is varying from limited effects such as nose, eye, and throat irritation, wheezing and coughing, fatigue, skin rash and severe allergic reaction to dangerous effects which including chronic bronchitis, aggravation of asthma, cardiovascular pathologies, heart rhythm, pulmonary tumors, and induce genotoxic effects such as base pair substitutions, frame shift mutations, deletions, s-phase arrest, stand break age and variety of chromosomal alterations (8,9).

Materials and Methods

Area of work

This study was conducted in al Nahrawan city, about 35 Km southern east of Baghdad, and it contain many

bricks factories (about 300) and 150 000 person live in it. The work reported here describes the estimations of selected toxic metals such as Cu, Pb, Mn, Zn and Mn in blood samples obtained from 60 subjects in Nahrawan (A) (20 subjects inside the factories (A1), 20 persons works in storage and transport outside the factories (A2) and 20 lives in al Nahrawan city (A3)), compared with 20 healthy men as a control group (B).

Blood samples

Venous blood samples (10 ml each) were collected from the 50 adult males using sterilized syringes.

Sample preparation

Samples were allowed to thaw to room temperature. Three milliliters of each blood sample were transferred to a clean beaker. Drops of digestion acid were added to each blood sample and heated at 110 °C for two hours on a hotplate. Hot plate temperature was increased heated until 1 ml remained.

Sample beakers were allowed to cool. Then each beaker contents were transferred to 10 ml volumetric flask, and completed to the mark with deionized water.

Finally, samples were analyzed by using flameless atomic absorption.

Determination of toxic metals

The toxic metals (Zn, Mn, Fe, Cr and Cu) were determined in the digested samples of blood using an atomic absorption spectrophotometer.

Results and Discussion

Field of study

One of the very important tests in this present study is the determination of heavy metals concentration in both regions in Baghdad, Al- Nahrawan region (that contains large number of factories), and Philistine street region as a control (not an industrial region).

Heavy Metal Concentration

This study was conducted in Al-Nahrawan city about 35 Km eastern south of Baghdad (Capital of Iraq), and it contain many bricks factories (about 300) and 150000 person live in it.

Table (1) shows the heavy metal concentration in blood in the studied samples:

Groups	Cu	Mg	Cd	Mn	Cr	Fe	Zn	Ca	Pb
In side	0.15+0.021	5.71+1.16	0.14+0.031	0.041+0.003	0.069+0.005	45.31+5.21	1.21+0.021	7.54+1.22	1.58+0.15
Out side	0.13+0.014	4.83+0.96	0.053+0.006	0.033+0.002	0.050+0.004	39.45+4.27	0.82+0.075	6.25+1.08	1.13+0.14
In city	0.073+0.008	3.86+0.63	0.036+0.002	0.022+0.001	0.032+0.003	31.26+2.41	0.71+0.056	3.80+0.85	0.13+0.03
Control	0.063+0.006	2.72+0.46	0.025+0.001	0.014+0.001	0.024+0.002	29.96+3.55	0.56+0.051	3.12+0.73	0.021+0.004
LSD	0.032	0.86	0.016	0.010	0.012	5.22	0.25	2.35	0.032

Heavy metals in Blood

We notice a significant difference in Mg and Pb between all groups, in Cd, Cr and Fe between three groups, and in Cu, Zn, Mn and Ca between two groups. The metals Mg, Cd, Cr, Fe, Zn and Pb show

significant differences between workers in A and B groups. Mg and Pb concentrations in the factories is hazardous and must be limited (5).

Medical Tests

The table (2) shows the hematology tests in studied samples:

Groups	R.B.C	W.B.C.	PLTs	MCV
In side	4.27+0.96	13.65+2.14	145.72+12.61	90.42+10.84
Out side	4.43+1.05	9.51+1.71	151.75+14.33	93.74+11.51
In city	5.87+1.13	6.33+1.23	184.70+16.55	84.62+9.64
Control	6.02+1.56	5.85+1.21	206.06+21.53	83.26+9.51
LSD	1.01	1.84	12.41	3.01

According to the results of this table, white Blood Cells values were increased in the studied group as compared with the control groups (5.70 +1.21 , 6.14 + 0.8) respectively, which indicate an infection case (9) or due to heart disorder (10). WBC, RBC and Plts have significant differences between workers in

sample A and B, that mean when heavy metals increased, RBC decreased, and WBC increased (5) (figure 1 and 2). According to these results, RBC, Hb and Plts decreased in the studied sample, that indicate gas pollution effect on blood measurements as mentioned in (11-13) .

