

SEROPREVALENCE OF AND RISK FACTORS FOR *TOXOPLASMA GONDII* AMONG PREGNANT WOMEN IN ABYEK TOWNSHIP OF QAZVIN PROVINCE, IRAN (2013)**FATEMEH TABATABAIE¹, MORTEZA MAFI¹, HADI MAFI², MOHSEN GOLESTANI³, MARYAM SADEGHI¹, BEHNAZ JALALIZADEGAN¹, NARGES SHAHMOHAMMAD¹, MARYAM AYAZI⁴, MOHAMMAD SABERI NASAB¹, ALI KERMANJANI^{1*}**

¹Department of Parasitology and Mycology, Faculty of Medicine, Iran University of Medical Sciences, Tehran, Iran. ²Department of Laboratory Sciences, Faculty of Medicine, Qazvin University of Medical Sciences, Qazvin, Iran. ³Department of Biology, Payame Noor University of Mashhad, Mashhad, Iran. ⁴Medical doctor (M.D.), Faculty of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran. Email: a.kermanjani@gmail.com

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ABSTRACT

Objective: Toxoplasmosis is an important disease which is caused by the coccidian parasite *Toxoplasma gondii*. The aim of this study was to determine seroprevalence of and risk factors for *T. gondii* among pregnant women in Abyek township of Qazvin province by enzyme-linked immunosorbent assay method.

Methods: Blood samples were taken from 200 pregnant women referred to the health centers of Abyek township. Immunoglobulin M (IgM) and IgG titers and effects of some factors on incidence of the disease were evaluated. The collected data were statistically analyzed with SPSS 17 using Chi-square test.

Results: Anti toxoplasma IgM and IgG were positive in 2% and 29% respectively. Seropositive subjects were more frequently seen in women with age >30 years compared to younger women. No significant relationship was found between the seroprevalence of *T. gondii* infection and level of education, residence area, history of abortion and gestational age.

Conclusion: It was indicative of having a latent infection due to the previous exposure to toxoplasma parasite in this region.

Keywords: *Toxoplasma gondii*, Prevalence, Pregnant women, Enzyme-linked immunosorbent assay, Immunoglobulin M.

INTRODUCTION

Toxoplasmosis is a global zoonosis that can infect almost one-third of the world's population by a protozoan parasite, *Toxoplasma gondii*. It may appear in several forms, infections in humans are usually clinically latent that usually persists for life, which is not seen as a health threat except in the case of pregnancy and immunocompromised persons. *T. gondii* can be transmitted to humans by eating raw or uncooked meat, by consuming oocysts those cats have passed in their feces, either from a garbage box or from soil, by transmitting the infection from infected pregnant women to their unborn fetus it can be happened. This parasite can cause congenital disease and abortion in humans and livestock. In most cases, the laboratory diagnosis of acute and chronic toxoplasmosis relies on the detection of *T. gondii* specific immunoglobulin G (IgG) and IgM antibodies and the avidity test of *T. gondii* specific IgG antibodies has also been very useful in the diagnosis. Many serological tests as an example of the latex agglutination test, enzyme-linked immunosorbent assay (ELISA), indirect fluorescence antibody test and hemagglutination test have been used [1,2]. There are many studies on the prevalence of anti-*T. gondii* antibody among Iranian women. Seropositivity of *T. gondii* is 48-74.6% in northern areas [3-5], 33-44% in northwest [6-10], 22-37% in south [11,12] and 27-54% in central parts of Iran [13-16]. This study was performed to determine the *Toxoplasma* antibodies in pregnant women in Abyek township by ELISA method because of its high sensitivity and specificity, easier technique and lower expense, which is preferred in order to screening toxoplasmosis. This research was novel and modern work because was not done previously.

METHODS**Study area**

This study was carried out in Abyek township, Abyek is situated at 36.07° North latitude, 50.55° East longitude and 1495 m elevation above the

sea level. Abyek is a town in Iran, having about 55128 inhabitants. Abyek lies roughly half way between Qazvin to the northwest and Karaj to the southeast.

Patients and blood sampling

In this descriptive-cross sectional study, after providing written informed consent, 3 ml of venous blood sample randomly were drawn from 200 pregnant women (β HCG-positive) women referred to the health centers of Abyek township and transferred to parasitology laboratory in Faculty of Para Medical Sciences, Iran University of Medical Sciences maintained under standard conventional conditions in <2 hrs and centrifuged at 3000 rpm for 15 minutes then isolated sera were frozen by Alicot method and were stored at -20°C until assays. Additional frozen sera were reserved for further surveys. Simultaneously, a questionnaire including demographic and educational characteristics of the subjects was filled. The samples were tested for anti-*Toxoplasma* IgM and IgG antibodies using *Toxoplasma* IgM and IgG ELISA kit (Dia-Pro, Milan, Italy) according to the manufacturer's instructions. The present work has been approved by Iran University of Medical Sciences Ethics Committee.

