

Determining seroprevalence of *Toxoplasma gondii* in girls referring to counseling centers before marriage in the city of Yasuj in the year 1391

Asghar Ghorbani¹, Abolghasem Hadi Niya², Ghamar Taj Khatayi³, Reza Mohammadi⁴, Janmohammad Malekzadeh⁴, Kanaan Gorjipour⁵, Abdoul Ali Moshfe⁶, Ali Keshtkari^{7*}, Hamid Reza Ghafarian Shirazi^{2,4}

¹Residents of Children's Department, Yasuj University of Medical Sciences, Iran,

²Cellular and Molecular Research Center, Yasuj University of Medical Sciences, Yasuj, Iran,

³Children's Medical Center, Tehran University of Medical Sciences, Tehran, Iran,

⁴Herbal Research Center, Yasuj University of Medical Sciences, Yasuj, Iran,

⁵Medical Immunology Department of Shahid Beheshti University of Medical Sciences, Tehran, Iran,

⁶Parasitology Department, Yasuj University of Medical Sciences, Yasuj, Iran,

⁷Department of Pediatrics, Yasuj University of Medical Sciences, Yasuj, Iran.

*Corresponding Author: Dr. Ali Keshtkari, Email: keshtkari@yums.ac.ir

Abstract: Regarding the serious dangers of Toxoplasmosis in pregnant women, the purpose of this study is to determine the prevalence of seroprevalence to *Toxoplasma gondii* in girls referring to counseling centers before marriage in the city of Yasuj. In this study, a number of 410 blood samples were taken from women who visited Ashrafi Esfahani Medical Center in Yasuj for routine pregnancy tests. Consequently, ELISA method was utilized to assess the presence of IgG and IgM against *Toxoplasma gondii*. In addition, other toxoplasma demographic and infection risk factors were gathered via surveys. The data were analyzed using chi-squared statistical test. A number of 36 cases (9 percent) of total had positive IgG titers and 4 cases (1 percent) had positive IgM titers against *Toxoplasma*. There was no significant relation between the positive cases of IgG and IgM against *Toxoplasma* and the level of education, residence, occupation and not using gloves when working with soil and chopping meat or having pet cats or direct contact with cats. This study showed that in more than 90 percent of women in pregnancy ages in the city of Yasuj, there is no antibody present against *Toxoplasma*, thus holding the required education classes during pregnancy and giving the required medical recommendations seems to be necessary.

[Asghar Ghorbani, Abolghasem Hadi Niya, Ghamar Taj Khatayi, Reza Mohammadi, Janmohammad Malekzadeh, Kanaan Gorjipour, Abdoul Ali Moshfe, Ali Keshtkari, Hamid Reza Ghafarian Shirazi. **Determining seroprevalence of *Toxoplasma gondii* in girls referring to counseling centers before marriage in the city of Yasuj in the year 1391.** *Life Sci J* 2013;10(12s):859-863]. (ISSN:1097-8135). <http://www.lifesciencesite.com>. 139

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Introduction

Toxoplasma gondii is a single cell parasite which causes chronic infections in humans and domestic animals. Toxoplasmosis is a clinical or pathologic disease which is caused by this parasite and differs from a symptomless toxoplasma infection which is seen in many individuals with normal immunity (1, 2). Infection is usually caused through oral transfer, placental transfer, blood and leukocyte transfusion, organ transplant, or rarely via accidental insemination in lab incidents. The clinical symptoms are to an extent, dependent on the host's immunity system. In older children with a healthy immunity system, the infection can appear as a symptomless and self-limiting lymphadenopathy or in some cases it can cause considerable organ damage (1-4). After receiving this infection, the tissue cyst will remain in the body of the host for the rest of life. In children or infants with immunodeficiency or in pregnant woman, the primary infection or its recurrence can result in the

involvement of the central nervous system. An infection received in utero, if not cured, in almost all cases will show symptoms in prenatal stages or after this stage. The most common symptom in these children includes chorioretinitis or the involvement of CNS. Of course other symptoms such as a decrease in hearing, pneumonia, hepatitis and Trombocytopenia are also common. Congenital Toxoplasmosis in infants with acquired immunodeficiency could be serious (3).

