



Original Research

Women Toxoplasmosis Relationship with Miscarriage in Najaf City

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Abstract:

Toxoplasmosis is caused by a protozoan parasite, classified as an intracellular coccidian that can be found in homoiothermic animals (including humans) dried cat feces, contaminated soil or contaminated water and raw or under - cooked meat containing infective tissue cysts. Infection with the parasite *T. gondii* causes serious public health problems and is of great economic importance worldwide. The incidence of *Toxoplasma gondii* infection among women with a history of abortion was found to be high (80.6%) and this may be due to the multiple source of infection and insufficient treatment.

Keywords: Toxoplasmosis, Miscarriage, Congenital Infectious Diseases, Najaf city



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Introduction:

Toxoplasmosis can be transmitted to the fetus in utero through tran-placental transmission (Ismael et al., 2003; Nakada, et al., 2021). It causes congenital infectious diseases as well as severe encephalitis, a major cause of death among immune-deficient persons such as AIDS patients. *T. gondii* is normally controlled by the immune system of healthy individuals leading to an asymptomatic infection (Mouveaux et al., 2022).

The obligate intra- cellular protozoan parasite, *T. gondii* has a complex life cycle where sexual production only occurs in the intestine of felines (definitive host), asexual multiplication can occur in almost all homoiothermic animals infected, as inter-mediate hosts (Warren, 1993; Sana, et al., 2022).

High *T. gondii* seroprevalence has been found in many countries such as in United Arab Emirates (Zhang, et al., 2021). In Iraq many studies were accomplished concerning the seroprevalence of toxoplasmosis by using different techniques including IHA, IFAT and ELISA (Hassan,2018). Toxoplasmosis has been investigated in other countries such as tropical areas of Latin America and sub - Saharan Africa (ALQAISI, A., & QAYS, 2018).

Toxoplasmosis stimulates the humoral immune response leading to antibody production, which includes IgM and IgG class. For most, the presence of specific IgG and IgM antibodies was sufficient to define serum samples as being from acutely infected individual, while the absence IgM

antibodies was sufficient to define serum samples as being chronically infected individuals (Fabiani et al., 2022). In addition, cell mediated immunity (CMI) is stimulated by *T. gondii* infection when the parasite rapidly induces production of the type-1 promoting cytokine interleukin-12 (IL-12) most likely from a subpopulation of dendrite cells. Natural killer and T cells are then activated and triggered to synthesize interferon- γ (INF- γ), the major mediator of host resistance during the acute and chronic phases of infection. During the acute phase, IL-10 is induced during this stage of infection and dampens the systemic type-1 cytokine production and prevents lethal immunopathology (Yap & Sher, 1999). Macrophages and / or dendritic cells are generally considered the major source of IL-10 during acute *T. gondii* infection, INF- γ is also important for controlling resistance to acute (Sana et al., 2022). The aim of the study: In this study we reviewed the performance of the To estimate the incidence of the *Toxoplasma* infection among women with a history of abortion.

Materials and methods:

Seventy-two women who had abortion were selected for this study. They were referred to different hospitals and private laboratories around Baghdad, indicating the possibility of having toxoplasmosis by the physician. Venous blood was collected from those women for serum collection in a period between August 2021 and January 2022. The women were divided into three groups according to the presence or absence of specific anti-*Toxoplasma* antibodies:-

Group 1 included women with IgG (28), Group 2 included women with IgM (13) and Group 3 included women with IgG and IgM (17) giving a total of 58.

The other 14 patients were excluded from this study due to the absence of specific anti *Toxoplasma* antibodies in their serum.

Enzyme Linked Immuno Sorbent Assay (ELISA):

This test was performed by the use of two kits (Omega Diagnostics Company, Scotland), one for the detection of IgG antibodies against *T.gondii*

antigens in the patient's serum, and the other for the detection of IgM antibodies against *T.gondii* antigens in the patient's serum.

IgG antibody detection principle:

Purified *T.gondii* antigen is coated on the surface of microwells. Diluted patient serum is added to the wells, and the *T.gondii* IgG- specific antibody, if present binds to the antigen. All unbound material is washed away.

Horse raddish peroxidase conjugate (HRP-conjugate) is added which binds to the antibody antigen complex. Excess HRP- conjugate is washed off and a substrate solution of TMB reagent is added. The enzyme conjugate catalytic reaction is stopped at a specific time. The intensity of the color generated is proportional to the amount of IgG- specific antibody in the sample. A microwell reader compared in a parallel manner with calibration and controls reads the result (Naot & Remington, 1980).

Statistical Analysis:

All the statistical analyses were performed on the shareware software EPIINFO, version 6 (linear regression analysis, Student "t" test, the calculation of the mean and standard deviation).6 A "p" value less than 0.05 was considered as statistically significant

Results:

Sensitivity and Specificity of ELISA Test:

Seventy-two samples of women's serum had been tested for specific IgG and IgM antibodies to confirm the presence of toxoplasmosis in those women by using ELISA kit (Omega Diagnostics).

The result showed that 58 of 72 women (80.6%) have antibodies against *T. gondii* (Table 4-1). Although the other 14 of 72 women (19.4%) had abortion (single or repeated), they were negative for toxoplasmosis using ELISA (Table 4-1).

