Original Article

Seroprevalence of *Toxoplasma gondii* Infection among Pregnant Women Admitted at Shahid Akbar Abadi Hospital, Tehran, Iran, 2010-2013

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Introduction: Toxoplasmosis, caused by *Toxoplasma gondii,* is a protozoan parasitic infection distributed worldwide. Early infection by this protozoa can lead to abortion and congenital toxoplasmosis in pregnant women. This study was conducted to determine the seroprevalence of *T. gondii* infection among pregnant women referring to Shahid Akbar Abadi Hospital, Tehran, Iran during 2010-2013. **Methods:** This descriptive study carried-out from October 2010 to March 2013. The blood samples from 785 pregnant women were collected and examined for specific IgG and IgM antibodies to *T. gondii* by ELISA method. **Results:** From 785 sera samples tested 541 (68.9%) were negative for any anti-*T. gondii* antibody. The women with anti-*T. gondii* positive and borderline IgG titers comprised 31.1% of the population study. *T. gondii* specific IgM was negative for all the pregnant women examined, and only for 6 women the titer showed to be at borderline. The rate of infection increased with age, as the highest rate of seropositivity (42.2%) was observed in 35-50 age group. However, no significant difference in the seroprevalence of *T. gondii* infection was observed between different age groups (P =0.139). **Conclusion:** As a considerable number of the pregnant women were negative for *T. gondii* antibodies and are prone to acquisition of acute *T. gondii* infection over the course of pregnancy, primary prevention measures and serological monitoring of seronegative pregnant women are important for preventing congenital toxoplasmosis. *J Med Microbiol Infec Dis, 2014, 2 (1): 16-18.*

Keywords: *Toxoplasma gondii*, Pregnancy, Seroprevalence, Iran.

INTRODUCTION

Toxoplasma gondii infection is one of the most common parasitic infections worldwide. It is caused by an obligate intracellular zoonotic protozoa, *T. gondii*, which infects warm-blooded animals including human. Members of cat family are the definitive hosts for this organism [1]. Human infection generally occurs by ingestion of tissue cyst in raw or undercooked meat or by ingestion of parasite oocytes shed in feces of cat that contaminate water and food sources. Congenital transmission is the other route of infection [2]. *T. gondii* infection in the majority of healthy and non-pregnant adults is usually asymptomatic or causes only mild symptoms, which develops as asymptomatic lifelong latent infection [1, 3].

The congenital toxoplasmosis normally occurs in children born to the women with no previous exposure to this parasite. The congenital transmission can result in serious health problems including sever damages to the fetus, *i.e.*, meningoencephalitis and hydrocephalus or even abortion and stillbirth [4].

Detection of anti- *T. gondii* IgG and IgM antibodies in the patient's sera is a routine screening method in epidemiological studies. IgM antibody response to *T. gondii* infection can be detected within a few days to one week following infection and disappears normally after three to five months [5, 6]. A negative test result for IgM antibody fundamentally excludes acute infection.

The IgG antibody response is detected within one to two weeks after infection, reaching to the highest point after four months, then declining to lower levels and residual positive for the lifetime [5]. A positive IgG test with a negative IgM indicates chronic *T. gondii* infection [1, 6].

Epidemiology investigations using serological methods are important for pregnant women and identification of susceptible individuals as they may acquire *T. gondii* infection over the course of pregnancy, leading to congenital toxoplasmosis in fetus.

Pervious serological studies in women in Iran indicated that toxoplasmosis was endemic in most areas, with seroprevalence rates ranging from 7-82% in the pregnant women and up to 78% in single women [7-10]. In Tehran, 7.1% of primiparous women had anti-*T. gondii* IgM antibodies and 34.4% were positive for IgG specific antibodies [11]. The rate of IgG seropositivity of pregnant women in another study in Aleshtar, Lorestan Province, was 36.2% in urban, and 44% in rural areas [12].

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The aim of the present study was to determine the prevalence of anti-*T. gondii* antibodies for pregnant women attending Shahid Akbar Abadi Hospital in Tehran, Iran. As a large number of pregnant women, especially from Tehran, refer to Shahid Akbar Abadi Hospital, results of this study may assist clinicians and health policy makers in preventing and control the *T. gondii* infection in Iran.

MATERIAL AND METHODS

This cross-sectional study was conducted in Shahid Akbar Abadi Hospital, Tehran from October 2010 to March 2013. Amounts of 5 ml of blood samples were collected from 785 pregnant women referred to the hospital and centrifuged at 3000 rpm for 10 min. The collected sera tested separately for IgG and IgM antibodies to *T. gondii* using ELISA kit (Pishtaz Teb, Iran). Absorbance was read at 450 nm using an automatic ELISA reader (Awareness, USA) and the obtained results were interpreted for IgG and IgM antibodies as recommended by the manufacturer: <0.9 IU/ml negative, 0.9-1.1 IU/ml borderline, >1.1 IU/ml positive. Demographic data, *i.e.,* age and medical history were recorded. Data analysis was carried out using Confidence intervals, Chi-square, and Fisher test in EPI Info software (version 3.3.2) with a probability value of ≤0.05 level of significance.

