WEB OF SYNERGY :
International Interdisciplinary Research Journal
Volume 3, Issue 3, Year 2024 ISSN: 2835-3013
https://univerpubl.com/index.php/synergy

Article

Evaluation of Lactoferrin, Thyroid Hormones and Some Electrolyte in Pregnant Women Infected with Toxoplasma Parasite Gondii

Maysaa Younis Ali[1]*

1. Department of Biology, College of Education For Women, University of Kirkuk, Kirkuk, Iraq
* Correspondence: maysailaaammm@gmail.com

Abstract: The current study was designed to detect and investigate infection with the Toxoplasma gondii parasite by detecting specific antibodies in pregnant women and evaluating the role of some biochemical indicators, including lactoferrin, thyroid hormones, and electrolyte , in infected pregnant women compared to uninfected pregnant women as a control group. 100 blood samples were collected from pregnant women infected with Toxoplasma gondii from some government hospitals and outpatient medical clinics in Kirkuk Governorate. The blood was collected and separated to take the serum and a rapid test was performed to detect IgM and IgG. The serums were distributed in 5 Ependorf tubes, and lactoferrin and hormones were measured. gland and minerals. The results of the rapid test showed 150 positive samples, 50%, which were divided into 130 samples that were positive for IgG, at a rate of 43.3%, while 20 samples appeared positive for IgM at a rate 6.6 % . Also the result showed a significant increase at (P ⊚ 0.05) in (LTF, TSH, T3 ,Iron) level and a significant decrease in (T4, Ca) level in pregnant women infected with Toxoplasma parasite gondii compered with control group .

Keywords: Toxoplasma, Lactoferrin, Thyroid hormones

1. Introduction

Toxoplasmosis is a zoonotic disease caused by the parasite Toxoplasma gondii of protozoan animals It is an obligate endocellular virus that infects humans and warm-blooded animals as intermediate hosts, while many members of the cat family act as final and intermediate hosts for the parasite (1). The parasite infects humans through ingesting food or water contaminated with Oocyst egg sacs excreted in feces. Infected cats, or through consumption of raw or poorly cooked meat containing tissue cysts. It can be congenitally transmitted from the infected mother to the fetus (2). Toxoplasmosis infection is globally widespread among humans, as it varies from one region to another, and about a third of the world's population is exposed to infection with the parasite. Infection is usually asymptomatic in immunocompetent indiviules, while infection is severe and dangerous in immunocompetent individuals, for example (HIV). Pregnant women and people with immunocompromised (3). The parasite is transmitted from the infected mother to the fetus through the placenta and causes congenital malformations and miscarriages, especially if the infection occurs during the first three trimesters of pregnancy. However, if the infection occurs during the last three months of pregnancy, the infection may not cause clinical signs in children in the early stages. However, as the child ages, other signs may

Citation: Maysaa Younis Ali. Evaluation of Lactoferrin, Thyroid Hormones and Some Elec-trolyte in Pregnant Women Infected with Toxoplasma Parasite Gondii. Web of Synergy: International Interdisciplinary Research Journal 2024, 3(3), 50-.57

Received: 10th July 2024
Revised: 11th July 2024
Accepted: 24th July 2024
Published: 27th July 2024

develop, for example, retinitis chorioretinitis or ocular toxoplasmosis. The severity of the disease is determined by several factors, including the host's immunity, the parasite strain, the size of the infectious dose, and the type of host's immune response (1). Lactoferrin- LTF is a glycoprotein with a molecular weight of 80 kDa and belongs to the transferrin famil transferrin, which is involved in a wide range of biological functions. This multifunctional protein is the most important biostimulant in human milk and other external secretions such as saliva, tears, vaginal fluids, semen, nasal secretions, bile, gastrointestinal fluids, urine, and neutrophil granules. granules (4). The concentration of lactoferrin is particularly present in breast milk and is related to the stage of lactation. The highest concentrations are found in colostrum, about 7 L/g, then it decreases significantly in mature milk, 2-3 L/g. (5) LTF It plays an important role in regulating the innate immune response, Being a first-line defense mechanism of the host against invading pathogens, it furthermore triggers signaling pathways influencing adaptive immune cell function, affecting the innate immune response in several ways including increasing natural killer (NK) cell activity, enhancing neutrophil function through enhanced phagocytosis. And limiting the spread of pathogens inside cells (5). It is necessary to point out the preventive effectiveness Lactoferrin against toxoplasmosis in immunocompromised individuals (2).

