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Estimation of Serum leukotriene and some interleukin Levels in Women Infected with *Trichomonas vaginalis* Parasite

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Received: 1 September 2024 **Accepted: 9 December 2024**

Published: July 2025

DOI: https://dx.doi.org/10.24237/ASJ.03.03.921A

Abstract

This case-control study aimed to estimate serum leukotrines IgG, IgA, IgM, Leukotrienes, Interlukin-10, Interlukin-IB and monocyte chemoattractant protein-1 (MCP) in women infected with Trichomonas vaginalis parasite. In the current study, venous blood samples were collected from (100) women infected with *Trichomonas vaginalis parasite* who visited the Obstetrics and Gynecology Hospital in Diyala Governorate, and whose ages ranged between (18-50) years during the period from 20/08/2023 to 01/12/2023. Also, venous blood samples were taken from (150) healthy women as a control group. In this study, the levels of serum (IgG, IgA, IgM, Leukotrienes، Interlukin-10، Interlukin-IB and monocyte chemoattractant protein-1 (MCP) were estimated.

The results showed that the prevalence rate of *Trichomonas vaginalis* infection in the studied women was 40%. The levels of IgA, IgM, and IgG were significantly elevated (P≤0.05) in the serum of patients compared to the healthy group. Also, the levels of serum LTB4, IL-10, IL-IB, and MCP were significantly increased (P≤0.05) in the patient group compared to the healthy group. It can be concluded from this study that serum levels of (IgG, IgA, IgM, Leukotrienes

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Interlukin-10, Interlukin-IB and monocyte chemoattractant protein-1 (MCP) were elevated in women infected with trichomonasiasis.

Key words: *Trichomonas vaginalis*, leukotrienes, interleukins.

Introduction

Trichomonas vaginalis is a single-celled parasitic protozoan that moves by flagella (possess 5 flagella), and its habitat is the urogenital tract of both females and males and it is attached to the vaginal epithelium in females. It causes vaginitis in female and urethritis in men [1]. *Trichomonas vaginalis* is a single anaerobic flagellate parasite that invades and suppresses the uterus and urinary system in women, and the bladder, vesicle, and prostate in men [2]. Trichomonosiasis is the most common type of sexually transmitted infection and is caused by the parasite *Trichomonas vaginalis*. There are no estimates of the severity of the infection among females of childbearing age, and symptoms do not appear in half of infected females. It is diagnosed by microscopic examination of a sample of vaginal fluid, and infection may occur through sexual intercourse or oral-genital contact [3]. *Trichomonas vaginalis* belongs to the unicellular eukaryotes and is considered an obligate parasite because it cannot synthesize many large molecules important for life, including purines, pyrimidines, and many lipids. It obtains these substances from vaginal secretions or phagocytizing host cells or existing bacteria [4].

Leukotrienes are produced from arachidonic acid, which is a lipid intermediate and a chemoattractant for inflammatory white blood cells, especially neutrophils. It promotes the recruitment of white blood cells to infected sites [5], and participates in the elimination of pathogens through interaction with its high-affinity receptor. Great interest has been shown in the role of the LTB4/BLTI axis in acute and chronic inflammatory diseases, such as infectious diseases, allergies, autoimmune diseases, and metabolic diseases by mediating the activation of different types of inflammatory cells depending on the different stages or nature of the inflammatory response [6].

Recent studies have also shown that LTB4 acts on non-immune cells via BLT1 to initiate and amplify pathological inflammation in various tissues. Excessive activation of LTB4 leads to

acute and chronic inflammation, leading to inflammatory diseases [7]. It has been proven that infection with *Trichomonas vaginalis* causes profuse inflammatory secretions containing neutrophils [8].

IL-10 is a multi-functional cytokine that has different effects on the components of most blood cells [9]. It is of a protein origin consisting of 172 amino acids [10]. Its molecular weight is 17-20 Kilo Daltons [11]. It is produced by several defensive cells, including neutrophils, normal cells, mast cells, macrophages, and monocytes. It possesses interleukin 10 Receptors, which are two subunits that are expressed by hematopoietic and non-hematopoietic cells [12].the aim of study to estimate serum leukotrines IgG, IgA, IgM, Leukotrienes, Interlukin-10, Interlukin-IB and monocyte chemoattractant protein-1 (MCP) in women infected with Trichomonas vaginalis parasite

Materials and Methods

In the present study, venous blood samples were collected from (100) women infected with cutaneous *Trichomonas vaginalis parasite* who visited the Obstetrics and Gynecology Hospital in Diyala Governorate, and whose ages ranged between (18-50) years during the period from 20/08/2023 to 01/12/2023. Also, venous blood samples were taken from (150) healthy women as a control group. In this study, the levels of serum (IgG, IgA, IgM, Leukotrienes، Interlukin-10، Interlukin-IB and MCP) were estimated.

