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Evaluation of the Serum Level of Cytokines IL-6, IL-8 Among Patients with Sinusitis in Diyala Governorate, Iraq

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Abstract: Sinusitis is inflammatory disorder infecting the mucus epithelial of nasal cavity and paranasal sinuses. This causes the closure of these sinuses and it has negative impact on the patients' life. The present study was conducted in Baqubah Teaching Hospital/ outpatient clinic in Diyala governorate for the period 20th October, 2022 to 28th February, 2023. This study involved immune detection about interleukin- eight (IL-8), and interleukin-six (IL-6) by using ELISA. The sample of this study included 88 individuals and it was distributed into 50 patients who suffered from acute and chronic sinusitis. All these were diagnosed by specialized doctors. The males in the sample were 28 (56%), while the females were 22 (44%). The results of the study showed that the infection was higher among males in comparison with females. Also, the current study involved 38 healthy individuals as a control group. It was distributed into 21 males and 17 females. The study showed that the age group 26-35 had the highest infected ratio of sinusitis. In addition, the results showed that there was an increase in the IL-6 in the patients' serum and the ratio was 32.28 ± 13.07 pg/ml in comparison with the control group (9.98 ± 0.70 pg/ml) at the statistic significant level ($p < 0.001$). Another finding of this study was that there was an increase in the level of IL-8 in the patients' serum (214.23 ± 72.58 pg/ml) in comparison with the individuals of the control group (60.09 ± 18.35 pg/ml) at the statistic significant level ($p < 0.001$).

Keywords: ELISA, Interleukin-8, Interleukin-6, Sinusitis

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Introduction

Sinusitis is an inflammation in the mucus epithelial and it infects the paranasal sinuses and the nasal cavity. It is considered one of the acute, common, and important problems (Taw *et al.*, 2022). The cause of the infection is viruses such as Rhino virus, Parainfluenza virus plus a number of

bacteria that cause the inflammation like *Klebsiella pneumonia*, *Staphylococcus aureus*. It appears in patients who suffer from a weakness in the immunity and some types of fungi (Bleier and Paz-Lansberg, 2021). Sinusitis is classified into the acute sinusitis and chronic sinusitis. The acute

sinusitis is a group of disorders that are characterized by the Respiratory epithelium infection of nose and paranasal sinuses. The inflammation lasts for less than 12 weeks (Shrestha *et al.*, 2023). The chronic sinusitis is a recurrent disorder continuing for more than 12 weeks. This type of sinusitis is characterized by the paranasal sinuses and the mucus epithelial (Chong *et al.*, 2020). The chronic sinusitis (CRS) is accompanied with nasal polyps CRwNP or without CRsNP. It has an impact on the healthy life and it includes a number of symptoms such as nasal obstruction, olfactory impairment, nasal secretions, facial pain or pressure. The diagnosis is made by endoscopy of the nose followed by a CT scan (Miraglia *et al.*, 2022). There are a group of factors that increase the opportunity of happening the paranasal sinuses infection like smoking and some medical cases such as the modern use of decongestant sprays for a long period, nose closure caused by the benign tumor, nasal septum deviation, asthma, some diseases infecting the face, sensitivity, and other diseases such as Cystic fibrosis, environmental variables such as air pollution, flying, diving. All these factors lead to increase the danger of infecting by sinusitis (Kishimoto *et al.*, 2021).

Cytokines are proteins secreted from the immunity cells which can do their different functions such as convey signals between cells (Intercellular signals). They organize the inflammatory response (Berraondo *et al.*, 2019). Some of these Cytokines are the pro-inflammatory (Interleukin-6). It is a mediate-innate and acquired immunity cytokine and multi-physiological processes like the renewal and protective processes, whereas the other cytokine (Interleukin-8) functions in attracting and activating neutrophils (Vilotic *et al.*, 2022).

Materials and Methods

This study was conducted in Baqubah teaching hospital/outpatient clinic in Diyala governorate for the period 20th October, 2022 to 28th February, 2023. Fifty samples (28 males and 22 females), were collected from patients with acute and

chronic sinusitis, their ages ranged from 15-65, and 38 healthy (21 males and 17 females) people were collected as a control group. Five milliliters of venous blood was drawn from healthy and infected with sinusitis by a medical syringe and placed in wine test tubes to separate the serum later. Immunoassays were carried out using the Sandwich ELISA test to estimate IL-6 and IL-8 levels.