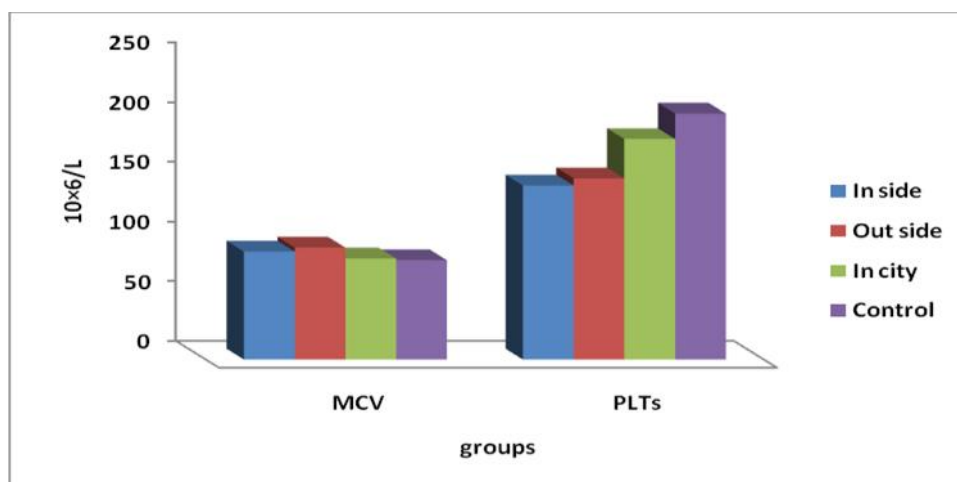


Figure 1: MCV and PLTs value in all groups

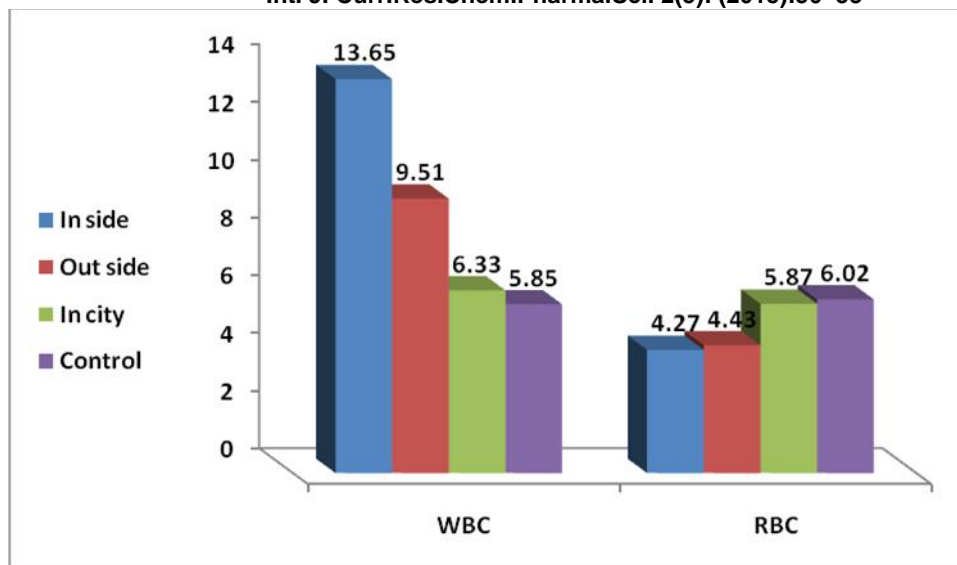


Figure 2: WBC and RBC value in all groups

Biochemistry Tests

Table (3) shows the biochemical tests in studied samples:

Groups	Cholesterol	Urea	Creatinine	Glucose
In side	6.24+1.42	7.25+1.87	93.33+9.72	6.54+1.03
Out side	6.35+1.57	6.31+1.75	82.63+7.84	5.22+0.84
In city	4.54+0.86	4.21+0.96	73.62+7.14	4.54+0.82
Control	4.32+0.85	4.16+0.93	74.51+7.87	4.63+0.85
LSD	1.22	0.91	4.52	1.43

According to this table, a significant difference was observed in all biochemical tests. Creatinine values increased highly in the studied sample which may be due to hard working, low activity of kidneys or because of blood deficiency. Urea readings also increased in

the studied sample due to blood deficiency that comes to kidneys (13). In Cholesterol values, a slight increase was observed in the studied samples which may be due to hard muscle stress for workers (figure 3 and 4). (14).