The blood samples were placed in gel tubes for 20 minutes to clot, then centrifuged at 3000 rpm for 15 minutes, and serum samples were obtained. The serum samples were placed in Eppendorf tubes and stored at a temperature of -20C^0 until use.

Two commercial test kits produced by the American company Bio-Sources were used to detect the specific serum antibodies (IgG IgM and IgA) to the parasite *Trichomonas vaginalis* by ELISA method.

The level of cytokines (LTB4, IL-10, IL1B, and MCP) in the serum of infected and uninfected women was measured using an enzyme-linked immunosorbent test based on the color change

resulting from the binding of specific antibodies to the antigen, according to the instructions of the kit prepared by the company.

Statistical analysis

The SPSS statistical program was used to find the Mean ± (SD). The differences between the patients and the healthy group were determined by using (t-test). The p value (≤ 0.05) was considered as significant.

Results and Discussion

The clinical diagnosis was made by specialized gynecologists, and samples were taken and examined using direct microscopic examination. The number of positive samples was 100 (40%) of the total (250) examined women, as shown in table (1).

Table 1: Prevalence of female patients infected with the *Trichomonas vaginalis parasite*

The total number of samples examined	Negative sample			Positive samples
250 (100%)	%	Number	%	Number
	60	150	40	100

The results of the current research showed a significant rise ($p \leq 0.05$) in (IgG, IgM, IgA, LTB4, IL-10, IL-1B, MCP) levels in women infected with Trichomonas vaginalis compared to healthy subjects. as shown in table (2) and figures (1,2,3,4,5,6,7) respectively.

Table 2: Mean ±S.D of the anti-bodies and cytokines of the samples under study

Groups / **Parameter**	**Mean ± SD**		**P-Value**
	Control	**Patients**	
IgG	1.5±0.65	3.002 ±0.95	P ≤ 0.05
IgM	0.080±0.012	2.91±0.55	P ≤ 0.05
IgA	0.085±0.011	17.31±2.43	P ≤ 0.05
LTB4	23.32±6.21	100.76±23.45	P ≤ 0.05
IL-10 (Pg/ml)	2.11 ± 5.22	6.22 ± 13.28	P ≤ 0.05
IL-IB (Pg/ml)	0.408 ± 0.208	0.978 ± 0.114	P ≤ 0.05
MCP(µgm/dl)	20.04 ± 14.91	40.13 ± 22.04	P ≤ 0.05

Significant P ≤ 0.05

P-ISSN: 2958-4612
E-ISSN: 2959-5568

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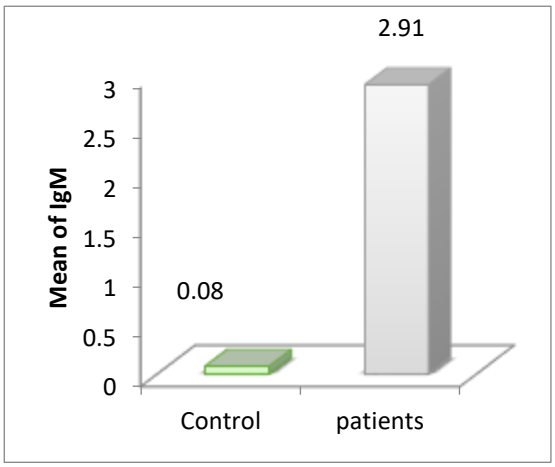