The thyroid gland secretes two types of hormones: iodine-containing hormones and non-iodine-containing hormones. The hormones that contain iodine are both thyronine and triiodine Triiodothyronin (T3) and Tetraiodothyronine (T4), as well as ionized thyronine and tyrosine compounds, including Monoiodotyrosin (MIT) and Diiodotyrosin (DIT). As for hormones that do not contain iodine, such as calcitonin (3).

2. Materials and Methods

Study Samples:

The study was conducted on (100) blood samples were collected during the period from 25/9/2023 to 1/11/2023. From the Oncology Hospital of the Medical City in Kirkuk Governorate, and were divided into two groups: (G1) which involve 60 samples from patients with pregnant women infected with parasite toxoplasma gondii and 30 samples of pregnant women healthy as a control group (C).

Collection of blood samples and preparation:

Were taken serum (5) ml of the drawn blood and put it in a plastic tube with a tight-fitting lid and free of anticoagulant (Plain tube) left at room temperature until the blood coagulates and then put in a centrifuge at a speed of (3000) rpm for (10) minutes The blood serum was kept at a temperature of (-20) C until use and biochemical analyses. blood serum was also taken to conduct a rapid test to detect IGM and IgG.

Determination of Lactoferrin level in serum

The lactoferrin-LTF concentration was estimated according to the kit prepared from the france company biolabo and using the ELISA technique using the double ELISA sandwich method for antibodies.

Determination of Thyroid hormones level in serum

The TSH, T3, and T4 batches are measured by purchasing the standard batch plan, which is purchased under the Minivids package using a number of allocated prices that vary from batch to batch and depending on the batch manufacturer. Minividas systems are based on automatic systems based on the Hawata filtration system. Enzyme Linked Fluorescent Assay (ELFA).

Determination of Electrolyte in blood serum

The calcium level was estimated according to the kit prepared from the Spanish company Spinrect and according to the researcher's method (8). As for the iron level, it was estimated according to the kit prepared from the German company M Spectrum and according to the researcher's method (9).

Statistical analysis:

The SPSS statistical program was used to find the Mean ± (SD) as the special differences between the patient and the healthy group were determined by using (T. Test) to show the difference between patients and heathy subject (P ⊚ 0.05).

3. Results

The current study, by examining 300 colored pigments using Rapid Test, recorded 130 positive sample (43.3%) recorded anti-IgG antibodies, and 170 (56.6%) recorded anti-IgG antibodies, while 20 recorded (6.6%) positive sample for IgM, 280 (93.3%) Jing gene Innovative dual antibodies IgG+IgM. As shown in Table (1).

Table (1): Shows Diagnosis of the Toxoplasma gondii parasite using the Toxoplasma IgM/IgG method Rapid test kit chromatograph

Method	N. of sample test	IgG Ve + (%)	IgG ve - (%)	IgM ve + (%)	IgM ve + (%)	Total positive sample
Toxo-IgG/IgM Rapid test kit	300	130 (43.3%)	170 (56.6 %)	20 (6.6%)	280 (93.3%)	150 (50%)

The results of the study are not visible with both Al-Qadi (2019) (10) in Tikrit 66% IgM 0% , in Salah al-Din 78.33%, (11), IgM 21.67%, IgG in Sulaymaniyah 36.2%, IgM 2.2%, IgG, as they recorded the percentage of IgG antibodies in women with toxoplasmosis higher than Anti-IgM ratio.

The IgG antibody is one of the most important components involved in the humoral immune response in controlling. The spread of the parasite begins to appear one to two weeks after infection, and its peak reaches (6-8) weeks, and begins to gradually decline from (1-2) years, as its long-term stay in the body gives the body the ability to control the infection. The parasite and prevents its spread (12).