RESULTS

A total of 785 sera samples obtained from pregnant women were tested for anti-*T. gondii* specific IgM and IgG antibodies. The mean age of the women was 23.52 ±2.94 years. Among the studied participants, 541 (68.9%) women were negative for anti-*T. gondii* antibodies. The anti-*T. gondii* IgG titer was positive in 135 (17.2%) and at borderline in 109 (13.9%) women (95% Confidence intervals = 27.86 to 34.3%). Anti-*T. gondii* specific IgM titer was negative for all the pregnant women, except six who showed it at the borderline (1 person in ≤15, 1 in 15-25, 3 in 25-35 and 1 in 35-50 age groups). The table 1 shows distribution of IgG seropositivity for *T. gondii* infection. The highest rate of prevalence (42.2%) was seen in 35-50 age group and then in 25-35 age group (32.8%). The lowest seroprevalence rate was seen in ≤15 age group (19%). There was no significant difference in the seroprevalence of *T. gondii* infection in different age groups ($P \geq 0.18$). The distribution of antibody titer in pregnant women is shown in figure 1.

Table 1. Distribution of IgG seropositivity to *T. gondii* infection in different age groups of pregnant women

Age groups Year	Negative No (%)	Positive or Borderline No (%)	Total No (%)
≤15	17 (81)	4(19)	21(100)
15-25	330 (70.4)	139(29.6)	469 (100)
25-35	168 (67.2)	82(32.8)	250 (100)
35-50	26 (57.8)	19(42.2)	45 (100)
Total	541(68.9)	244(31.1)	785(100)

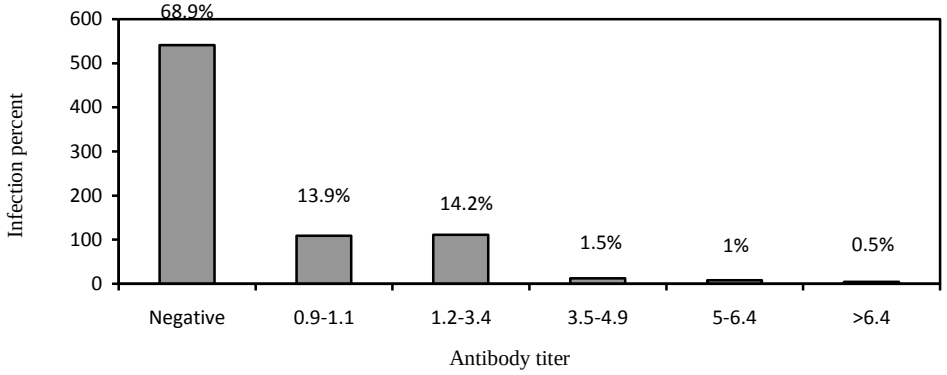


Fig. 1. Distribution of antibody titer in pregnant women attended at Shahid Akbar Abadi Hospital, Tehran, 2010-2013

DISCUSSION

The results from this study showed that the prevalence of anti-*T. gondii* IgG antibodies was 31.1% in pregnant women attending Shahid Akbar Abadi Hospital, Tehran, Iran. The results obtained in this study are important as in this region, there is a significant number of susceptible women (68.9%) who are prone to acquisition of acute *T. gondii* infection. If infection first contracted during pregnancy, *T. gondii* may be transmitted vertically by tachyzoites passed to the foetus via the placenta.

The rate of seropositivity samples from women contributed to the present study is concordant with the findings of other researchers on pregnant and unmarried women from other parts of Iran. The seropositivity rates for pregnant women from urban and rural areas of Aleshtar, Lorestan Province were 36.2% and 44%, respectively [12], 34.2% in Bandar-Abbas [13], 30.8% and 31.4% in urban and rural pregnant women of Khorram-Abad, Lorestan Province, respectively [14], and 33.5% in Hamadan city, Hamadan Province [15].

The comparison of seropositivity rates of pregnant women from other countries showed that the seropositivity rate found in this study was higher than those in Palestine (27.9%), China (12.3%), and Northern India (19.4%) [16-

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18], and lower than those found in France (47%), Albania (48.6%), Egypt (57.6%), Brazil (58.5%) and Turkey (50%) [19-23].

As in other similar studies [7, 9, 10] it was found that the seropositivity rate increased with age; this may be explained by the fact that older women have been exposed to infection for a longer period of time (24-26). However, in the current study, no meaningful statistical difference was observed between age and *T. gondii* seroprevalence. Although, this descriptive study included a large number of pregnant women, other studies should be conducted to follow up and measure the abortion rate or congenital toxoplasmosis among these women.

The data found from the current study leads to the conclusion that a considerable number of pregnant women are prone to acquisition of acute *T. gondii* infection over the course of pregnancy. This means that providing guidance to these women on primary prevention measures such as avoiding consuming raw or undercooked meat and keeping cats away from home, and monitoring their antibody titers during pregnancy can prevent congenital *T. gondii* infection.

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CONFLICT OF INTEREST

The authors do not have any conflict of interests.

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