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Estimation of lead levels in human blood and marshes water in south of Iraqi

Abdel Ameer Naser Al-Rekabi; Reyadh Mohammed Reda Al-Mashat

Department of Biology, College of Science, University of Al-Mustansiriya

Summary:

One hundred- eight of water samples have been collected from six stations in Al-Hammar marshes in the period between 18th till 24th of Aug in 2007. In addition ninety-seven of blood has been collected from marsh's inhabitants who are living and using the marsh water. Lead level has been detected in both water and blood samples by using flame and flameless atomic absorption respectively, the results showed that most samples of water and blood were contained lead levels higher than the acceptance level mentioned by WHO.

Keyword: *lead, marshes water.*

Introduction:

The term "Heavy Metals" refers to any metallic chemical elements that have a relatively high gravity and toxic or poisonous ability at low concentrations. These elements are natural components of the Earth's crust and cannot be degraded or destroyed to a small extent [1]. Lead has long been recognized as a serious pollutant of the aquatic environment, it cause serious impairment in metabolic, physiologic, structural, and all other systems when present in high concentrations in the milieu [2]. Exposure to heavy metals occurs through the three routine routes; inhalation, ingestion or occasionally dermal contact [3]. Researchers showed that Blood lead level of 0.36 mg/L (0.36 ppm) or greater was connected with an 89% greater rate of death from heart attack, and a 250% greater chance of stroke. A higher rate of Arteriosclerosis has been found in adults with blood lead levels of greater than 1 mg/L [4]. The lead poisoning is a medical condition caused by the increased levels of the metal lead in the blood. Lead may cause irreversible neurological damage, renal disease, cardiovascular effects, and reproductive toxicity [5]. Vomiting, higher blood pressure, headache, weakness, coma, increased numbers of menstrual problems, spontaneous abortions and stillbirths in women, are some of the lead poisoning symptoms , as well as damage the organs responsible for sperm production in men [6]. Recently, there are evidences that lead is carcinogenic (cancer causing). In addition to all these effects, lead may cause changes in gene expression if child have been exposed to it as well as other health problems for the later in life [7].

Corresponding Address:
Abdel Ameer Naser Al-Rekabi
Department of Biology, College of Science, University of Al-Mustansiriya
Email: aghaloup@yahoo.com

Materials & Methods:

Sample location

Al-Hammar marshes area represented the sampling location of the present study. It is formerly covered an area of 2,800 km2 of permanent wetland, extending to over 4,500 km2 in certain seasons, but were almost totally destroyed during the 1990s by drainage projects, and have only recently seen some recovery [8]. It is stretched between Nasiriyah and Basra and were located south of the Euphrates River, which formed their principal source, it represent the largest water body in the lower Euphrates. Surface water were collected from six stations in Al-Hammar marshes, all these stations located in Dhi-Qar provinces, and covered a big area of the marshes, starting from Al-Eslah till the beginning of Al-Chebayesh.

Samples collection.

One hundred-eight samples of water were collected from six stations in Iraqi marshes (eighteen samples from each station). Water samples were collected in 2□litre containers (from 30 □ 50 cm depth) [2]. In addition, ninety-seven of blood samples from different ages, the blood samples collected in sterilized plan tubes, and then immediate centrifuge part of water samples and blood samples. Flame atomic absorption was used to detect the metals levels in water samples, while flameless atomic absorption was used to detect them in

blood samples, then after centrifugation of blood samples; the plasma was transferred to another plan tube. The collection happened during the period from the 18th of Aug-2007 are the 24th of Aug-2007 and starting from the beginning of Al-Eslah till Al-Kermashia area.