The reason behind discovering this relative proportion in living organisms is due to the ability of the parasite to the stimulus on which the child is present, and this stimulation of immunity continued for the period of the parasite's partial stay inside the body, and requires an immune response, and any defect or decrease occurs in the kitchen due to the re-supply of the parasitic stages of the existing parasites. Within the host's body cells (13).

Estimation of lactoferrine, thyroid hormones and electrolyte for the samples under study:

Table (2): shows the mean ±S. D of the lactoferrine, thyroid hormones and electrolyte of the samples under study

Groups / Parameter	Mean ± SD Control n=60	Mean ± SD Patients n=30	P-Value
LTF (Pg/ml)	30.21 ± 6.17	60.2 ± 13.07	P ≤ 0.05
TSH (ng/ml)	2.12± 0.99	10.12 ± 1.01	P ≤ 0.05
T3 (ng/ml)	2..2 ± ..00	7.14 ± 5.1	P ≤ 0.05
T4 (ng/ml)	8.33 ± 1.22	3.9 ± 0.85	P ≤ 0.05
Iron (micro mol /100 cm3)	20.42 ± 3.45	32.61 ± 5.13	P ≤ 0.05
Ca (mmol/L)	10.55 ± 2.9	6.65 ± 2.13	P ≤ 0.05

The results of the current research showed a significant rise at ($p \leq 0.05$) in (LTF, TSH, T3, Iron) concentration and a significant reduction in (T4, Ca) in pregnant women infected with Toxoplasma parasite gondii compared to healthy subject. as in Figures (3,4,5,6,7,8) respectively.

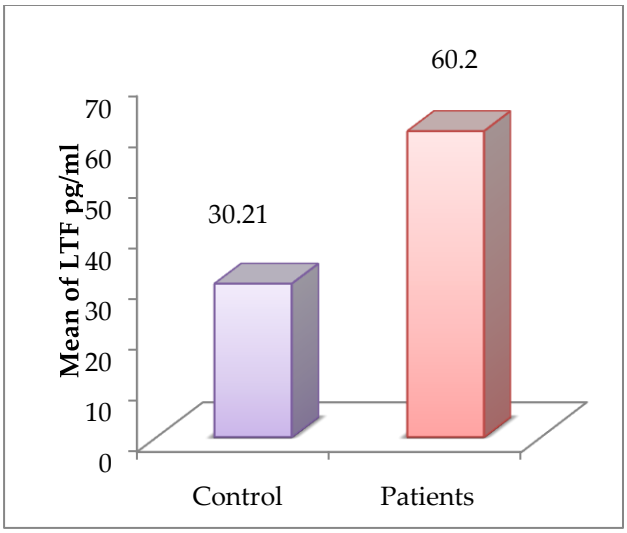
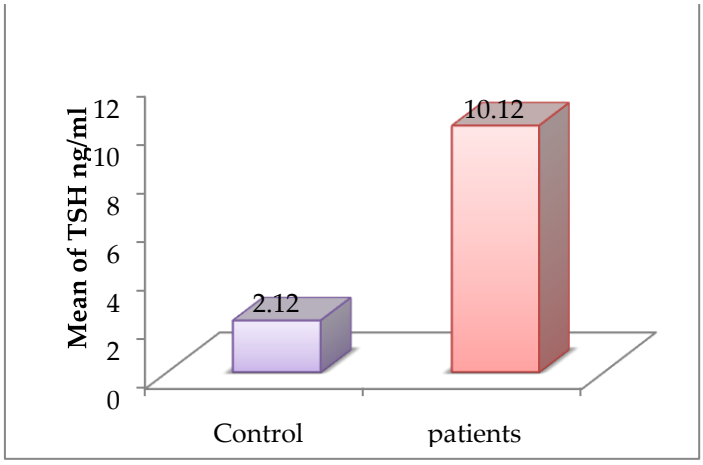