Samples from 26 healthy-looking women were collected as controls and tested for IgG and IgM specific antibodies for *T. gondii* by using the ELISA kit. The results indicated that 20 women (76.9%) were negative to the presence of IgG and IgM of *T. gondii* in their serum, while the

remaining six women had *T. gondii* antibodies. The sensitivity and specificity of the ELISA kit had been calculated as 90.6% sensitivity and 58.8% specificity. The results showed that 28

(68.3%) women had IgM antibodies (Table 4-2), 13 (31.7%) women had IgM antibodies (Table 4-3) and 17 (29.3%) women had both IgG and IgM antibodies (Table 4-4).

Table (4-1): Frequency distribution of *T. gondii* antibodies using ELISA test in women with a history of abortion compared with healthy-looking controls

Type of case	ELISA positive	ELISA negative	Total
Single or repeated abortion	58 (80.6%)	14 (19.4%)	72 (100%)
Healthy-looking controls	6 (23.1%)	20 (76.9%)	26 (100%)
Total	64 (64.7%)	34 (34.3%)	98 (100%)

Table (4-2): Frequency distribution of *T. gondii* IgG antibodies using ELISA test in women with a history of abortion compared with healthy-looking controls

Type of case	IgG positive	IgG negative	Total
Single or repeated abortion	28 (68.3%)	13 (31.7%)	41 (100%)
Healthy-looking controls	6 (23.1%)	20 (76.9%)	26 (100%)
Total	34 (50.7%)	33 (49.3%)	67 (100%)

Table (4-3): Frequency distribution of *T. gondii* IgM antibodies using ELISA test in women with a history of abortion compared with healthy-looking controls

Type of case	IgM positive	IgM negative	Total
Single or repeated abortion	13 (31.7%)	28 (68.3%)	41 (100%)
Healthy-looking controls	0 (0%)	20 (100%)	20 (100%)
Total	13 (21.3%)	48 (78.7%)	61 (100%)

Table (4-4): Frequency distribution of T. gondii IgG and IgM antibodies using ELISA test in women with a history of abortion compared with healthy-looking controls

Type of case	IgG and IgM positive	IgG and IgM negative	Total
Single or repeated abortion	17 (29.3%)	41 (70.7%)	58 (100%)
Healthy-looking controls	0 (0%)	26 (100%)	26 (100%)
Total	17 (20.2%)	67 (97.8%)	84 (100%)

Discussion:

Abortion is the termination of pregnancy before the embryo or fetus is capable of survival. This issue created moral and social concern since the beginning of time. It has been established that *Toxoplasma gondii* has a direct effect on the fetus leading to spontaneous abortion, still birth or congenital anomalies (Roizen, *et al.*, 1995). The risk and severity of the baby's infection depends partly on the timing of the mother's infection. Studies suggest that, when mothers are infected in the first trimester, 14 percent of fetuses become infected, as compared to 29 percent in the second trimester and 59 percent in the third (Roizen *et al.*, 1995).

Babies whose mothers had toxoplasmosis in the first trimester usually have the most severe infection. If no screening program is carried out, most infected babies appear normal at birth. However, most of them will develop sight-threatening eye infections months to year after birth. Some also will develop hydrocephalus, mental retardation, learning disabilities or seizures. Other infected babies have severe *Toxoplasma* infection that is evident at birth with severe eye infections, hepato splenomegaly, icterus and hydrocephalus. (Dupouy-camet, 2003 & Aline, *et al.*, 2004).

Toxoplasmosis is a worldwide prevalent disease. (Al-Quraishi, *et al.*, 2001). In Iraq, studies also indicate this fact (Niazi, *et al.*, 1992). In this

study, the incidence of this disease was also found to be relatively high (80.6%) in women with single or repeated abortion. The percentage of women with past or chronic toxoplasmosis (with IgG class) was also found to be relatively high (68.2%) and those with acute toxoplasmosis (with IgM class) was high (31.7%) while those with both IgG and IgM was 29.3%.

In Iraq, similar results were obtained (Abbas, 2002 & Al-Khafajy, 2004). These results are also similar to those in other countries like Egypt 81.4% (Soliman *et al.*, 2001), France 71%, Ibadan and Nigeria 87% (Jones, 2001) other studies had variable results as 25% in Saudi Arabia (Al-Qurashi, 2001).

Specific IgM antibodies were reported in 60.4% of women in USA (Oliver, *et al.*, 2001) and 60.21% of women in Iraq (Abbas, 2002); the results differed in Saudi pregnant women being 35% (Chazi *et al.*, 2002).

The high prevalence of this disease in Iraq could be due to the high number of risk factors and many sources of infection. These include the ingestion of sporulated oocysts in soil (e.g. during gardening), eating under cooked meat contaminated with cysts, eating unwashed raw vegetables or unpeeled fruits. (Population & public health branch, 2001; Baxter, 2002). One of the other sources of infection, the animals that are consumed by human, were also found to be

infected in addition to the transplacental transmission. (Dupouy-camet, 2003). Serological surveys found the highest prevalence of *Toxoplasma* specific antibodies in rabbits 22.2% (Sroka *et al.*, 2003), in pigs 3.3%, 17.3% in adult swine (Lunden *et al.*, 2002), 33% in dogs (Mineo, *et al.*, 2001) and 70.6% of cats were- sero positive (Pawlowski, 2002).

Conclusions:

The incidence of *Toxoplasma gondii* infection among women with a history of abortion was found to be high (80.6%) and this may be due to the multiple source of infection and insufficient treatment.

Recommendations:

- Because of high frequency of abortions due to toxoplasmosis, screening tests in pregnancy are necessary using ELISA test rather than IFAT.
- Studies for estimation of hormones and their relation to abortion and the immune response, especially the progesterone and estrogen.

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