Al-Kitab Journal for Pure Sciences (2024); 8(1):1-9.
https://doi.org/10.32441/kjps.08.01.p1

Al-Kitab Journal for Pure Sciences
ISSN: 2617-1260 (print), 2617-8141(online)

https://isnra.net/index.php/kjps

Detection of Hematological Correlations of People Lived at Al-Ahdab Oil Field in Al-Kut City, Iraq

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Citation: Muhsin EA, Abdulkareem AF, Khalaf SA. Detection of Hematological Correlations of People Lived at Al-Ahdab Oil Field in Al-Kut City, Iraq. Al-Kitab J. Pure Sci. [Internet]. 2024 Jan 13 [cited 2024 Jan 13];8(1):1-9. Available from: https://doi.org/10.32441/kjps.08.01.p1.

Keywords: Renal function, Hb, CRP, Wassit.

Article History
Received 04 Oct. 2023
Accepted 25 Dec. 2023
Available online 13 Jan. 2024

Abstract:

This study was done in Wassit province, Al-Kut city in December 2023. Two groups were selected in this study: the first one consists of 25 people who have lived near the Al-Ahdab oil field, while the second one consists of controls with no significant difference in age between them and of both genders. This study aims to detect the influence of environmental pollution on the measured parameters of the blood (Urea, Creatinine, Hb, PCV, and CRP) with the presence of a significant relation among them. The results indicate that there is a highly significant relationship between Urea and creatinine and between Hb and PCV in both study groups. There is also a significant correlation between Urea and both Hb and PCV in the exposed group. While it was a significant correlation between Urea and CRP was detected in the control group only.

Keywords: Renal function, Hb, CRP, Wassit.

الكشف عن علاقات المؤشرات الدموية للأشخاص الذين يعيشون في حقل الأحدب النفطي في مدينة الكوت، العراق

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الخلاصة:

أجريت هذه الدراسة في محافظة واسط، مدينة الكوت في كانون الأول ٢٠٢٣. تم اختيار مجموعتين في هذه الدراسة: الأولى تتكون من ٢٥ شخصا يسكنون بالقرب من حقل الأحدب النفطي، بينما تتكون المجموعة الثانية من افراد مجموعة السيطرة ولا يوجد فرق كبير في العمر بينهم وبين كلا الجنسين. تهدف هذه الدراسة إلى الكشف عن تأثير التلوث البيئي على مؤشرات الدم المقاسة (اليوريا، الكرياتينين، *Hb*، *PCV*، و*CRP*) مع وجود علاقة معنوية فيما بينها. تشير النتائج إلى وجود علاقة ذات دلالة إحصائية كبيرة بين اليوريا والكرياتينين وبين *Hb* و*PCV* في كلا المجموعتين. كما أنه يوجد ارتباط كبير بين اليوريا وكل من *Hb* و*PCV* في المجموعة قيد الدراسة. في حين أنه تم الكشف عن وجود ارتباط كبير بين اليوريا و*CRP* في المجموعة الضابطة فقط.

الكلمات المفتاحية: وظيفة الكلى، Hb، CRP، واسط.

1. Introduction:

Iraq has suffered in recent periods of wars and the introduction of various pollutants in large quantities to the ecosystem and thus arrived at the man either directly or cumulatively or through food and water, air and soil and then suffering from disease never encountered, in the forefront of their cancer and respiratory diseases, in the modern era [1]. Some scientific studies have reported that the city of Kut was one of the cities exposed to radiation in 2003, as mentioned by UN reports about the environment in the United Nations Environmental Programs (UNEP) and WHO [2]. Air pollution has long been thought to exacerbate minor acute illnesses, recent studies have suggested that air pollution, particularly hydrocarbon-related pollution, is associated with high levels of mortality and the development of certain disorders in areas where particle concentrations have fallen [3]. Although many of these associations seem likely to be causal, others require and warrant additional investigation because although the role of air pollution in

exacerbating existing illness has been well established, recent evidence has implicated pollution exposure with the development of chronic disease or impairments [4]. For several decades, studies tended to determine the relationship of biological indicators and hydrocarbon environmental contaminants, previous studies have highlighted natural emission exposure (environmental) or in other areas such as industry and medicine [5]. In general, the effect was strongly associated with immune system disorders and more mixed results have been reported mainly in the levels of some blood components. It was discovered that exposure to environmental pollutants has a toxic effect on the immune system and its effect on the vitality and functions of immune cells, rendering the intact human cells into cancerous ones [6]. Several proteins and biomarkers were measured for the efficient work of the kidneys where the structural change of the nephron (functional and structural unit of the kidney) by taking an autopsy. The same procedure was done by taking samples of renal biopsy from some people within the scope of exposure showed that several histological changes of renal cells even in the absence of a direct cause of the emergence of kidney damage; but when exposed to constant increase, the chance the continued evolution of this damage [7]. This study aimed to measure some blood factors in both groups (study and control group) and find the interactions between factors measured in terms of the correlated effects among all factors.