Figure 1: Serum IgM levels in the study groups

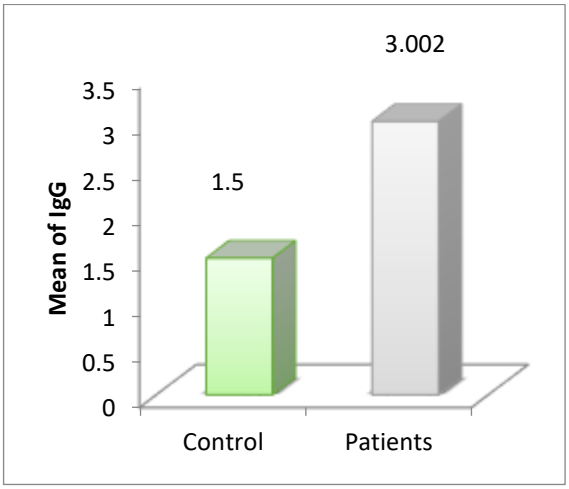

Figure 2: Serum IgG levels in the study groups

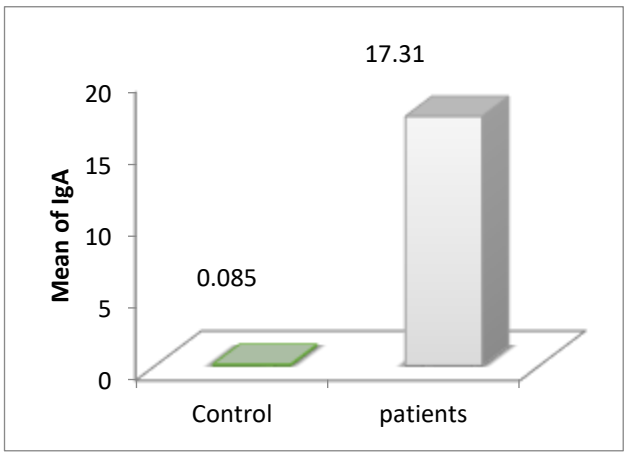

Figure 3: Serum IgA levels in the study groups

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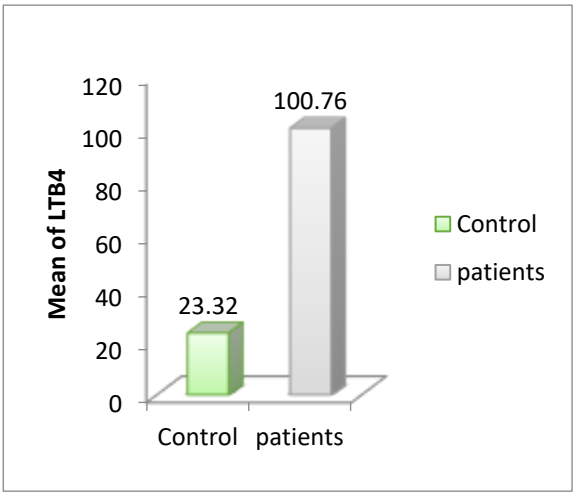