Figure 1. LTF concentration in the serum for all groups



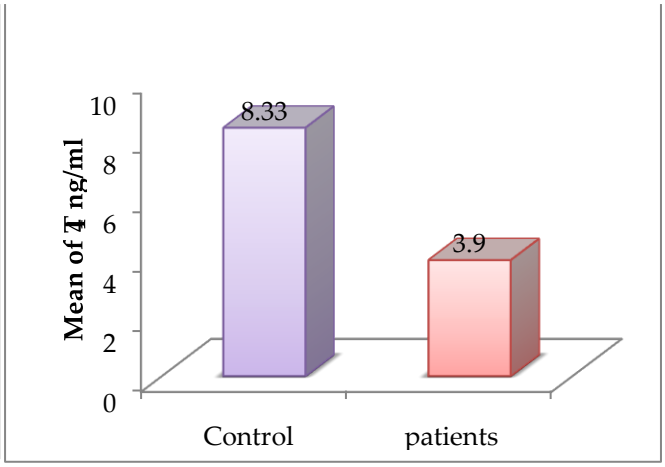


Figure 2 & 3: TSH concentration in the serum for all groups & T4 concentration in the serum for all groups

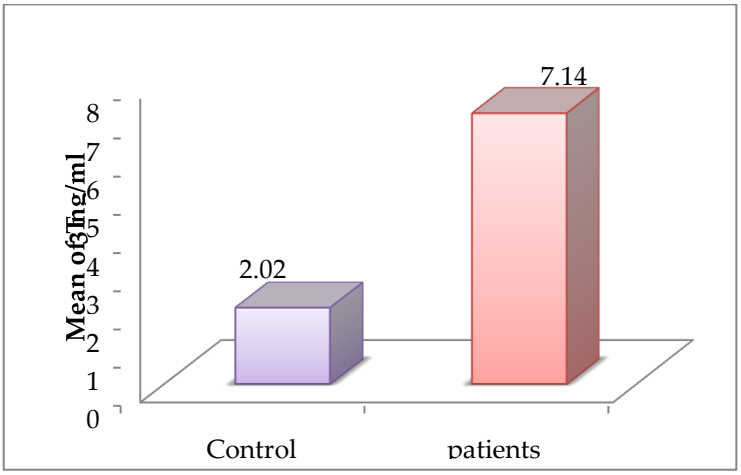


Figure 4: T3 concentration in the serum for all groups

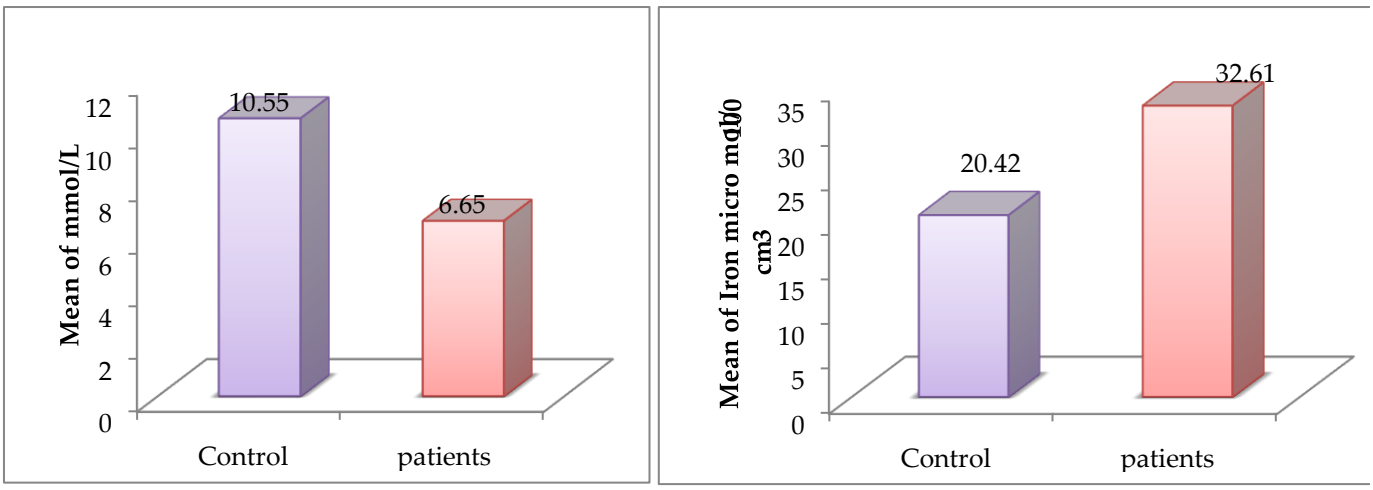


Figure 6 & 5. Ca concentration in the serum for all groups & Iron concentration in the serum for all groups

