

Epidemiological study of toxoplasmosis infection in pregnant women in the city of Al-Rifai, Dhi Qar – Iraq

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ABSTRACT

Introduction: Toxoplasmosis is a zoonotic disease caused by the parasite Toxoplasma gondii. It is widespread throughout the world and affects most warm-blooded animals, including humans. The goal of this investigation was to study the relationship between age, areas of residence, educational level, and the incidence of toxoplasmosis. Method: About 3ml of venous blood was drawn from each woman after sterilizing the area from which blood was to be drawn. The blood sample was then placed in a sterile test tube containing gel and devoid of anticoagulants (Gel tube) and left at room temperature for 10 minutes, then placed in Centrifuge at 3000 rpm for 10-20 minutes. After that, the separated serum was drawn into it using a micropipette equipped with a fine tip, and the serum was placed inside a plastic Eppendorf test tube, which was tightly closed and installed inside a test tube holder (rack). Then it was transferred to a deep freezer and stored at -20 °C until the required tests were carried out. Results: The results of the study showed an increase in the levels of IgM and IgG in pregnant women living in rural areas compared to pregnant women living in urban areas, and antibody levels were also higher in uneducated pregnant women compared to educated pregnant women. On the other hand, there was an increase in the level of IgM in Age group 25-34 and an increase in IgG levels in the age group 17-24. Conclusion: The effect of residence in rural areas on the rates of infection with acute and chronic toxoplasmosis was significant, while the effect of low educational level on the rates of infection with toxoplasmosis was without significant significance in the acute and chronic cases. On the other hand, it was found that there was no significant significance in the effect of age on the incidence of acute toxoplasmosis and, on the contrary, in chronic toxoplasmosis.

KEYWORDS: Acute toxoplasmosis , chronic toxoplasmosis, Epidemiology, IgG,IgM.

Introduction

The humoral response to *Toxoplasma gondii* infection leads to an increase in the levels of IgM, IgG, IgA, and IgE antibodies [1]. Stimulation of the humoral immune response by toxoplasmosis produces IgM and IgG antibodies, which are indicators of early infection and late infection, respectively [2].

Infection with *Toxoplasma gondii* leads to stimulation of B-cells to produce antibodies which have an important role in eliminating the parasite in its rapidly multiplying form Tachyzoite, before it enters the cells by decomposing the parasite and thus limiting its replication, It also has a role in increasing the effectiveness of the phagocytosis process by phagocytic cells to get rid of the parasite, and although its role is limited in eliminating the parasite while it is outside the cells, it has its importance in diagnosing the infection in humans [3].

IgM antibodies are formed in response to the presence of the parasite upon initial exposure to the parasite [4]. The IgM antibody can be detected in the serum of an infected person about one week after infection, as it is considered an indicator of acute infection. However, it can be present for several months or years [5]. IgM antibody levels decrease about 1-6 months after infection with *Toxoplasma gondii*, but old infection cannot be excluded, despite the high levels of IgM that indicate acute infection, as it may be found for a year or more after infection [6]. In addition, in the absence of IgM antibody to *Toxoplasma gondii*, IgA antibody can be useful in detecting recently acquired infections [7,5].

After the body acquires immunity to parasitic infection, IgG antibodies are formed, known as maturation of the humoral immune responses. In the first months of infection, IgG antibody levels are low, while high levels are evidence of chronic parasitic infection [8]. Antibodies act on the rapidly multiplying extracellular Tachyzoites that are released when the infected cell decomposes and limit their reproduction with the help of complementary factors and thus help in the Opsonization process [9].

On the other hand, *Toxoplasma gondii* during the process of invading host cells, secretes many parasitic protein substances that work to disrupt signaling pathways within the host's cells. These parasitic secretions are considered an advantage for the *Toxoplasma gondii* parasite through which it can evade the effective immune response of the host during the invasion process Primary [10]. Therefore, the interactions that occur between the parasite and the host cells through the secretion of many parasitic factors lead to the formation of a chronic latent infection, and the chances of transmitting the infection to another host also increase, especially hosts that suffer from immunodeficiency [11].

Methods

Study design

The current study included 219 samples of pregnant women's blood that Initially, consent was taken from all women from whom blood was drawn, and a recording was also made. A set of information about them, which included their age (lowest age group 17 - highest age group 41) and residence (city, countryside) and their educational level (educated, uneducated) was also identified.

Collecting blood samples and working

About 3ml of venous blood was drawn from each woman after sterilizing the area from which blood was to be drawn. The blood sample was then placed in a sterile test tube containing gel and devoid of anticoagulants (Gel tube) and left at room temperature for 10 minutes, then placed in Centrifuge at 3000 rpm for 10-20 minutes. After that, the separated serum was drawn into it using a micropipette equipped with a fine tip, and the serum was placed inside a plastic Eppendorf test tube, which was tightly closed and installed inside a test tube holder (rack). Then it was transferred to a deep freezer and stored at -20°C until the required tests were carried out.

Statistical Analysis

SPSS for windows operating system was used for statistical analysis. Data were analyzed by using Chi-squared test.