2. Materials and methods:

The systematic execution of the research included the following steps:

1) The creation of scientific and material supplies: the creation of laboratory supplies for the withdrawal of blood and look at the scientific sources, considering that the city of Kut from cities exposed to radiation in 2003, and recorded a high rate of environmental pollution by sources [2,8]

2) Collection of blood samples from people in the surrounding areas Ahdab oil field (residents and staff) and filling in the questionnaires, and people living in areas far from Kut as a control group.

The samples were collected from the people near the Al-Ahdab area and people far from the city of Kut and considered as a control group. Sera were separated from blood samples and then frozen until use [9]. The levels of urea, creatinine, and C-reactive protein were measured. Blood hemoglobin ratio and packed cell volume were also applied (all were done according to the manufacturing companies' instructions). These tests reveal the performance of the kidneys and the nature of the blood and immune components in each of the exposed people and the control group for comparison.

3. Statistical analysis:

The results were analyzed statistically by SPSS ver. 17 using Chi-square for the parameter within the same category, and T-Test in parameters comparison between two categories.

4. Results and discussion:

As seen in **Tables 1** and **2**, the results show that a significant relation was recorded between urea and creatinine in both the exposed and control groups. Also, a significant correlation was detected between each of the hemoglobin and packed cell volume in both groups. There was no significant difference between age and smoking in both groups.

Table 1: Correlations of parameters in the exposed group

		Urea	Creatinine	Hb	PCV	CRP	Age
Urea	Pearson Correlation	1	.608**	.406*	.408*	-.104-	.131
	Sig. (2-tailed)		.001	.044	.043	.622	.532
	N	25	25	25	25	25	25
Creatinine	Pearson Correlation	.608**	1	.344	.344	-.014-	-.060-
	Sig. (2-tailed)	.001		.092	.093	.948	.777
	N	25	25	25	25	25	25
Hb	Pearson Correlation	.406*	.344	1	1.000**	.341	.356
	Sig. (2-tailed)	.044	.092		.000	.096	.081
	N	25	25	25	25	25	25
PCV	Pearson Correlation	.408*	.344	1.000**	1	.336	.358
	Sig. (2-tailed)	.043	.093	.000		.101	.079
	N	25	25	25	25	25	25
CRP	Pearson Correlation	-.104-	-.014-	.341	.336	1	.099
	Sig. (2-tailed)	.622	.948	.096	.101		.636
	N	25	25	25	25	25	25
Age	Pearson Correlation	.131	-.060-	.356	.358	.099	1
	Sig. (2-tailed)	.532	.777	.081	.079	.636	
	N	25	25	25	25	25	25

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

The relation between urea and creatinine indicates the linear relationship between these two indicators of renal function. In the exposed group, there was a rise in urea accompanied by a rise in creatinine where they are affected together in the same pattern. There were natural values of urea and creatinine in the healthy range, and this demonstrates the safety of renal function **[10,11]**. These results coincided with the results of each of **[12.13]**on renal function assessment

and the role of each of urea and creatinine in the credibility of the measure, as reflected in turn damage caused in the nephron, the structural and functional unit of the kidney, by its two parts: glomeruli and tubule [7]. These recordings agreed with [14] and [15].