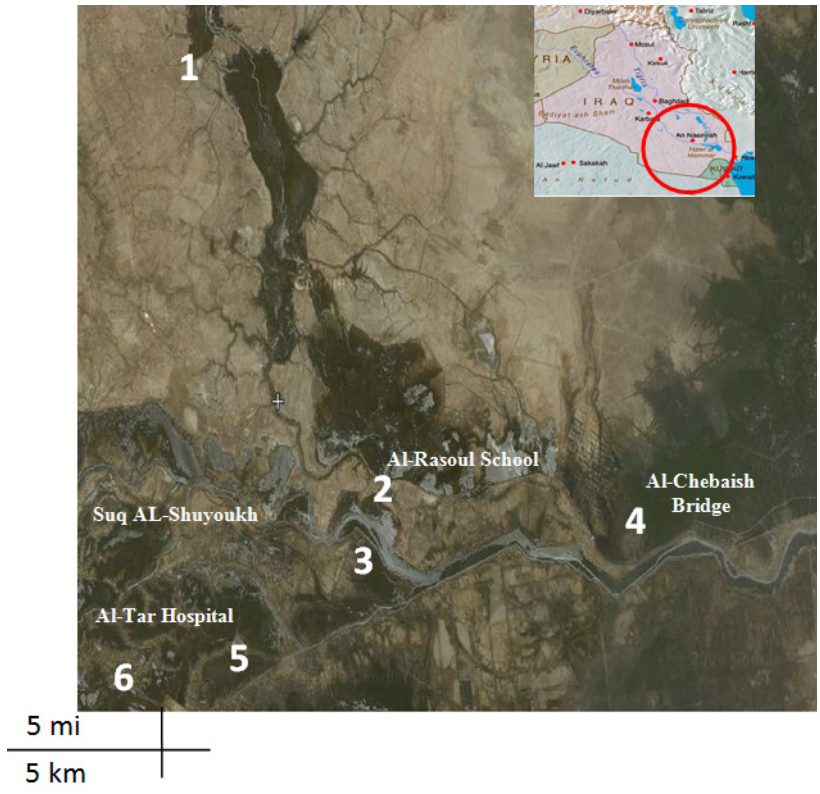

Figure (1) Portrait of the study area www.wikimapia.org

Table (1): The Geographical positions of the studied sites (GPS).

No.	Station	Longitude			Latitude		
1	Al-Eslah	31°	16>	54»	46°	61>	0.1»
2	Al-Fohood	30°	97>	76»	46°	71>	29»
3	Al-Mrawih	30°	94>	99»	46°	72>	34»
4	Near Al-Chebayesh	30°	96>	66»	46°	92>	74»
5	Al-Tar	30°	91>	29»	46°	65>	15»
6	Al-Kermashia	30°	86>	71»	46°	55>	79»

Detection levels of the heavy metals:

Levels of lead was determined in both water and blood samples. Flame atomic absorption was used to detect the metals levels in water samples, while flameless atomic absorption was used to detect them in blood samples according to [1].

Results:

Determination of lead levels in marsh water:

According to the results of the detected lead levels in all collected samples of marsh water it's clear to see among all the water samples numbers which were collected, the huge pollution values of all the currently heavy metals in the marshes as shown in figure (2).

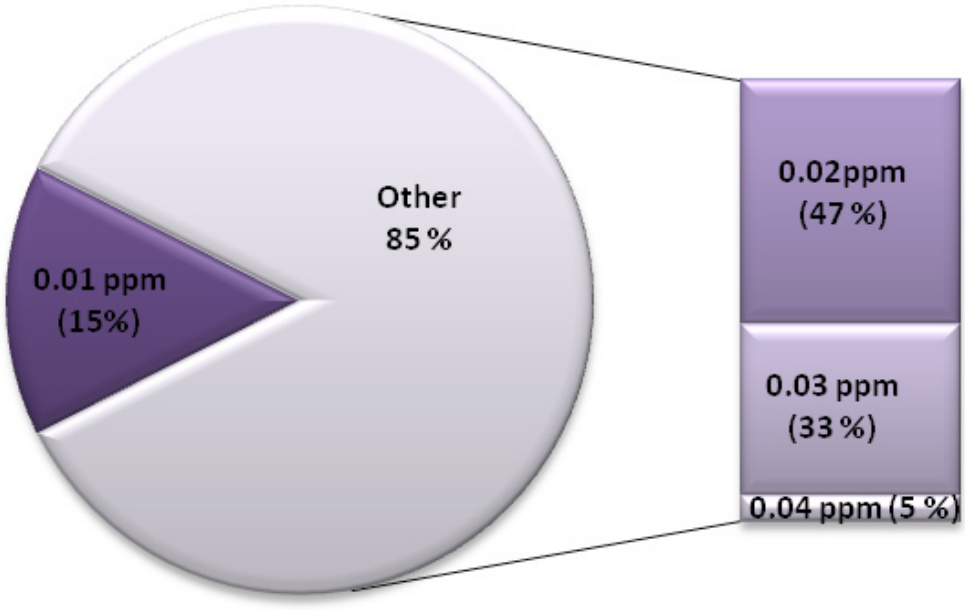

Figure (3-3): Comparing results of lead levels in marsh water with maximum acceptance level of WHO (MAL)

Briefly, the determined lead levels were arranged from 0.022 up to 0.04 ppm with average equal to 0.031 ppm while its acceptance levels in water suppose to be less than 0.01 ppm, as shown in table (2).

