

The prevalence of toxoplasmosis among female patients in Al-Hawija and Al-Baiji Districts in Iraq

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ABSTRACT

Objectives: *Toxoplasma gondii* is a ruthless intracellular parasite belonging to Coccidia. Toxoplasmosis is a disease affecting 500 million people worldwide. The seroprevalence varies from 5% to 90% depending on geographical location, age, habit of eating, raw meat or unwashed fruit and vegetables, and general level of hygiene. The objective of the current study was to assess the prevalence of this parasitic disease which lately seems to be elevated generally in Iraq and particularly in the middle and northern Iraq. A prospective study was carried out on females which attended public hospitals complaining of abortion and/ or infertility during 2009. **Methods:** We collected blood samples from the female patients to detect the presence of specific antibodies of *Toxoplasma gondii* utilizing direct agglutination test which was compared with ELISA techniques for evaluations of their testing sensitivity. The history of all patients was taken particularly abortion and marriage periods with and/ or without children with the family. **Results:** Direct latex agglutination test and ELISA methodology gave almost the same results when both were utilized for the detection of the toxoplasmosis in the sera of the women examined. A high frequency of toxoplasmosis incidence was seen among women with one abortion group which happen during their marital life. **Conclusions:** It was concluded that the high prevalence of toxoplasmosis among the investigated high risk women at Al-Hawija and at Al-Baiji districts is due to many risk factors including age, number of deliveries, contact with host animals. This disease was elevated after Iraq occupation with a frequency of infection more than 40% compared to eighties of Iraqi life which was the frequency of the infected women with toxoplas-

mosis which did not exceed 2% of the women tested at that time by our laboratories.

Keywords: Toxoplasmosis; Females; Abortion; Infertility; Iraq

1. INTRODUCTION

Toxoplasma gondii is a ruthless intracellular parasite belonging to Coccidia. *T. gondii* occurs in three forms: tachyzoites, bradyzoites (in tissues), and sporozoites. The parasite locates in the brain, heart, lungs, and most frequently in the lymph nodes. Toxoplasmosis is a disease affecting 500 million people worldwide. The seroprevalence varies from 5% to 90% depending on geographical location, age, habit of eating raw meat or unwashed fruit and vegetables, and general level of hygiene. The incidence of infections is higher in warmer and humid climate and increases with age. The disease can be congenital or acquired [1-4]. The parasite after invading the human body multiplies inside the cell, causing damage to the reticuloendothelial system. Rapid multiplication of the parasite and formation of the so-called pseudocysts are characteristics of the acute phase of invasion [5].

In parasitic invasions, an increase is observed in the production of IgE antibodies, especially in helminth infections. This defect results from disturbances in the regulation of antibody production by Th cells, which promotes local inflammatory reaction. Via release of mediators from mast cells IgE participates in the reaction of antibody dependent cellular cytotoxicity (ADCC). Cytotoxic activity of eosinophils is increased under the influence of cytokines (TNF- α and IL-5) released by mast cells, lymphocytes, and macrophages [6]. Th2 lymphocytes synthesize specific cytokines (IL-4, IL-5, IL-6, IL-10, IL-13, and IL-14), which play a major role in the pathogenesis of parasitic diseases. IL-5 is the major cy-

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tokine responsible for the increase in the eosinophil population in parasitoses, whereas IL-6 stimulates production of antibodies and exerts a proinflammatory effect by stimulating the generation of acute phase proteins. IL-10 and IL-12 control the type of the immune response. The former inhibits cytokine synthesis and by blocking the production of IL-6 and TNF- α causes an advantage of the response occurring with Th2 involvement and B cell activation. However, IL-12 facilitates formation of a Th1 type response [7-10].

2. MATERIALS AND METHODS

Blood samples were collected from 285 women (150 from Al-Hawija and 80 from Al-Baiji subjects) with average number of abortions (1 - 3) during 2009. The final diagnosis of toxoplasmosis was determined by the presence of IgM anti-*Toxoplasma gondii* (>1.252 UI, positive cut-off > 0.65; ELISA Biokit, Toxo IgM, Biomieux, Spain) [11]. Direct latex agglutination test was done by utilizing Toxocell (Toxocell latex, Barcellona, Spain); this technique was used for direct detection of *Toxoplasma gondii* antibodies according to the manufacturer's in

structions.