Test principle:

In this test, a group of enzymes were used according to the Immunoassay technique using the Sandwich ELISA test to estimate the levels of IL-6, and IL-8, after the incubation process, biotin was added to bind the antibodies to both IL-6 and IL-8 to form the immune complex after an incubation period, later The enzymes are removed and the plate is washed using the wash solution, then a substrate is added, the color of the solution turns from blue to yellow after the addition of the stop solution and the optical density is measured using an ELISA reader.

Statistical Analysis:

The Statistical Package of Social Sciences (SPSS) version (24) was used to analyze the data of the current study, and the descriptive data was expressed in the form of frequency, percentage, and the Chi-square test was used. While the quantitative data was expressed in the form of mean and standard deviation. A comparison was made using the t-test to find out the differences between the two study groups.

Results and Discussion

Measuring the concentration of IL-6 in the sera in both groups of the study- patients and control:

Table 1 shows a high level of IL-6 in the patients (32.28 ± 13.07 pg/ml) in comparison with the control group (9.98 ± 0.70 pg/ml). Also, the results showed that there is a high statistic significant difference ($p < 0.001$; Table 1, Fig. 1).

The results of the current study are in conformity with Kubota *et al.* (2017) who stated that there was remarkably high levels of IL-6 in

Table 1: IL-6 concentration in both patients and control group

		Study groups		P-value
		Patients	Controls	
IL-6 (pg/dl)	Mean	32.28	9.98	<0.001**
	S.D.	13.07	0.70	

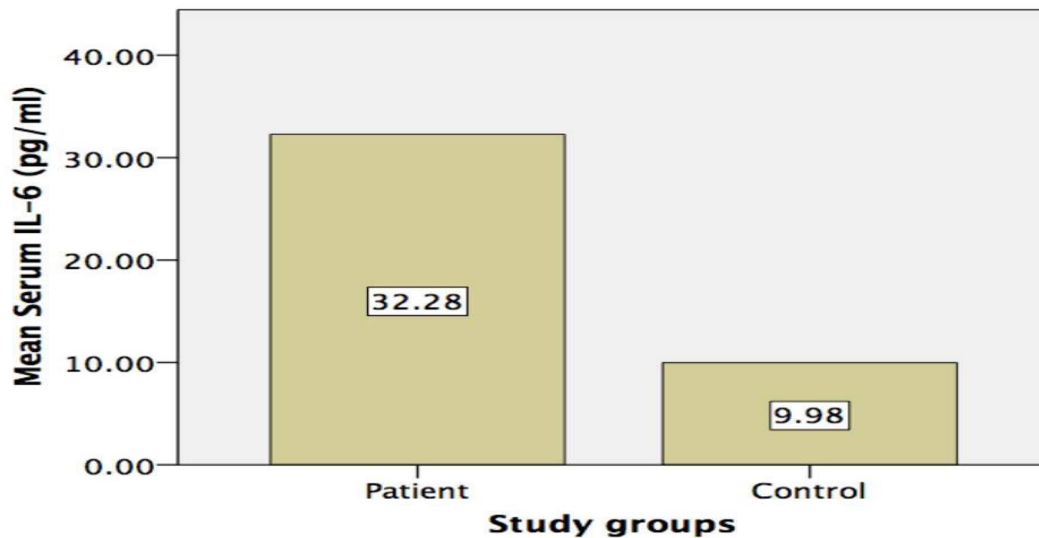


Fig. 1: IL-6 concentration in the sera of both patients and control groups.

the patients of sinusitis. This happened because the increase in the inflammatory process and this in turn leads to activate the immunity cells and the immune system response. IL-6 has an important role in the host's immune system and renewing tissues. Also, it plays a crucial role in responding of the acute face via a number of clinical and biological features. Another study conducted by Ivanov *et al.* (2019) showed an increase in the levels of IL-6 in the patients of sinusitis. Both IL-6 and IL-1 take part together with TNF- α and it showed a number of cellular and Humeral effects which are related with inflammation and defense the host when the tissues are infected. Also, it contributed largely in the pathogeneses and physiological processes, the production of acute phase proteins, and maturing and producing Granulocytes cells and differentiating T-cells (Crocker *et al.*, 2012). The concentration of IL-6 increases at the excessive inflammation. So, the inflammatory response of the host secretes the

pro-inflammatory Cytokine and acute phase protein. This leads to stimulate the immune response (Slaats *et al.*, 2016).

