

Estimation of the Levels of some Immunological Markers in Aborted Women Infected with *Toxoplasma gondii* at Baghdad City

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ABSTRACT

Toxoplasma gondii is one of the most common parasites among humans worldwide, as serological studies indicate that more than one third of the population of the world is infected with this parasite. This parasite is one of the main causes of abortion in pregnant women which mainly occur in the acute phase of infection and in early pregnancy. The present study aimed to detect toxoplasma among pregnant women and its relationship with some immunological markers. Fifty blood samples (5ml) were collected from aborted woman (within 15 days after abortion) and 10 blood samples collected from healthy woman as control. The serums were used to evaluate IL-8, IL-10, IL-17, and IFN- γ . The results showed that toxoplasma caused abortion in the first trimester in rate of 68%. The majority of aborted women (76%) were at age group 25-30 years. As for immunological parameters, IL-8, IL-10, IL-17, and IFN- γ significantly increased in woman aborted with toxoplasmosis in compare with healthy woman. The parameters were also higher among toxoplasma positive patients when compared with aborted women with other cause but these increases in the immunological parameters were not significant. The study conclude that toxoplasma is still the main causes of abortion in women and it associated with significant increase in immunological markers represented by IL-8, IL-10, IL-17, and IFN- γ .

Keywords: toxoplasmosis, IL-8, IL-10, IL-17, IFN- γ , abortion

INTRODUCTION

Abortion defined as spontaneous loss of pregnancy during the first 24 weeks of pregnancy, it may happens once followed by a successful pregnancy this called a spontaneous abortion, or it may be a miscarriage for more than three times and this is called recurrent abortion (Quenby *et al.*, 2021).

Toxoplasmosis either Acquired toxoplasmosis (acute, sub-acute and chronic) or congenital toxoplasmosis (Flegr, 2021). *Toxoplasma gondii* is main parasitic causes of abortion; the seriousness of this disease appears, as the infection can be transmitted from the mother to the fetus and lead to miscarriage or congenital malformations in the fetus (Megli, 2022). Congenital toxoplasmosis occurs due to mother infection with the parasite during pregnancy, The severity and the risk of infection depend on the mother's immune competence, the virulence of the parasite, the number of parasites transmitted to the fetus, as well as the age of the fetus at the time of transmission (Fabiani *et al.*, 2022).

Mother infection in the first three months of pregnancy leads to miscarriage in 10% of cases, or no miscarriage and pregnancy continues and leads to birth of congenitally fetus but without symptoms at birth, but symptoms will appear later in life, congenital malformations such as meningitis may occur cerebral, as the fetus notices symptoms of hydrocephalus, microcephaly or neurological signs such as balance disorder, dysphagia, and dyspne (Popova, 2021; WHO, 2022)

Toxoplasmosis led to stimulation of inflammatory cytokines production from various immune cells such as T cells, neutrophils, and macrophages, and its action as promoting and regulating the immune response. These cytokines send signals to molecules and cells and stimulate them towards Inflammatory sites are important in the development and regulation of immune system cells (Haq *et al.*, 2021; Sana *et al.*, 2022).

MATERIAL AND METHODS

Patients

The study conducted in Baghdad province, all patients were aborted at first trimester of pregnancy, and the aborted women arrived to privet gynecological clinic and privet medical laborites in period from beginning of October-2021 to end of March. The age of aborted woman (20-40).

Samples

50 blood sample (5ML) were collected by aborted woman in period not more than 15 days after abortion and 10 blood samples collected from healthy woman. Serum was separated by centrifuge and kept at -20c.

- Serodigenesis of toxoplasmosis: ELISA test (indirect ELISA) was used and (Serodigenesis of toxoplasmosis: ELISA test (indirect ELISA) was used and (Human Anti-*Toxoplasma gondii* IgM ELISA Kit- Abcam). according to Manufacturer's instructions.
- Detection of interleukin 8: IL8 detected by (Abcam co.) according to Manufacturer's instructions
- Detection of interleukin 10: IL10 detected by (shanghai korain biotech co.) according to Manufacturer's instructions.
- Detection of interleukin 17: IL17 detected by (Biotechne-) according to Manufacturer's instructions.
- Interferon gamma: were detected by use of (Human Interferon Gamma ELISPOT Kit- Abcam co.) Manufacturer's instructions.

RESULTS AND DISCUSSION

According to results of ELISA test, toxoplasma caused abortion in the first trimester in rate of 68% (34 out of 50). This result agreed with result of Saki, *et al.* (2021) and; Kalantari *et al.* (2021) who show that toxoplasma is the mean caused of abortion in the first trimester. From (Table 1)

showed that the age groups 25-30 and 31-35 are the most sensitive group this result agreed with Kheirandish *et al.* (2019); Motoi *et al.* (2020).