3. RESULTS

Direct latex agglutination test and ELISA methodology gave almost the same results when both were utilized for the detection of the toxoplasmosis in the sera of the women examined. The statistical analysis of the data showed no significant differences between the results of the both methods used; the positivity of the tests was 89 and 100 percents respectively (**Table 1**).

Table 2 shows that women in Al-Hawija district were under risk of catching toxoplasmosis more than those living in Al-Baiji district and more than 50% of them were infected with this parasite.

A high frequency of toxoplasmosis incidence was seen among women with one abortion group which happen during their marital life (**Table 3**). Direct latex agglutination test and ELISA methodology gave almost the same results when both were utilized for the detection of the toxoplasmosis in the sera of the women examined, *i.e* after marriage tested (**Table 4**). **Table 4** shows that *Toxoplasma gondii* can be attack any women.

Table 1. Comparison between two serological diagnostic methods of toxoplasmosis among women.

Method used	No. patients tested	No. (%) of patients positive
Direct agglutination test	121	108 (89)
ELISA (anti-toxoplasma IgM)	121	121 (100)

Table 2. The prevalence of toxoplasmosis among patients of Al-Hawija and Al-Baiji districts.

District	No. patients examined	No. of patients with toxoplasmosis	% positive
Al-Hawija	150	80	53%
Al-Baiji	135	41	30%
Overall	285	121	42%

Table 3. The rate of abortions in women infected with toxoplasmosis.

No. of abortion	No. of patients tested		Total
	Al-Hawija	Al-Baiji	
0	16	10	26
1	15	22	37
2	3	28	31
3	7	20	27
Total	41	80	121

Table 4. Number of children possessed by women tested for toxoplasmosis.

District	No. of babies possessed					Total
	0	1	2	3	4	
Al-Hawija	30	22	18	7	3	80
Al-Baiji	18	11	7	2	3	41
Total	48	33	25	9	6	121

4. DISCUSSION

Routine serologic diagnosis of toxoplasmosis provides high sensitivity, but specificity varies depending on the test used [11]. The present attempt showed that there was no significant difference in the data collected when direct latex agglutination and ELISA tests utilized and compared (**Table 1**). The same conclusion was reported by Anoiné *et al* [12]. The present findings can make the survey studies on toxoplasmosis distribution especially in the third world countries easier and cheaper to be carried out particularly in the time of high incidence of the disease. However, it was shown that the high number of toxoplasmosis cases were recorded among females with seen among families with one baby that being already delivered (**Table 3**). However, *T. gondii* infection in human may occur vertically by tachyzoites that are passed to the foetus via the placenta, or horizontal transmission which may involve three life cycle stages *i.e.* Ingesting sporulated oocysts from cats or ingesting tissue cysts in raw or under cooked meat or tachyzoites in blood products or primary offal (viscera) of many different animals, tissue transplants and unpasteurized milk [13]. Furthermore, the women examined might be already infected with disease before marriage and she might be chronic carrier of the parasite concerned. The present report showed that Al-Hawija district is more contaminated by the organism compared to Al-Baiji area and this might be because that Al-Hawija area is a well known agricultural area in Iraq, so there are a large number of animal keepers in the area and consequently the possible transmission of the parasite is suspected due to large opportunity of contacts with animal which might be infected with toxoplasmosis [13]. Moreover, in the present study, the seroprevalence of *T. gondii* IgG and IgM among non-pregnant women was higher than pregnant group as shown in **Table 4**. In contrast, pregnant women were mostly under risk of catching toxoplasmosis as concluded elsewhere [14].

It was concluded that the high prevalence of toxoplasmosis among the investigated high risk women at Al-Hawija and at Al-Baiji districts is due to many risk factors including age, number of deliveries, contact with host animals (small ruminants), contact with uncooked meat, drinking raw sheep or goat milk as well as negligible studies on the disease concerned, bad health education, no efficient medication, no surveys and possible environmental pollution with the organisms due to situations of sanctions and series of wars that attacked the country as far as this disease was elevated after Iraq occupation with a frequency of infection more than 40% compared to eighties of Iraqi life which was the frequency of the infected women with toxoplasmosis did not exceed 2% of the women tested at that time by our laboratories.

5. CONCLUSION

This disease was elevated after Iraq occupation with a frequency of infection more than 40% compared to eighties of Iraqi life which was the frequency of the infected women with toxoplasmosis which did not exceed 2% of the women tested at that time by our laboratories. Possible environmental pollution with the organisms due to situations of sanctions and series of wars that attacked the country as far as this disease was elevated after Iraq occupation.

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