Results and discussion

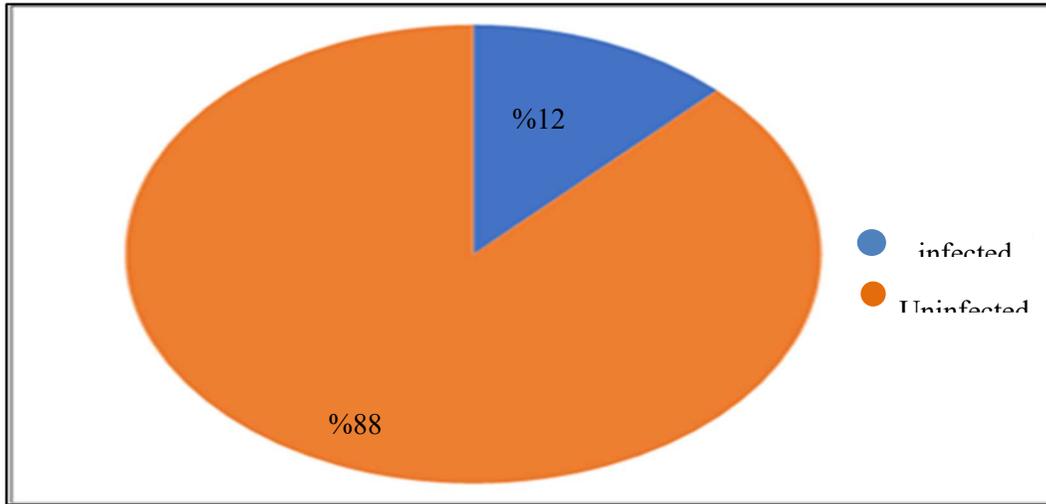


Figure 1 Total percentage of acute toxoplasmosis infection

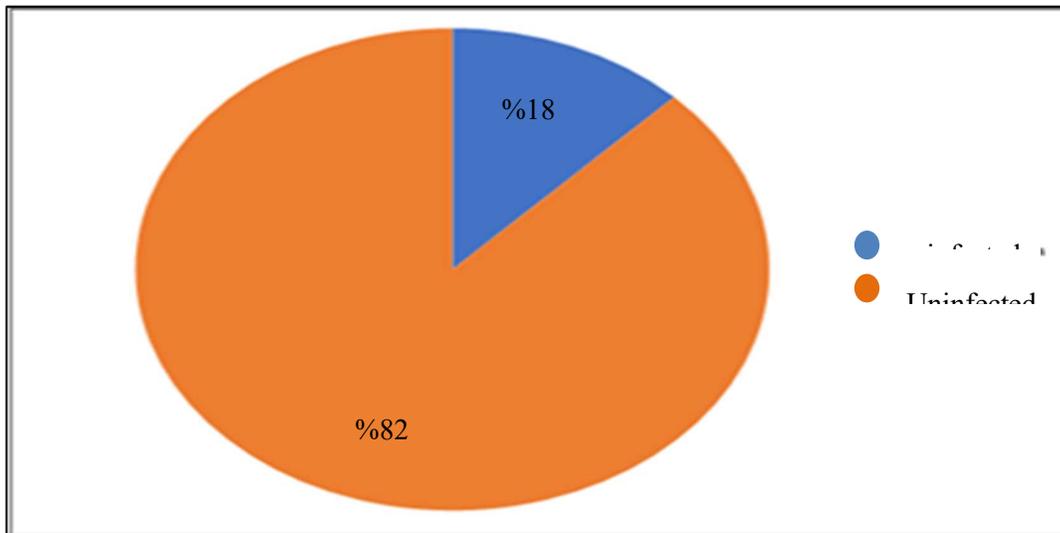


Figure 2 Total percentage of chronic toxoplasmosis infection

Table 1 Effect of residence on toxoplasmosis infection.

Residence	Anti-Toxo Ab (IgM)		percentage	Anti-Toxo Ab (IgG)		percentage
	Tested samples	Infected samples		Tested samples	Infected samples	
Rural	120	21	17.5%	120	33	27.5%
Urban	99	6	6%	99	6	6%
Total	219	27	12.3%	219	39	17.8%

Moral level	P= 0.007	P= 0.01
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Table 2 Effect of age on toxoplasmosis infection.

Age Groups	Anti-Toxo Ab (IgM)		percentage	Anti-Toxo Ab (IgG)		percentage
	Tested samples	Infected samples		Tested samples	Infected samples	
17-24	87	9	10.3%	87	18	20.6%
25-34	84	12	14.2%	84	15	17.8%
35-41	48	6	12.5%	48	6	12.5%
Total	219	27	12.3%	219	39	17.8%
Moral level	P= 0.922			P= 0.492		

Table 3 Effect of education level on toxoplasmosis infection.