Table 1: Relationship between toxoplasmosis and woman age

| Age | Number of samples | Number of positive cases | rate of positive cases |
|-------|-------------------|--------------------------|------------------------|
| 20-25 | 6 | 2 | 33.3% |
| 25-30 | 25 | 19 | 76% |
| 31-35 | 11 | 9 | 81.8% |
| 36-40 | 8 | 4 | 50% |
| Total | 50 | 34 | 68% |

The IL8, IL10, IL17 and interferon gamma significant increase in woman abortion with toxoplasmosis in compare with healthy woman as in (Table 2).

Table 2: Immune marker accompanying with abortion

| Immune markers | Aborted woman with toxoplasmosis | Aborted woman without toxoplasmosis | Healthy woman |
|------------------|----------------------------------|-------------------------------------|---------------|
| IL8 | 811±94 | 793±153 | 471±72 |
| IL10 | 326± 42 | 294±79 | 210±19 |
| IL17 | 1023±93 | 948±214 | 437±62 |
| Interferon gamma | 161±21 | 152±41 | 39±9.4 |

After ingestion of contamination food, parasite became inside intestine, then reach to blood and lymph. The parasite covers itself with an outer protein layer called Lamex. This layer interacts with surface phagocytic receptors and inhibits phagocytosis (Smith *et al.*, 2021, Xu *et al.*, 2021). The macrophages phagocytose the parasite after opsonization, then forming Parasitophorous vacuole, toxoplasma secreted rhoptries protein prevents the lysozyme enzyme action (Lodoen *et al.*, 2021).

Interferon-gamma plays a key role in shifting the phase from the trophozoite form found in acute infection to the bradyzoite found in chronic infection, as well as preventing the reverse transition (Smith *et al.*, 2021; Xue, 2021). T helper cells are responsible for the immune response to kill the parasite when it is inside the cell, as they secrete interferon-gamma, which is the main medium for killing the parasite and leads to the activation of phagocytic cells (Hamid *et al.*, 2021). Th2 are responsible for killing the parasite when it is outside the cells by forming immune complexes between specific antibodies produced by the humoral immune response and parasite antigens and activation of complement system (Elmahallawy *et al.*, 2021).

The main source of interleukin-10, 17 productions is Th2 cells, and it can also be produced by CD4 cells and CD8 cells. In addition to T cells, IL-10 is produced by macrophages, monocytes, dendritic cells, neutrophils, mast cells, eosinophils, and killer cells, IL-10 has many natural roles in the placenta, the most important of which are trophoblast invasion, proliferation in the placenta, and angiogenesis (Hazrati *et al.*, 2021, Adusei *et al.*, 2021).

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تقدير مستويات بعض المؤشرات المناعية عند النساء المجهضات المصابات بالتوكسوبلازما جوندي في مدينة بغداد

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الملخص

تعد التوكسوبلازما جوندي من أكثر الطفيليات شيوعاً بين البشر في جميع أنحاء العالم، حيث تشير الدراسات المصلية إلى أن أكثر من ثلث سكان العالم مصابون بهذا الطفيل. هذا الطفيل هو أحد الأسباب الرئيسية للإجهاض عند النساء الحوامل والذي يحدث بشكل رئيسي في المرحلة الحادة من العدوى وفي بداية الحمل. هدفت الدراسة الحالية إلى الكشف عن التوكسوبلازما لدى النساء الحوامل وعلاقتها ببعض المؤشرات المناعية. تم جمع خمسين عينة دم (5 مل) من امرأة مجهضة (في غضون 15 يوماً بعد الإجهاض) و10 عينات دم جمعت من نساء سليمات كعينات سيطرة. تم استخدام الأمصال لتقييم IL-8 و IL-10 و IL-17 و IFN-. أظهرت النتائج أن التوكسوبلازما تسببت في الإجهاض في الثلث الأول من الحمل بنسبة 68٪، وكانت غالبية النساء المجهضات (76٪) في الفئة العمرية 25-30 سنة. بالنسبة للمؤشرات المناعية، زاد IL-8 و IL-10 و IL-17 و IFN- بشكل ملحوظ في النساء المجهضات بدءاً المقوسات مقارنة بالنساء الأصحاء. كانت المؤشرات المناعية أعلى أيضاً بين المرضى المصابين بالتوكسوبلازما عند مقارنتها بالنساء المجهضات لأسباب أخرى ولكن هذه الزيادات في المؤشرات المناعية لم تكن معنوية. خلصت الدراسة إلى أن التوكسوبلازما لا تزال من الأسباب الرئيسية للإجهاض عند النساء وترتبط بزيادة معنوية في المؤشرات المناعية المتمثلة في IL-8 و IL-10 و IL-17 و IFN-.

الكلمات الدالة: toxoplasmosis، IL-8، IL-10، IL-17، IFN- γ ، الاجهاض.