4. Discussion

Lactoferrin- LTF as a natural molecule has the ability to improve and improve the effect on the client network of the innate and adaptive system of guests of Rahman, and this activity is possible due to the presence of LTF receptors on a wide range of immune cells and its ability to bind the molecule, whereby the savings can be used to influence the desired immune adaptation. Innate, with the aim of assigning it to the host as a first defense against infectious pathogens, in addition to stimulating innate innate factors and initiating signaling pathways affecting the function of adaptive immune cells, as they affect the system in ways including increasing the activity of normal cancer cells, enhancing neutrophil function by supporting phagocytosis and activation of macrophages and limiting the spread of intracellular pathogens (5). To enhance the active effectiveness against all of the pathogens of microbial diseases, for example, parasites, fungi, viruses and bacteria, as the antibiotic activity was recorded against all of the parasites Toxoplasma gondii, Giardia lamblia,

Pneumocystis carinii, Trypanosoma cruzi, and Entamoeba Haemolytica histolytica and Plasmodium ssp. (14)

Also the present study indicated that latent toxoplasmosis is associated with altered thyroid function and autoimmunity during pregnancy. Pregnant women should be tested for FT3, FT4, TSH and anti-TPO antibodies along with measurement of hematological parameters in order to reduce risks to both mother and fetus and provide early treatments (15). Toxoplasmosis (acute and latent) is the most prevalent parasitic infection worldwide and can be associated with some problems in pregnant women. Thyroid diseases are the most common endocrine disorders secondary to diabetes among pregnant women. Previous studies proposed a relationship between latent eoxoplasmosis (LT) and autoimmune thyroiditis diseases (AITDs) (16). Liu et al (1994) (17) in their study confirmed the diagnosis of Toxoplasma gondii of the thyroid gland. Infection with the parasite Toxoplasma gondii is associated with autoimmune diseases of the thyroid gland causing a slight increase in levels of thyroid hormones. Also the results of the current study did not agree with a study conducted by (18), which indicated a negative relationship between the thyroid gland and gonorrhoeae, as no abnormalities were detected in the functioning and levels of the thyroid gland. Hormones, and the researcher explained the reason as follows: Does this infection have a role in thyroid dysfunction, or does this infection have a protective role against thyroid dysfunction? If the researcher points out that it is possible for T gondii to infect the thyroid gland in a very small number of individuals infected with this parasite, therefore any inflammation or damage to the thyroid tissue is rarely detected. On the other hand, it

is not clear whether the toxoplasmosis conidia parasite has a protective role Against thyroid dysfunction (19).

Regarding the levels of minerals iron, calcium, and the effect of infection with the toxoplasmosis parasite. The current study showed an increase in iron with a decrease in calcium levels in the group infected with conidial toxoplasmosis compared to the control group. It was found that infection with conidial toxoplasmosis leads to an increase in the levels of interleukin-6 (IL-6), which causes anemia as a result of a direct relationship between the levels of interleukin-6. -IL and hemoglobin levels (19). There is also study indicated a non-significant decrease in iron levels in pregnant women infected with Toxoplasma gondii (20).

As well as the results of the current study agreed with (21), who indicated a decrease in calcium levels in patients infected with toxoplasmosis conidia compared to the control group. The reason was attributed to the decrease in calcium being due to the spread of parasite cells in the tissues of the infected person, and it is known. The parasite's need for calcium and its consumption from infected cells thus leads to a decrease in calcium levels in the host's cells (22). In another study (23), the researcher indicated that 48 hours after infection and after the parasite began to divide and reproduce, it leads to a decrease in Cat levels in the cytoplasm of infected cells, which regulates calcium in the host cells, Vascular structures are associated with the growth and release of the parasite from the host cells (24). It is considered one of the cytokines that have an important role in stimulating reactions in the advanced stages of inflammation including cytokines (IL-1β, IL-6, TNF-α, IL-17), chemokines, and autoantibodies that lead to an exacerbated activation of immune system cells (25) and antibodies are produced by stimulating B-lymphocytes (B-cells); known as IgM, IgG, IgA and IgE. These antibodies are functionally acting on the eradication of the infection and removing the parasite found free in body fluids by activation of supplement pathways and catalytic activity of immune system (26)

