Testing the immune markers MIP, IL-23 and find a relationship between them in the serum of male patients with toxoplasmosis

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Abstract
The aim of the current study is to find the levels of MIP and IL-23 in the serum of a group of male patients infected with Toxoplasma gondii who were diagnosed with the disease by rapid IGg screening and to find the levels of IGg protein in the blood serum of a group of male patients infected with the disease. The aforementioned immune indicators in the serum of healthy people as a control group. Blood samples were taken from donors who came to the main blood bank in Najaf Al-Ashraf, and the relationship between these immune indicators was studied using ELISA technology. The total number of males was (78), (48) of whom were sick males and (30) healthy males who were not infected with the disease. The study showed that the percentage of infected males was 61% and those who were not infected were (4.38%). Age was studied and it was found that there was no significant difference in the age of patients and healthy people, and that the age range of patients was between (16 – 56) years. Serum tests were conducted for MIP, there was a slight increase, and a highly significant increase for IL-23. The current study demonstrated the existence of positive relationships between MIP-1 and IL-23.

Keywords
Parasite, Toxoplasma gondii, MIP and IL-23, Toxoplasmosis

MATERIALS AND METHODS
This study included a total of (76) people, (48) males who were confirmed to be infected with toxoplasmosis by diagnosing them with the rapid diagnostic test for toxoplasmosis by testing the blood serum IGg. Their ages ranged between (18-62) years. The subjects were examined by measuring blood serum IGg.

Vein blood samples with a capacity of 5 milliliters were collected from blood donors at the blood bank using single-use syringes. The blood was placed in gelatinous tubes and left to clot for approximately 30 minutes. The serum was then separated by centrifugation at 300 rpm for 5 minutes. The samples were stored (Serum and blood) in deep freezing until used in testing to measure immune biomarkers.

One-step rapid diagnostic kit for IgG or IgM antibodies to Toxoplasma (colloidal gold chromatog-
raphy). Based on the fundamentals of GICA (Gold Immunochromatography Assay), this reagent puts recombined antigen TOX and anti-human IgG monoclonal antibodies into practice and uses sensitive IgG/IgM capture to detect TOX-IgG/IgM antibodies in human serum.

ELISA kit uses the Sandwich-ELISA principle. The micro ELISA plate provided in this kit has been pre-coated with an antibody specific to Human IL-23, MIP-1α. Standards or samples are added to the micro ELISA plate wells and combined with the specific antibody.

(MIP-1α) Kit : Human monocyte Macrophage Inflammatory protein 1α (MCP-1) ELISA Kit is to assay MIP-1α levels in Human serum, Plasma, culture media or any biological fluid.

(IL-23) Kit : Human Interleukin ELISA Kit is to assay IL-23 levels in Human serum, Plasma, culture media or any biological fluid.

STATISTICAL ANALYSIS

Graph pad prism for Windows (5.04, Graph pad software Inc. USA) was used to analyze the data, and the results are reported as the mean, standard error (SE). A student t-test was used to examine the differences between the patient and control groups (Al-Hadraawy et al., 2022)

RESULTS

Concentration of Serum MIP-1α

The present study has indicated that there is a little significantly level of serum MIP-1α in the patients with Toxoplasmosis disease, compared to the healthy controls. It is clear that MIP-1α has been increased in the serums of patients with Toxoplasmosis as the mean concentration was (12.06 ± 2.122 pg/ml) in comparison with the mean concentration of the control group (6.971 ± 0.4809 pg/ml) (P=0.001).

Concentration of Serum IL-23

The present study has indicated that there is a high significantly level of serum IL-23 in the patients with Toxoplasmosis disease, compared to the healthy controls. It is clear that IL-23 has been increased in the serums of patients with Toxoplasmosis as the mean concentration was (8.964 ± 1.302 pg/ml) in comparison with the mean concentration of the control group (4.552 ± 0.4437 pg/ml) (P=0.001).

Relationship between MIP-1 (pg/ml) levles and IL-23(pg/ml)

The current results revealed that the serum levels of MIP-1 (pg/ml) correlated positively and significantly with IL-23(pg/ml) in patients infected with chronic Toxoplasmosis (R² = 0.7609).

![Graph showing correlation between MIP-1 (pg/ml) and IL-23 (pg/ml)](image-url)
DISCUSSION

Toxoplasmosis is an infection of animal origin known to be caused by an obligate intracellular protozoan called *T. gondii*. Domestic cats and members of the cat family (felines) are the definitive hosts, and it is possible for mammals, birds and humans to be the intermediate hosts of the parasite (Lakhamsen et al., 2022). The current study demonstrated a slight increase in the level of MIP-1α in blood serum in patients infected with toxoplasmosis compared with healthy controls. Chemokines orchestrate the recruitment of various immune cells, including monocytes, macrophages, DCs, NK cells, and various T cell subsets, resulting in an amplification of immune responses. Inflammatory monocytes play a critical role in immune defence against the parasite during both the acute and chronic stages of the infection. *T. gondii* infection may lead to an excessive release of pro-inflammatory cytokines, commonly known as a “cytokine storm”. Cytokine storms often arise within the framework of specific ailments, conditions, and treatments, including toxoplasmosis. Of which, Macrophage inflammatory protein-1α (MIP-1α). A study had the same result, it was performed on pregnant women with Toxoplasmosis (Ali, 2016). The current study demonstrated an increase in the level of interleukin -23 in the blood serum of patients infected with toxoplasmosis compared to healthy control. An interleukin is a group of cytokines that are activated as a result of the direct interaction between autophagy proteins and immunological signalling molecules (i.e., cytokines. The IL-23 produced by antigen-presenting cells (APC) induces the differentiation of Th17 cells. These cells will then produce IL-17A, IL-17F and IL-22. In the current study, it was found that the correlation is positive between MIP-1 and IL-23 levels in patients infected with chronic Toxoplasmosis. The main effect is inflammatory and mainly consists of chemotaxis and transendothelial migration but cells can be activated to release some bioactive molecules also. These chemokines affect monocytes, T lymphocytes, dendritic cells, NK cells and platelets. They, too, activate human granulocytes (neutrophils, eosinophils and basophils) which can lead to acute neutrophilic inflammation. They also induce the synthesis and release of other pro-inflammatory cytokines such as interleukin IL-23, IL-6 and TNF-α from fibroblasts and macrophages. The levels of global leucocytes, IL-23, and MIP-1α showed by Toxoplasmosis patients support the involvement of the immune system in the pathophysiology of this condition. Its levels rise in many diseases in which inflammation occurs.

REFERENCES