Statistical analysis

The Chi-square test was used to analyze the data in SPSS version 11.5 (SPSS Inc., 233 South Wacker Drive, 11th Floor, Chicago, IL 60606-6412). Differences between variants were considered significant when $p < 0.05$.

RESULTS

The overall seroprevalence of toxoplasmosis in pregnant women was 31% (62/200 cases). IgG and IgM anti-*Toxoplasma* antibodies were positive in 58/200 cases (29%) and 4/200 cases (2%), respectively. The results, including seroprevalence data together with personal and demographic variables are detailed in Table 1. The proportion

Table 1: Seroprevalence of *T. gondii* in pregnant women in Abyek township

Risk factors	N (%)		P value
	Seropositivity	Seronegativity	
Age groups (year)			
≤20 years	14 (7)	70 (35)	0.028
21-30 years	17 (8.5)	30 (15)	
>30 years	49 (24.5)	20 (10)	
Education			
Illiterate	14 (7)	29 (14.5)	0.155
High school	20 (10)	41 (20.5)	
Diploma	26 (13)	40 (20)	
University graduated	12 (6)	18 (9)	
Residence area			
Urban	86 (43)	40 (20)	0.64
Rural	48 (24)	26 (13)	
Gestational age			
First trimester	30 (15)	35 (17.5)	0.167
Second trimester	20 (10)	30 (15)	
Third trimester	25 (12.5)	60 (30)	
History of abortion			
Yes	60 (30)	80 (40)	0.89
No	20 (10)	40 (20)	

of seropositive women increased with increasing age, from 7% in ≤20 years old to 24.5% in >30 years old women ($p=0.025$). No significant relationship was found between the seroprevalence of *T. gondii* infection and their level of education. The prevalence rate showed no significant differences between women resident in rural and those in urban areas, neither the history of abortion had a significant association with *Toxoplasma* seroprevalence rate. The surveyed pregnant women at their first, second and third gestational trimesters showed in different rates of the *Toxoplasma* infection. The data of the above variables are epitomized in Table 1.

DISCUSSION

Toxoplasmosis is a zoonotic infection in the world. The prime invasion during pregnancy can lead to irreversible effects on the fetus. This parasite is one of the opportunistic infections in immunocompromised patients. The 29% prevalence of chronic toxoplasmosis (IgG positive) and 2% recently acquired infections (IgM positive) during pregnancy were found in this study that is accordance with weather and geological conditions of this area. In Iran, at least 35% of people have been found seropositive for anti-*T. gondii* in most regions. Low level of education was associated with a higher rate of toxoplasmosis [7,17,18]. We did not find a significant relationship between the seroprevalence of *T. gondii* infection and the level of education. There are similar reports in Turkey and Hamadan [6,19]. Some other studies showed a significance decreases in seropositivity as the level of the education increases [7,12,20]. In the present study, we found no statistical difference among seroprevalence of *T. gondii* and the residence areas, which is in accordance with other reports [7,18,21], but some studies showed higher seropositivity in urban than in rural areas [22,23]. In addition, in the present research similar to the results of previous studies no significant relationship was found between the seroprevalence of *T. gondii* infection and history of abortion in pregnant women. No significant association of the infection with gestational age was remarked [19,24]. The prevalence of toxoplasmosis in the women with bad obstetric history is known to be significantly higher than those without it. Some reports on congenital toxoplasmosis were issued in some parts of Iran [25-27]. Women older than 30 years had a significantly higher seroprevalence (24.5%) compared to those who were 20 or less (7%) ($p=0.025$). Results of the present study showed a significant increasing rate of seropositivity with age (Table 1), which is predictable, because older individuals have more chances for exposure to an infectious form of parasite. In studies conducted in Venezuela and Croatia, the peak age of acquisition of the infection was ages <15 years. In another study in

12 provinces in Iran, most people acquired the infection for 30 years and the seroconversion rate was slightly more in 10-19 years age group, which is compatible with our results. The difference in the peak age of acquisition in various regions could be due to different climate conditions, dissimilar nutritional and behavioral patterns of life, which expose the population to the infective form of parasite in different ages. The highest acquisition of the infection in active social ages in Iran is alarming which necessitates preventive programs from toxoplasmosis in these high-risk age groups [28-31].

CONCLUSION

In conclusion, this study showed to require care to avoid parasite exposure during their pregnancies. The measurement of the serial titration of these patients especially in pregnant women (negative serum - high risk) should be done and undergone the anti-parasitic treatments. The results of this study confirm that the determination of the diagnostic toxoplasmosis is a necessary test during pregnancy. Increased knowledge through higher education and its consequence on patterns of life and behaviors may lead to a decrease in *T. gondii* infection, and may have an indirect effect on environmental and cultural factors involved in *T. gondii* infection.

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