Measurement IL-8 in the sera of both the patients and control:

Table 2 shows an increase of IL-8 in the patients (214.23 ± 72.58 pg/ml) in comparison with the control (60.09 ± 18.35 pg/ml). The statistic results showed there was a statistic significant difference ($p < 0.001$; Table 2, Fig. 2).

The results of the current study consented with those of Kim *et al.* (2019) which indicated that there was an obvious increase in the IL-8 level in the patients group with regard to the control group. Also, the results are in agreement with that of Jung *et al.* (2019). The expression of IL-8 was higher in the patients than in the control. At the beginning, IL-8 is released by the Leukocytes in an early time after the infection. It attracts mainly neutrophils. It is identified

Table 2: IL-8 concentration in both study groups

		Study groups		P-value
		Patients	Controls	
IL-8 (pg/dl)	Mean	214.23	60.09	<0.001**
	S.D	72.58	18.35	

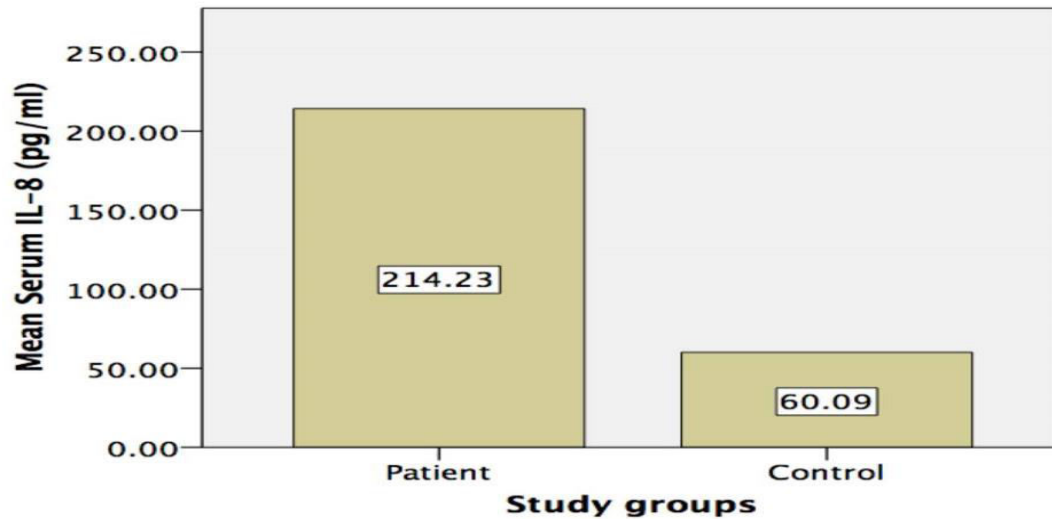


Fig. 2: IL-8 concentration in the sera of the patients and control groups.

through the enzymes which destroy connective tissues (French *et al.*, 2017). The invasion of the pathogens to the nasal epithelium leads to release IL-8 and IL-6, besides TNF α and many chemical materials by Nasal epithelia (Hirschberg *et al.*, 2016). IL-8 has a number of biological effects and it reinforce the formation of angiogenesis in the body. This has an important role in reinforcing the inflammation of the airway. It increased the secretion of IL-8 in the mucous membrane. Then, this can cause an inflammation and destruction of the mucous membrane via the direction of the Neutrophils and Eosinophils (Wang *et al.*, 2021).

Conclusion

The present study concluded that there is (i) increase of the IL-6 levels in the sera of the patients of sinusitis with regard to the control, and (ii) increase in the IL-8 levels in the sera of the patients in comparison with the control.

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