



ISSN 2320-7078

JEZS 2014; 2 (6): 217-219

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Received: 27-10-2014

Accepted: 09-11-2014

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## Study of seroprevalence and risk factors for *Toxoplasma gondii* among pregnant women in Karaj township of Alborz province [2013]

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### Abstract

The aim of this study was to determine seroprevalence of and risk factors for *Toxoplasma gondii* among pregnant women in Karaj township of Alborz province by ELISA method. The blood samples were taken from 400 pregnant women referred to the health centers of Karaj township. IgM and IgG titers and effects of some factors on incidence of the disease were appraised. Anti *Toxoplasma* IgM and IgG were positive in 1% and 29% respectively. Seropositive subjects were more frequently seen in women with age >30 years compared to younger women. No significant relationship was found among the seroprevalence of *T. gondii* infection and level of education, residence area, history of abortion and gestational age. According to the positive cases between the patients, there should be some regular screen programs to recognize the chronic and acute infections especially in pregnant women.

**Keywords:** *Toxoplasma gondii*, Pregnant women, IgM, IgG.

### 1. Introduction

*Toxoplasma gondii* is an obligate intracellular protozoan parasite occurring with a global distribution in human and animals. The infection is caused by consuming contaminated meat or coming into contact with cat feces containing oocysts. *T. gondii* infects a large proportion of the world's population from temperate to tropical areas. Individuals at risk include fetuses, newborns, and immunologically compromised individuals. *Toxoplasma gondii* can cause congenital disease and abortion in humans and livestock. In most cases the laboratory diagnosis of acute and chronic toxoplasmosis depends on the detection of *T. gondii* specific IgG and IgM antibodies [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 [11-13] and 27%-54% in central parts of Iran [13-16]. This study was performed to determine the *Toxoplasma* antibodies in pregnant women in Karaj township by ELISA method because of its high sensitivity and specificity, easier technique and lower expense which is preferred in order to filtering toxoplasmosis. This study was novel and modern work.

### 2. Material and Method

#### 2.1 Study area

This research was carried out in Karaj city from January to December 2013, It is connected by freeway, railway to Tehran 40 km east and Qazvin 100 km northwest, and by commuter rail to Tehran subway system [Metro]. Karaj's climate is a bit cooler than Tehran and it receives 260 mm of rain annually. Karaj is a city in and the capital of Karaj County, Alborz Province, Iran. At the 2006 census, its population was 1.61 million in the latest 2011 census, making it the third-largest city in Iran after Tehran, Mashhad. It is situated 20 kilometres west of Tehran, at the foothills of the Alborz Mountains. The city has effectively become an extension of metropolitan Tehran. Karaj is mostly famous because of its academic and educational complexes along with tourist attractions.

#### 2.2 Patients and blood sampling

After providing written informed consent, three ml of blood sample randomly were drawn from 400 pregnant women [BHCG-positive] in health centers of Karaj Township.

The samples were transferred to parasitology laboratory in Faculty of Medical Sciences, Iran University of Medical Sciences. The samples were maintained under standard conventional conditions in less than 2 hours and centrifuged at 2500 rpm for 15 minutes then isolated sera were frozen by Alicot method. The samples were stored at -20 °C until assays. At the same time, a questionnaire including demographic and educational characteristics of the subjects was filled. The sera were tested for anti *Toxoplasma* IgM and IgG antibodies using *Toxoplasma* IgM and IgG ELISA kit [Dia-Pro, Milan, Italy]. The present study has been approved by Iran University of Medical Sciences Ethics Committee.

### 2.3 Statistical analysis

The chi-square test was used to analyze the data in SPSS version 13.0. Differences between variants were considered significant at  $p < 0.05$ .

### 3. Results

The overall seroprevalence of toxoplasmosis in pregnant women was 30% [120/400 cases]. IgG and IgM anti-*Toxoplasma* antibodies were positive in 116/400 cases [29%] and 4/400 cases [1%], respectively. The results, including seroprevalence data together with personal and demographic variables are detailed in Table 1. The proportion of seropositive women increased with increasing age, from 5% in  $\leq 20$  years old to 24.5% in  $> 30$  years old women [ $P = 0.026$ ]. 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 significant association with parasite seroprevalence rate. The surveyed pregnant women at their first, second and third gestational trimesters showed in distinctive rates of the *Toxoplasma* infection. The data of the above variables are epitomized in Table 1.

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

		Seropositivity		Seronegativity		P value
		N	%	N	%	
Age groups [yr]	$\leq 20$ years	20	5	148	37	0.026
	21-30 years	30	7.5	64	16	
	$> 30$ years	49	24.5	20	10	
Education	Illiterate	26	6.5	60	15	0.18
	High school	40	10	82	20.5	
	Diploma	25	12.5	42	21	
	University graduated	28	7	30	7.5	
Residence area	Urban	170	42.5	92	23	0.78
	Rural	96	24	42	10.5	
Gestational age	1st trimester	70	17.5	60	15	0.19
	2nd trimester	48	12	82	20.5	
	third trimester	40	10	100	25	
History of abortion	Yes	110	27.5	150	37.5	0.94
	No	45	11.25	95	23.75	

### 4. Discussion

Toxoplasmosis is a zoonotic disease. The prime invasion during pregnancy can lead to irreversible effects on fetus. This parasite is one of opportunistic infections in immunocompromised individuals. A 29% prevalence of chronic toxoplasmosis [IgG positive] and 1% recently acquired infections [IgM positive] during pregnancy were found in this study in accordance with weather and geological conditions of this area. In Iran, at least 30%-35% of people have been found seropositive for anti *T. gondii* in most regions [7]. Low level of education was associated with higher rate of toxoplasmosis [16, 17]. 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, 18]. Some other studies showed a significant descent in seropositivity as the level of the education increased [7, 13, 19]. In the present work, we found no statistical difference between seroprevalence of *T. gondii* and the residence areas, which is in accordance with other studies [7, 18, 20], but some studies showed higher seropositivity in urban than in rural regions [21, 22]. In addition, in the present research similar to the results of previous works no significant relationship was found among the seroprevalence of *T. gondii* infection and history of abortion in pregnant women. No significant association of the infection with gestational age was remarked [18, 23]. Women older than 30 years had a significantly higher seroprevalence [24.5%] compared to those who were 20 or less [5%] [ $P = 0.026$ ]. 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 infectious form of parasite. In studies conducted in Venezuela and Croatia, most people acquired the infection in age  $> 15$  years. In another research in twelve 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 peak age of acquisition in various regions could be because of different climate conditions, dissimilar nutritional and behavioural 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 obligates preventive programs from infection in these high risk age groups. In 1998 the researchers showed that infection in karaj district was %45.5 [24]. Increased knowledge through higher learning, instruction and its consequence on patterns of life and behaviours 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 [24-28]. Therefore, carrying out pre-marriage tests and training of the people, especially pregnant women is necessary. The measurement of the serial titration of these patients particularly in pregnant women should be done and undergone the antiparasitic treatments must be given. The results of this work confirm that the determination of the diagnostic toxoplasmosis is an essential test especially during pregnancy.

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