Table (2): Maximum, minimum, and mean of lead values in water samples

No.	Metals	Max.	Min.	Mean	MAL* (WHO)
1	Lead	0.04	0.022	0.031	<< 0.01

* MAL means maximum acceptance level.

Determination of some heavy metals levels in blood samples:
Levels of lead in blood of a random group of Iraqi marshes inhabitants were showed that only forty-two blood samples were contained the acceptance level of lead as shown in figure (3).

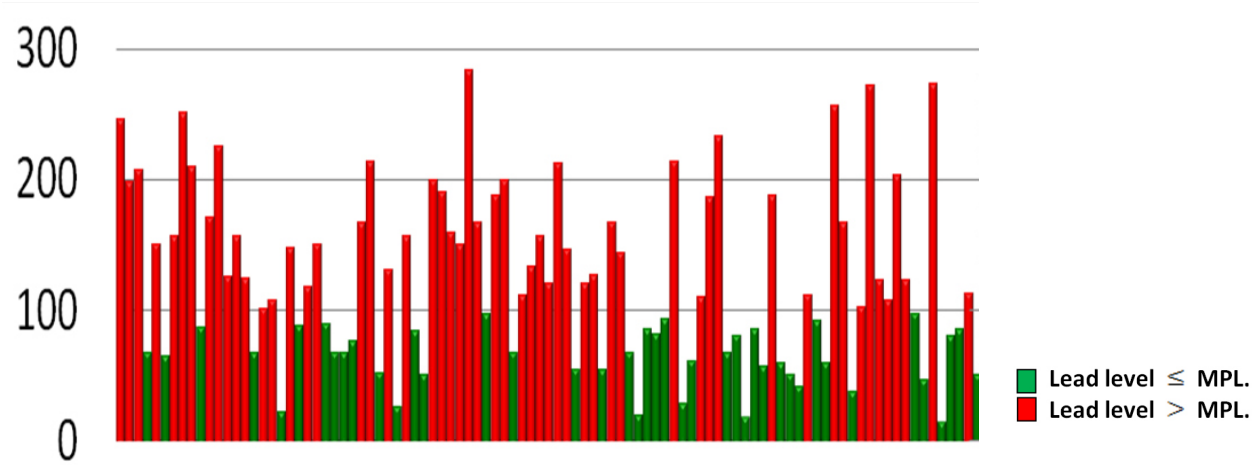

Figure (3-6): The lead levels in the blood samples (ppm.).

The lead levels were starting from 0.011 ppm up to 0.281 ppm with mean value equal to 0.119 ppm. According to these results, it's clear to see that the mean of the blood levels were higher than MPL which was 0.1 ppm as shown in table (3).

Table (3): Lead levels in blood samples (ppm)

No.	Metals	Max.	Min.	Mean	MPL (WHO)*
1	Lead	0.281	0.011	0.119	<< 0.1

Discussion:

Comparing of lead levels determined values in Iraqi marshes with their MALs reflects the huge pollution values of all the currently lead in the marshes. These results came along with others which were carried by [10] indicating that all lead, levels where higher than MALs in Iraqi marshes, while it disagree with other results carried by [11] in the same area of marshes.

Increasing of lead in the entire world may come by many reasons including untreated sewages and waste water which were thrown in river or other water bodies, in addition to other natural sources [12][13]. increased population in the last few decades have caused a dramatic increase in the demand for river water, as well as significant deteriorations in water quality throughout the world [10].