Seroepidemiology studies show that *Toxoplasma* infections are found worldwide in humans or warm-blooded vertebrate, but the prevalence of human infections differs in different regions (5). The least amount of infections is found in hot-dry or cold regions and the amount of infection in hot-humid regions is more than moderate regions. This situation is probably related to the suitable conditions for the survival of the oocytes (6). Serologic evidence concerning Toxoplasmosis infection in humans has

been reported from all over the world, so that it is estimated that close to 500 million individuals in the world are infected with this parasite. The amount of prevalence differs based on age, geographic location of the region, temperature, moisture and diet of the people. In some countries including El Salvador, Haiti and France, in the fourth decade of life, the prevalence of this infection reaches 90%, but a significant difference has not been observed in infection of different sexes (7). In United States and London, the amount of infection among pregnant women differs from 16 to 40 percent based on serologic studies (9). The highest observed rate of Toxoplasmosis prevalence is 93 percent of woman in Paris which this issue is related to the diet of these individuals where they used raw or partially raw meat (5).

In Iran, in various studies different numbers of prevalence of Toxoplasmosis have been reported. Studies in provinces of Gilan and Mazandaran showed 55.7 percent infection in the four villages that were studied (8). In another study conducted by Ghorbani et al. in the North-West of Azerbaijan and south-west of Khuzestan, the total rate of prevalence in this region was 12.8 percent (10). Studies in the southern coasts of Iran show that 43.8 percent of the residents of the coasts of the Persian Gulf and the Oman Sea are infected with the mentioned parasite. This amount is 44.5 percent for the province of Hormozgan (11). Studies in the highlands of Iran such as the province of West-Azerbaijan show fewer prevalence. In Maku and Orumia, 23.2 percent of the individuals show positive infections in serum. In these regions, infections were more common in woman compared to men (10). In a study conducted in urban and rural parts of Kashan in the year 1372, in patients visiting health centers of this city, 2080 cases were gathered where 1057 individual, meaning 50.7 percent of the population has anti-toxoplasmosis antibody (12).

With regards to the issue that there have been no comprehensive and accurate studies on the degree of infection in women in pregnancy ages in the city of Yasuj, thus the objective of this study is to define the prevalence of serums infected to *Toxoplasma gondii* in girls referring to counseling centers before marriage in the city of Yasuj.

Materials and Methods

This cross sectional study was carried out in the year 1391 on women referring to counseling centers before marriage in the city of Yasuj. The study population were women who referred to counseling centers before marriage in the city of Yasuj, with regard to the 10 percent prevalence (in girls studied in the area of Fasa) and by applying the estimated error of 3 percent and confidence level of 95 percent, the

number of needed cases was estimated to be 410 people who were chosen among the girls referring to the counseling center before marriage via access method of sampling and studied.

With regards to the issue that all marriage applicants in the city of Yasuj and its environs refer to Shahid Rejaii Health center, after the required coordination, we began working in this center. In this center, before taking samples for thalassemia screening from the marriage applicants, they were referred to two questioners who were previously trained in this regard, and they explained about Toxoplasmosis infection for the applicants and the importance of this study, and got their consent by interviewing them and completing a survey which was prepared beforehand, and in cases where the questioned person did not agree to participate, she would be removed from the experiment. The obtained data is kept confidential.

The survey was in three sections: the first section included demographic data such as age, place of residence, job and education; and the second section showed the information of the individual on Toxoplasmosis and the last section, the individual behaviors of that person which seemed to raise the risk of infection, such as contact with cats and diets.

After completing the survey, 3Cc of blood was taken from the cases being studied and kept in -20 °C until time of study. After completing the sampling, the amount of specific antibodies against *Toxoplasma gondii* parasite was measured. By using a diagnostic kit made in Italy, the amount of IgM antibody against the specific gene of *Toxoplasma* parasite were measured qualitatively by capture ELISA method and by using a diagnostic kit made in Italy, the amount of IgG against the specific antigen of *Toxoplasma gondii* parasite was measured quantitatively and qualitatively via indirect ELISA method.

The obtained data were analyzed using SPSS version 18 and Chi-square test.

Results

The results showed that the prevalence of specific IgG antibody against *Toxoplasma gondii* in the studied cases in this study was 36 cases (9percent). The average age of the individuals with positive IgG titer was 23.94 ± 5.85 years and the average age of the individuals with negative serums was 22.23 ± 4.98 years which all of them were women in marriage ages. In addition, the amount of IgM antibody prevalence was 4 cases (1 percent). The average age of the individuals with positive IgM antibody was 19 ± 2.94 years and the average age of the persons with negative serum was 22.41 ± 5.09 . The results showed that there was no significant relation between the percent of

positive IgG and IgM antibody cases with demographic, place of residence, occupation and education variables.

Among the patients, only 25 individuals had heard the name of this parasite which is a very low percentage. On the other hand, 103 of the individuals mentioned a history of miscarriage or still birth in their sisters or mother. A large number of the cases (84.4

percent) did not use gloves while chopping meat or vegetables but on the other hand, the history of using raw meat was very low in this group (18.8 percent). In addition, 80 percent of the questioned cases never had pet cats or contact with cats. Almost 95 percent of them were somehow in contact with garden soil or soil in the environment.