5. Conclusion

The article titled "Evaluation of Lactoferrin, Thyroid Hormones, and Some Electrolytes in Pregnant Women Infected with *Toxoplasma gondii*" investigates parasitic infections caused by *Toxoplasma gondii* in pregnant women. The study aims to detect specific antibodies in infected pregnant women and evaluate the role of biochemical indicators such as lactoferrin, thyroid hormones, and electrolytes in infected pregnant women compared to a control group of non-infected women.

The study found that 50% of the 100 blood samples taken from pregnant women tested positive for *Toxoplasma gondii* infection. There was a significant increase in levels of lactoferrin (LTF), thyroid-stimulating hormone (TSH), triiodothyronine (T3), and iron in infected pregnant women, while thyroxine (T4) and calcium (Ca) levels showed a significant decrease compared to the control group.

The research also suggests a connection between latent toxoplasmosis infection and changes in thyroid function and autoimmunity during pregnancy. Therefore, testing thyroid hormones and hematological parameters in infected pregnant women is recommended to reduce risks for both the mother and the fetus.

In conclusion, *Toxoplasma gondii* infection can affect thyroid hormone and electrolyte levels in pregnant women, and early detection and management of this condition are crucial to preventing further complications.

REFERENCES

1. Mahmood, S. I., Saeed, N. A. H. A. A., & Ali, L. Q. (2022). RUBELLA VIRUS AND TOXOPLASMA GONDII INFECTION WITH IMMUNE ANTIBODIES DIAGNOSIS AMONG BAD OBESTETRIC AND PRIMIGRAVIDA PREGNANT WOMEN IN BAGHDAD CITY. World Bulletin of Public Health, 12, 78-85.