There are two ways of lead entrance into the aquatic environments of southern Iraqi marshes; natural and anthropogenic ways [14]. Natural ways include storm dust fall, erosion or crustal weathering and decomposition of the biota in the water, without mention to other ways such as lava and volcanic projectiles or acid rain [10] on the other hand, anthropogenic ways can be assembled by untreated domestic and industrial sewage which were discharging to the Tigris and Euphrates Rivers then reaching to southern marshes or by discharging directly into marshes [11], the wars that happened in that area also served as a source of heavy metals due to using the extensive burning, heavy bombing and shelling, and widespread use of chemical weapons [10].

In addition to all these reasons, it is possible to believe that metals in the study area were derived mainly from the igneous mineral deposits in the Iraq-Iran Mountain range [15].

Al-Juboury recorded a slight pollution of lead metal in the up regime of Tigris in the north of Iraq, he suggested that the clay and heavy minerals may form an important source for the natural pollution by the heavy metals in the recent sediments of the Tigris River, as well as most of the pollution came from the wastewater contributed to the river [16]. Generally, all lead estimated results show high levels in blood of the collected samples, and – except few samples which contained normal lead levels – all the samples contained levels excess than maximum permitted levels. The reported results of metals blood levels reflect the huge pollution in that area.

In an attempt to compare the concentration of lead in both water of Iraqi marshes and blood samples of marsh inhabitants, it is obvious to see the similarity between concentrations of lead in both samples (higher concentration than MAL). In more details, results showed that both water and stool samples contained high level concentration of lead in their samples, (85%) of water samples and (58%) of blood samples were above the acceptable levels of lead. As well both water and blood samples contained chromium and cadmium concentrations higher than the acceptable levels in there.

It is quite pleasant to reach a conclusion those human beings inhabitants of southern Iraqi marshes have got contaminated from the marsh water based on the fact that the same or similar levels of concentrations of heavy metals have been recorded in both marsh water and blood samples in the present study.

This assumption is also based on the fact that the Iraqi marshes habitants were using the contaminated water for drinking till now, as well to drinking source for their animals, and to water their plant, these high levels of the heavy metals inside their bodies is a result of the bioaccumulation of metals which enter them majority by marsh water. The critical point during any dealing with heavy metals is the bioaccumulation; the metals ability to accumulate inside living organisms into a specific organs [17]. Accumulation ultimately causes toxic effects on humans by affecting food quality of crops, animal products, as well as drinking water quality, with more consideration to food chain [18].

[19] mentioned that the increasing of heavy metals inside the human fluids mostly occurred by ingestion (drinking or eating) or inhalation (breathing). previous study done by [11] showed that there is no air pollution of marshes area by any kind of heavy metals, this result as well as the current investigation represents also a good base to conclude the absence of air pollution effects on heavy metals levels in blood and therefore major cause of the high levels of these metals inside human body was their total dependant on the marsh water.

In brief, heavy metal contamination in the environment has become a serious problem due to the increase in the addition of these metals to the environment. Natural sources as well as the anthropogenic sources account for this contamination, which has become a threat to public health. Heavy metals are being released to the environment [20]. Contamination of the aquatic environment by toxic metal ions is a serious pollution problem. Due to the fact that, unlike organic pollutants, chemical or biological processes can't degrade toxic metal ions. To remediate the aquatic environment, the toxic metal ions should be concentrated in a form that can be extracted conveniently, possible for reuse or at least for proper disposal. Natural resources including plants and microorganisms are extensively explored to combat metal ion pollution [21].

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تقييم مستويات الرصاص في دم الانسان وفي مياه الاهوار في جنوب العراق

بشرى هندي صالح[1]، شلال مراد حسين[2]، عصام فاضل الجميلي[3]

المركز العراقي لبحوث السرطان والوراثة الطبية/ جامعة المستنصرية

الخلاصة:

تم جمع مائة وثمانية عينة اخذت من ستة محطات في هور الحمار في الفترة من 24-18 اب عام 2007. فضلا عن 97 عينة دم جمعت من مناطق اهوار مختلفة حيث يعيش الناس هناك ويستخدمون مياه الاهوار للشرب والاستعمالات الاخرى. وقد درست مستويات الرصاص في كلا عينتي المياه والدم, حيث استخدمت طريقتي الامتصاص الذري اللهبية وغير اللهبية على التوالي, واظهرت النتائج ان معظم العينات من الماء والدم كانت تحتوي على مستويات مرتفعة من الرصاص اعلى من المستويات اللتي وضعت من قبل منظمة الصحة العالمية.