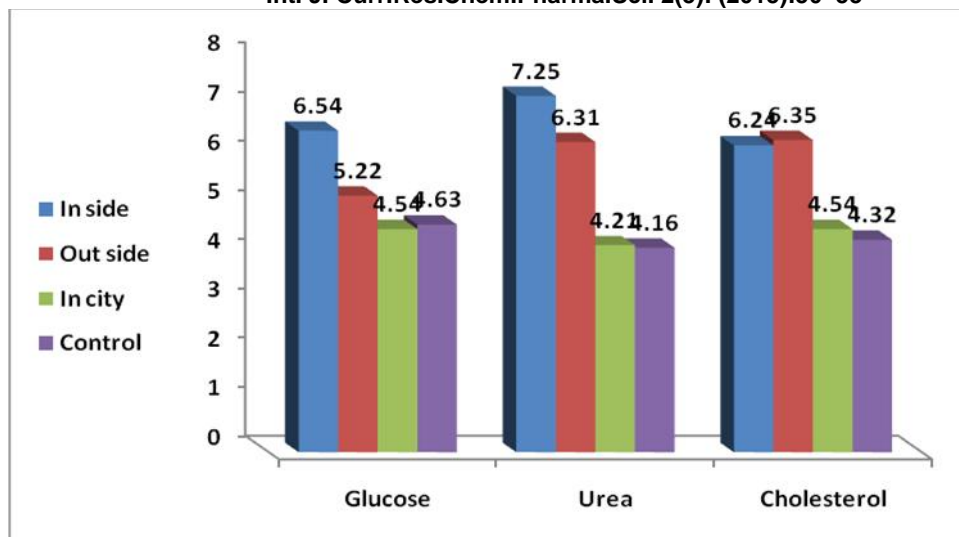


Figure 3: Glucose, Urea and Cholesterol value in all groups

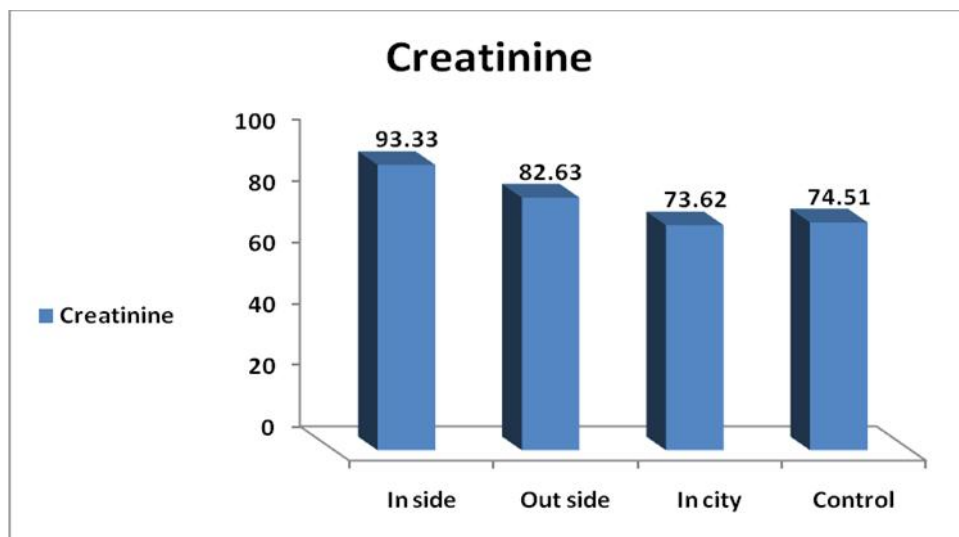


Figure 4: Creatinine value in all groups

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