2. Addo, S. O., Asare, T. O., Arthur, C., Amoateng, K., Addo, K., & Larbi, J. A. (2023). Toxoplasma gondii among pregnant women attending antenatal care in a district hospital in Ghana. Public Health Challenges, 2(2), e82.
3. Ali, H. Z., & Al-Warid, H. S. (2021). Changes in Serum Levels of Lipid Profile Parameters and Proteins in Toxoplasma gondii Seropositive Patients. Iraqi Journal of Science, 801-810.
4. Hao, L., Shan, Q., Wei, J., Ma, F., & Sun, P. (2019). Lactoferrin: major physiological functions and applications. Current Protein and Peptide Science, 20(2), 139-144.
5. Gawel, P., & Krolak-Olejnik, B. (2023). Lactoferrin supplementation during pregnancy—a review of the literature and current recommendations. Ginekologia Polska.
6. Al-Hadrawwy, A. H., Zabibah, R. S., Imarah, A. A., Almulla, A. F., & Algon, A. A. A. (2022). Role of P-selectin, hemopexin, lactoferrin, iron and ferritin in patients with giardiasis and amoebiasis: a narrative review. Russian Open Medical Journal, 11(3), 314.
7. Tietz, N. W. (1999). Text book of clinical chemistry. 3rded. C.A. Burtis, E. R. Ash wood, W. B. Saunders.; 819-861,1245-50. 8-Williams et al., (1977). Clin Chem.23,237.4.
8. Al-Qadi, Raghad Tayes Saeed (2019). The effect of infection with the parasite Toxoplasma gondii on the concentrations of regulatory Calcium ions, some elements, and immune antibodies in pregnant and non-pregnant women in the city Tikrit. Master's thesis, College of Education for Girls, Tikrit University, 104.
9. Karim, D. O., Azeez, K. H., & Abdullah, Y. S. (2022). Seroprevalence of Toxoplasma gondii among ocular infection patient in Shahid Dr. Aso Hospital in Sulaimani City, Iraq
10. Frenkel, j.(2000).Biology of Toxoplasma gondii . In: Ambroise_ Thomas, P.; Petersen, E. Congenital toxoplasmosis: Scientific Back_ ground, clinical manage ment and control. Springer_Verlag. Paris,25:55_61.-Leszczyńska, K.; Ostrogórska-Gonszewska, P. and Matuszyk, D. (2021).
11. Tanaka, T., Abe, Y., Inoue, N., Kim, W. S., Kumura, H., Nagasawa, H., ... & Shimazaki, K. I. (2004). The detection of bovine lactoferrin binding protein on Trypanosoma brucei. Journal of veterinary medical science, 66(6), 619- 625.
12. Valizadeh G., Khamseh M., Kashaniyan M., Rafiei-Sefiddashti R., Hadighi R. Role of Toxoplasma gondii in thyroiditis in pregnant women. Home > Archives > Vol 12, No 5 (2022) > Role of Toxoplasma gondii in thyroiditis in pregnant women. 52-manal.A.M, Esaa.S .H, EFFECTS OF LATENT TOXOPLASMOSIS ON AUTOIMMUNE THYROID DISEASES IN PREGNANT WOMEN - DUHOK CITY-KURDISTAN REGION-IRAQ. Vol 17 No 1 (2023): Duhok Medical Journal.
13. Shapira Y, Agmon-Levin N, Selmi C, Petríková J, Barzilai O, Ram M, Bizzaro N, Valentini G, Matucci-Cerinic M, Anaya JM, Katz BS, Shoenfeld Y. (2012). Prevalence of anti-Toxoplasma antibodies in patients with autoimmune diseases. J Autoimmun.;39(1–2):112–6
14. Sadiqui, S., Shah, S. R. H., Almugadam, B. S., Shakeela, Q., & Ahmad, S. (2019). Distribution of Toxoplasma gondii IgM and IgG antibody seropositivity among age groups and gestational periods in pregnant women. 4, pp. 344– 347, 2018.
15. Alcantara-Neves N.M, Veiga R.V, Dattoli, V.C, Fiaccone, R.L, Esquivel, R. Cruz Á.A, Cooper P.J. Rodrigues L.C. Barreto, M.L. (2012). The effect of single and multiple infections on atopy and wheezing in children. J Allergy Clin Immunol.; 129(2):359–67, 367.e1-3s.
16. Muna ISMAIL IBRAHIM, Layla ABDULLAH MUSTAFA. Measuring the Level of Some Trace Elements in the Serum and Placentae of Pregnant Women Infected with Toxoplasmosis. International Conference on Technology, Engineering and Science (IConTES), November 04-07, 2021, Antalya/Turkey.
17. Ripley BJ, Goncalves B, Isenberg DA, Latchman DS, Rahman A (2005). Raised levels of interleukin 6 in systemic lupus erythematosus correlate with anemia. Arch Rheum Dis; 64(6): 849-853.
18. Bouchot, A.; Zierold, K.; Bonhomme, A.; Kilian, L.; Belloni, A.; Balossier, G.; Pinon, J. and Bonhomme, P. (1999). Tachyzoite calcium changes during cell invasion by Toxoplasma gondii. Parasitol. Res., 85: 809-818.
19. Pingret, L.; Millot, J.M.; Sharonov, S.; Bonhomme, A.; Manfait, M. and Pinon, J.M. (1996). Relationship between intracellular free calcium, concentrations and the intracellular development of Toxoplasma gondii. J. Histochem. Cytochem., 44(10): 1123- 1129.
20. Endo, T.; Sethi, K.K. and Piekarski, G. (1982). Toxoplasma gondii: calcium ionophore A23187-mediated exit of trophozoites from infected murine macrophages. Exp. Parasitol., 53: 179-188.

21. Al-Obaidi, W.M., Mahmood Al-Izzi, M.H., Yaseen, A.S. Comparative study for carrot juice and selenium supplement in many physiological and biochemical parameters in patients with rheumatoid arthritis in Kirkuk City Volume 6, Issue 4, 2021, Pages 2228-2232 http://www.revistabionatura.com
22. Barzinij, A. K. R. (2021). Seroprevalence and risk factors of toxoplasmosis among University of Kirkuk female students. Annals of Parasitology, 67(2), 175-186.