Table 1. Comparing the relative frequency (number and percent) of positive and negative cases for IgM and IgG antibody in individuals being studied based on demographic variables.

	antibodyvariables	IgG +	IgG -	IgM +	IgM -
Residence	city	17 (8.5)	183 (91.5)	3 (1.5)	197 (98.5)
	village	17 (8.5)	174 (91.1)	1 (0.5)	190 (99.5)
	Tribe	2 (11.1)	16 (88.9)	0 (0.0)	18 (100)
occupation	unemployed	19 (8.9)	195 (91.1)	2 (0.9)	212 (99.1)
	Employed	5 (14.7)	29 (85.3)	2 (2.4)	82 (97.6)
	Student	9 (10.7)	75 (89.3)	0 (0)	73 (100)
Education	uneducated	1 (16.7)	5 (83.3)	0 (0)	6 (100)
	Primary school	3 (9.1)	30 (90.9)	1 (3)	32 (97)
	Secondary school	6 (9.7)	56 (90.3)	0 (0)	62 (100)
	Diploma	14 (8)	161 (92)	3 (1.7)	172 (98.3)
	higher	12 (9.5)	114 (90.5)	0 (0)	126 (100)

Discussion

Toxoplasmosis is one of the common parasite infections which are mutual between humans and warm-blooded animals. Seroepidemiology studies show that toxoplasma infections are found in humans and other warm-blooded vertebrates worldwide but the prevalence of this infection in humans is different depending on geographic situation and diet (13). The purpose of this study was to determine the seroprevalence of infection with *Toxoplasma gondii* in girls referring to counseling centers before marriage in the city of Yasuj.

The results of our study showed that 9 percent of the participants in this study had positive IgG and 1 percent positive IgM. The results of this study did not comply with some studies in regard to the percent of positive titer of IgG. For instance, a study conducted in Ahwaz on 400 women before marriage showed that 25.8 percent of the cases had positive IgG titer which is a higher percentage than the current study (10). The reason could be defined in this way that if the environment is not hot and humid, the oocysts will be destroyed and maybe this reason could describe the difference of the studies in these two regions, one being in highlands with a cold and dry environment (Yasuj) and the other hot and humid (Ahwaz), where

in cold and dry environments, oocysts are destructed more rapidly. Although in most studies, the number of un-immune individuals is very high which shows the need for education and informing individuals in this regard. On the other hand, the reason of this difference could be related to less contact with cats and cat waste in Yasuj or personal hygiene is practiced more in this region.

Similar studies have been conducted in Hormozgan, West Azerbaijan and Kashan where the percentage of positive IgG was reported to be 34.5, 23.2, and 50.7 respectively which again shows the difference between the current studies with these studies (9-11). Another similar study in Qazvin showed that the seroprevalence of IgG in pregnancy ages is 34 percent in studied cases where similar numbers have been reported in Tehran and Kerman, but this number is much higher than our results and should be assessed (15).

Since the province of Kohgiluyeh and Bouyerahmad are considered as the south and southwest parts of the country, a broader compare of this study with similar environments seems to be a logical matter for comparison. For instance, the prevalence of IgG in high school girls in the city of Boushehr showed that 22.1 percent of these girls had positive

serum titers which are again a number about twice the results of this study (16). But in a similar study in Fasa, this number in the high school girls of different parts of this region was estimated to be 10 percent which is very close to the results of our study, which the reason could be related to the hot and dry climate of this city where the oocytes do not have much durability, like the city of Yasuj (17).

In a Toxoplasmosis infection, considering the Geographic Information System is highly important, plus it has many changes which is better to consider them in the epidemiology of infectious diseases. If the climate is not hot and humid, the *Toxoplasma gondii* oocytes will be rapidly destroyed, as the altitude raises and the climate becomes colder, the conditions become less suitable for this infection (18). *Toxoplasma gondii* is positive in at least one-third of the adult population of most of the countries of the world, but is different based on different geographic regions and it could even be less than 5 percent (19). After infection with *Toxoplasma*, the serum Antibody titer may remain for many years to come and normally, the minimum titer of antibody shows previous infection or a latent infection in individuals (20).

Another point which should be assessed is the low level of IgG in girls about to marry or become pregnant and thus, the probability of a primary infection during pregnancy and thus the probability of congenital diseases of the fetus is higher, which this requires educating today's girls and tomorrow's mothers regarding *Toxoplasma* and it seems that studies are required in this regard during pregnancy and also evaluating the number of abortions due to toxoplasma.

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