Figure 4: Serum LTB4 levels in the study groups

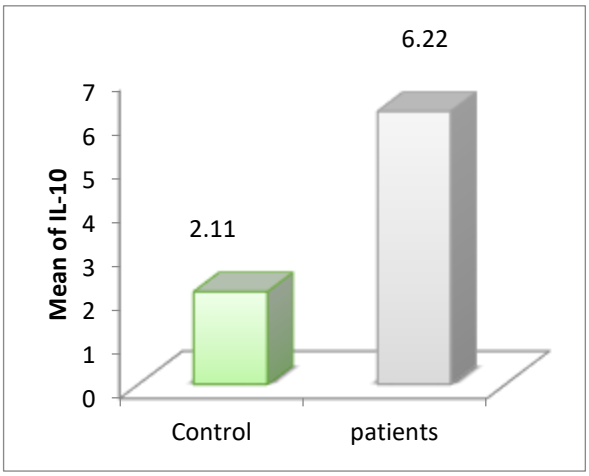

Figure 5: Serum IL-10 levels in the study groups

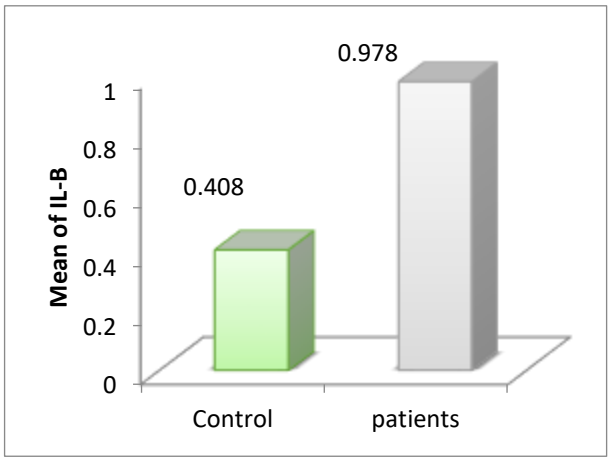

Figure 6: Serum IL-B1 levels in the study groups

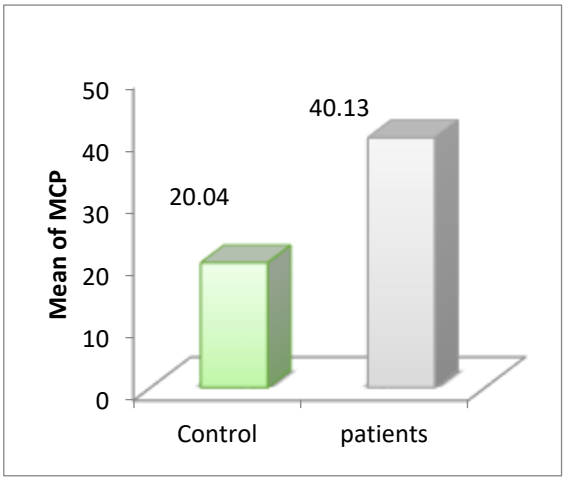

Figure 7: Serum MCP levels in the study groups

Discussion

The results of the current study showed that the infection rate for women with Trichomonas parasite is 40%. This percentage is close to what It is one study researchers in Iraq found in their studies, including [9], who recorded the percentage for females was 28.8%, and also [10], who reported that 20.11% infection rate in women. This result was based on results cited by researcher [11], where they found that the prevalence of trichomoniasis among women was 24.5%, as well as [12], who found that 22% of women were infected, while the results of the study did not agree with both [13] in Najaf, which indicated a small percentage of 4.9%, and [14], who conducted a microscopic study on trichomoniasis in Diwaniyah governorate, who found 2.8%, and [15] In Basra governorate who detected only 4.1%, as well as the study of [16] in Kirkuk who reported 2.8% infection rate. The reason for the relative differences in the above-mentioned studies is due to several causes, including the size of the studied groups or women, and the choice of samples, for example, women visiting reproductive disease clinics or visiting private disease clinics in the world, or pregnant and lactating women, different diagnostic methods, and the period during which the collection was done. The time period of differences in social diversity, social diversity in different regions of the world, especially multiple sexual partners and different living conditions in foreign countries. In general, the percentages

obtained in the current study are not equal to what was recorded in other studies, whether in Diyala Governorate or other governorates. The reason may be due to the current circumstances that prevent the patient from being transferred to hospitals except in the resulting cases, as well as in general. Visiting private clinics in some countries that suffer from poor care and lack of treatment in governmental hospitals

In the current study, it was found that antibodies were higher in women infected with the parasite compared to healthy women, and this is consistent with the study performed by [17]. There is a significant increase in the concentration of antibodies as a result of an increase in the percentage of B lymphocytes in the peripheral blood of women infected with the parasite *Trichomonas vaginalis* when compared to the control group [17]. This indicates the induction of a humoral immune response during infection with *Trichomonas vaginalis* [18].

The reason for the increase in the level of leukotriene is attributed to infection with the parasite, which causes the development of immunity in the tissue lining the vagina, as it contains a large number of monocytes, and thus these quantities of leukotriene were produced. The results of our study was in agreement with [19], who revealed in their study that there was an increase in leukotriene in women infected with *Trichomonas vaginalis*, since this parasite releases a neutrophil-activating factor known as leukotrienes [20].

Many studies have shown an increase in the level of interleukin-10 (IL-10) when infected with the parasite *Trichomonas vaginalis* and these results agreed with the finding of [21].

Th2 helper cells secrete anti-inflammatory cytokines, including interleukin-10, which is involved in the humoral immune response and reduces the activity of phagocytes [22], as the main function of the cytokine (interleukin-10). The limitation and end inflammatory responses [23], and the slight effect of cellular activity causes a high immune response, which led to an increase in the rest of the immune parameters and a decrease in its production by the productive cells in the area of infection [24].

Also there may be an increase in the level of IL-1β due to an increase in monocytes or macrophages that induce *T. vaginalis* infection and cause inflammation in the vagina leading to stimulation of host immune and organelle immunity [25]. These results coincide with the study

conducted in Al-Diwaniyah Governorate, Iraq by [26], who revealed that the concentration of IL-1β increased in the serum of women infected with trichomonasiasis. However, the current results differed from the results of [27], whose study showed a decrease in the level of interleukin-1 in women infected with trichomonasiasis., compared to the active group, which indicated that this may sometimes be surprising to the level of interleukin-1.

The results in the present study agreed with [28], who indicated in their study an increase in the levels of chemotactic protein attracting monocytes in a group of people infected with the symptomatic *Trichomonas vaginalis* parasite, due to the host's response to the parasite's antigens and the activation of chemotactic protein-generating cells, which are mast cells. It is known that these cells are rapidly secreted into inflammatory media, which promote such chemokines and histamine's response to infection with the parasite *Trichomonas vaginalis* [29].

Source of funding: No source of funding

Conflict of interest: None.

Ethical clearance: The samples were gained according to Local Research Ethics Committee Approval in the College of Science, University of Diyala, No. 24 EC-21 in 10/1/2024

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