Level of Education	Anti-Toxo Ab (IgM)		percentage	Anti-Toxo Ab (IgG)		percentage
	Tested samples	Infected samples		Tested samples	Infected samples	
literacy	60	6	10%	60	6	10%
illiteracy	159	21	13.2%	159	33	20.7%
Total	219	27	12.3%	219	39	17.8%
Moral level	P= 0.416			P= 0.041		

-Total incidence of toxoplasmosis

The current study was conducted on 219 samples from pregnant women at Al-Rifai General Hospital - Dhi Qar Governorate, and it became clear in light of the examination results that the percentage of infection using IgM for the Toxoplasma parasite was about 12% of the total number of samples examined (Figure 1), while the percentage of infection using IgG to the Toxoplasma parasite is about 18% of the total number of samples examined (Figure 2). The results of the current study showed that the rate of infection with the *Toxoplasma gondii* parasite using the IgM and IgG tests was 12% and 18%, respectively. The positive serological results for IgM were higher than what Colak & Asgin [12] found in Turkey, while the positive serological results for IgG were close to the results of his study, where the infection rate among pregnant women was 0.7% and 15.7% for acute and chronic toxoplasmosis, respectively. While the study obtained by Al-Awadi et al [13] in Baghdad showed results similar to the results of the current study regarding the prevalence of the IgM antibody, as the percentage reached 8%, while the prevalence of the IgG antibody was higher than the current results, reaching 59%.

-Effect of residence on toxoplasmosis infection

Table 1 revealed a significant increase ($p \leq 0.05$) for IgM and IgG antibodies (17.5%) and (27.5%), respectively, in pregnant women living in rural areas compared to urban areas (Table 1). The results of the current study in terms of place of residence and its relationship to toxoplasmosis infection showed that the highest rates of infection were in pregnant women living in the countryside using IgM and IgG testing, amounting to about 17.5% and 27.5%, respectively. Researchers Belluco et al [14] and Mareze et al [15] explained that the difference in infection rates between women in the countryside and the city is due to a decline in the economic and social level in some rural areas, as well as the difficulty of accessing some services, such as running water, as well as customs. Eating in some areas and contact with animals, as these risk factors are more common in rural areas than urban areas, which may be linked to a higher seroprevalence rate of the parasite. The results of the current study were consistent with the results shown in the study conducted by Rivera et al [16] in Argentina, where the infection rates in rural areas were 36.4% compared to 26.8% in urban areas. The results of the current study also agreed with the study conducted by Abdullah & Mahmood [17] in Erbil, where the seropositivity for IgM and IgG in women living in the countryside was 20.93% and 44.18%, respectively, which is higher than the seropositivity for IgM and IgG for women. The population of the city reached 9.03% and 30.5%, respectively.

-Effect of age on toxoplasmosis infection

Table 2 revealed a non-significant increase in the age group 25-34 for anti-IgM in pregnant women (14.2%), while there was a non-significant increase in the age group 17-24 for anti-IgM in pregnant women (20.6%) (Table 2). In terms of the age groups of pregnant women and their relationship to the rates of toxoplasmosis infection, the current study showed that the highest infection rate for IgM was 14.2% in the age group 25-34, but it was not significant, while the highest infection rate for IgG was 20.6% in the age group 24-17. The current results have shown a difference with the results of the study reached by Yohannes et al [18] in Ethiopia, where the researcher showed that infection rates increase with age, as appears at the ages of 35-38. In the study conducted by researchers Yousif & Alsakee [19] in Erbil, they found that the highest prevalence of seropositivity for IgM and IgG was in the age group 21-30.

-Effect of education level on toxoplasmosis infection

Table 3 revealed a non-significant increase in anti-*Toxoplasma gondii* IgM, and a significant increase in anti-*Toxoplasma gondii* IgG in uneducated pregnant women (13.2%) and (20.7%), respectively (Table 3). In terms of the educational level of pregnant women and the extent of its relationship to the incidence of toxoplasmosis in the current study, the results showed that the highest infection rate was among uneducated women using the IgM test, which was 13.2%, but no significant correlation was observed between infection and educational level, while the highest infection rates were in uneducated women using the IgG test 20.7%. Researcher Rocha et al [20] revealed the extent of the relationship between educational level and infection and indicated that educational level is an important risk factor for toxoplasmosis and that educated women have greater information and knowledge about this disease and how to prevent it. Different results appeared in the study conducted by researcher Bamba et al [21] in Burkina Faso, where infection rates among educated women were higher as a result of increased meat consumption (beef, poultry, and wild meat). The researcher pointed out the necessity of educating women about infection and Methods of transmission and prevention. The results of the current study agreed with the study conducted by researcher AL-Safar et al [22] in Mosul, where it was found that the low level of education among women and direct contact with cats leads to an increase in infection

with *Toxoplasma gondii*, as the percentage reached 53.8%, while women who were not They had direct contact with cats, and their infection rate was 23.5%.

Conclusion

The effect of residence in rural areas on the rates of infection with acute and chronic toxoplasmosis was significant, while the effect of low educational level on the rates of infection with toxoplasmosis was without significant significance in the acute and chronic cases. On the other hand, it was found that there was no significant significance in the effect of age on the incidence of acute toxoplasmosis and, on the contrary, in chronic toxoplasmosis. Therefore, there is a need to use various audio and print means to ensure people's health and cultural awareness of the danger of the spread of infection and not to come into direct contact with cats and other animals that could be carriers of parasitic infections.

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