Table (2): Correlations of parameters in the control group

		Urea	Creatinine	Hb	PCV	CRP	Age
Urea	Pearson Correlation	1	-.476-*	.022	.024	-.490-*	-.025-
	Sig. (2-tailed)		.016	.917	.911	.013	.906
	N	25	25	25	25	25	25
Creatinine	Pearson Correlation	-.476-*	1	.318	.315	.189	-.022-
	Sig. (2-tailed)	.016		.121	.125	.365	.917
	N	25	25	25	25	25	25
Hb	Pearson Correlation	.022	.318	1	1.000**	-.183-	.097
	Sig. (2-tailed)	.917	.121		.000	.381	.645
	N	25	25	25	25	25	25
PCV	Pearson Correlation	.024	.315	1.000**	1	-.186-	.099
	Sig. (2-tailed)	.911	.125	.000		.372	.636
	N	25	25	25	25	25	25
CRP	Pearson Correlation	-.490-*	.189	-.183-	-.186-	1	.029
	Sig. (2-tailed)	.013	.365	.381	.372		.889
	N	25	25	25	25	25	25
Age	Pearson Correlation	-.025-	-.022-	.097	.099	.029	1
	Sig. (2-tailed)	.906	.917	.645	.636	.889	
	N	25	25	25	25	25	25

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Urea is one of the important tests to assess renal function as it has a standard rise in many cases, including factors related to the kidney and its performance, or other factors that are not directly related to it such as the nature of food and metabolism of proteins, drought and lack of fluid intake. The rise in urea level reflects the state of the kidneys and the possibility of being affected negatively by certain stimuli in the urinary system hindering his performance properly [16]. Creatinine is deemed to be the most honest cursor in the expression of the efficiency of renal function because it is not affected by the nature of the food, or metabolism and because it raises through the kidney only and not through other outlets such as skin and intestine like urea,

so the height is a clear indication of a defect in renal function and effect and evolve it to real renal disease **[17]**.

Numerous studies have found that these percentages have increased with time or dose exposure to environmental pollutants, as gene expression of the components of the blood increases excessively so the body will consider it as an inflammatory state **[18]**. Hemoglobin levels are associated with the packed cell volume of red blood cells in both groups. Because hemoglobin is a certain size of the red blood cells, it means that the change in the total size of the cells will be affected by a parallel pattern and there will be a regular effect on hemoglobin, and the relationship between these two variables would be according to the following equation (equation.1) as mentioned by Connor *et al.* (1994) as it is simple and scientifically supported method **[19]**: **Hb (g/dl)+PCV(L/L)/3**.

The hemoglobin rose steadily as in the study of Hemoglobin and hematocrit values are age-dependent **[3]**. The strong relationship recorded only in the exposed group is the urea relationship with both hemoglobin and packed cell volume. According to the equation above, the effect of urea with both variables is linked by the fixed pattern with both hemoglobin and packed cell volume. When urea rises will cause an increase "in blood pressure and this refers to the injury shocked size (increase in size is controlled by the body) as in cases of deterioration of renal function itself. **[20,21]**. The style of life and inhalation of toxic materials and gases, affected by the ecosystem and the kind of food, will lead to genetic mutations and overproduction of blood cells after free radicals' formation **[22]**.

Finally, a significant relationship was recorded between urea and C-reactive protein in the control group. That can be explained by the relationship between these two variables is that the urea is produced by the liver which also produces a protein called C-reactive protein **[18]**. This last one has a natural level in the blood and so as long as the function of the liver is intact, the production of these two hematological will be less than the allowable limit, without any effect or infection **[22]**. While this relation was not detected in the exposed group due to non-intact healthy function, agreed with **[13]**.

Increased human exposure to pollutants leads to an imbalance in the proportions of blood components in humans according to potions and exposure time **[1,23]**. A mechanism was suggested to give a certain explanation, about blood components that are not within normal limits, which is an irregular and frequent production of proteins and cellular secretions by recurrent exposure to toxic materials or pollutants. So, recurrent exposure to emitted airborne particulate matter (PM) and gaseous pollutants leads the body to suffer an inflammatory or infectious case which results in a wide range of health hazardous problems, including

respiratory and cardiovascular diseases [5]. Other factors, like poor diet, low exercise, underlying diseases, and individual diversity of human genes, may worsen the effects of air pollution and bring on adverse chronic organ pathology [24].

5. Conclusions:

1) The presence of a high-significant correlation between renal function parameters (urea, creatinine) as well as blood indicators (hemoglobin and PCV) in the exposed group and the control group.

2) There was a significant relationship between urea and the level of each of the hemoglobin and the PCV in the exposed group.

3) There was a significant relationship between urea and C-reactive protein in the control group.

6. Recommendations:

Periodic hematological and genetic tests should be performed particularly for people who live near oil fields or workers in industry and energy generation fields.

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