

# Seroprevalence of Toxoplasmosis in Pregnant Women in Urmia, Iran

Zakieh Rostamzadeh Khameneh,<sup>1</sup> Haleh Hanifian,<sup>2,\*</sup> and Alireza Rostamzadeh<sup>3</sup>

<sup>1</sup>Faculty of Para Medical Sciences, Urmia University of Medical Sciences, Urmia, IR Iran

<sup>2</sup>Department of Parasitology and Mycology, School of Public Health, Tehran University of Medical Sciences, IR Iran

<sup>3</sup>Department of Cardiology, Seyyed-Al-Shohada Heart Center, Urmia University of Medical Sciences, Urmia, IR Iran

\*Corresponding author: Haleh Hanifian, Department of Parasitology and Mycology, School of Public Health, Tehran University of Medical Sciences, IR Iran. E-mail: haleh.hanifian@gmail.com

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## Abstract

**Background:** *Toxoplasma gondii* is an obligate intracellular parasitic protozoan, capable of infecting a wide range of warm-blooded hosts, including humans. Infection with *T. gondii* can be life threatening in immunocompromised people. Moreover, infection with *T. gondii* during pregnancy can lead to severe problems for fetus.

**Objectives:** This study was performed to evaluate the seroepidemiological status of toxoplasmosis in pregnant women in Urmia, Iran.

**Materials and Methods:** In this cross-sectional study, a total of 156 serum samples were selected randomly from pregnant females and their anti-*Toxoplasma* IgG and IgM antibodies were screened using routine commercial ELISA kits. The probable risk factors related to toxoplasmosis were asked and collected in pregnant women of Urmia.

**Results:** Of the 156 sera, 44 were positive for *T. gondii* IgG antibodies and 112 were negative. The mean age of women was 19.68 and the rate of IgM-positive cases for *T. gondii* infection was 2.6%.

**Conclusions:** According to our study, *Toxoplasma* regular screening program in pregnant women is strongly recommended, since a considerable number of pregnant women in our area are susceptible to infection with acute *T. gondii* over the course of pregnancy.

**Keywords:** Seroepidemiology, Toxoplasmosis, Enzyme-Linked Immunosorbent Assay, Iran

## 1. Background

*Toxoplasma gondii* is an obligate intracellular parasitic protozoan, capable of infecting a wide range of warm-blooded hosts, including humans. Infection with *T. gondii* has very different clinical signs in human, such as abortion and congenital eye disease (1). Toxoplasmosis is caused by the consumption of contaminated meat or being in contact or touch with cats which may pass oocytes through their feces (2).

The diagnosis of toxoplasmosis is extremely important in four groups of people: pregnant women who are infected during pregnancy, congenitally infected newborns, patients with chorioretinitis, and also immunocompromised people (3).

Therefore, if the mother is involved in infection during pregnancy, the infection can be transferred to the fetus. However, if the mother is infected before pregnancy, the infection will not be transferred to the fetus and the mother will acquire immunity against future infections of *Toxoplasma*. Several studies have been conducted on seroepidemiology of toxoplasmosis on pregnant women in Iran and other countries. The mean prevalence of toxoplasmosis in different districts of Iran has been reported about

35%. The reports indicate that the prevalence rate changes in different areas (4).

## 2. Objectives

There is very limited information about the rate of toxoplasmosis in pregnant women of west Azerbaijan, Iran. Therefore, we performed this study because of the need to determine the seroprevalence of *T. gondii* among pregnant women in Urmia, west Azerbaijan, and offer effective practices that to prevent toxoplasmosis in this group of people. Additionally, to perform a novel and more effective strategy for preventing congenital toxoplasmosis, latest seroepidemiological statics will be needed.

## 3. Materials and Methods

This study was performed from March to June 2014 in Urmia, north-west of Iran. In this study, the sample size was calculated considering a prevalence of 32%, a degree of precision of 4 (d = 0.04) and 95% confidence interval. In the limited time of sampling, we could collect 156 blood samples of pregnant women of our city. Our sampling was

among pregnant women who were referred to health centers in Urmia for routine exams of pregnancy. The women filled a questionnaire containing socio-demographic questions. Blood samples were collected and sera were separated by blood centrifugation at 2500 - 3000 rpm for 5 - 8 minutes and frozen at -20°C until use.

Anti - *T. gondii* IgG and IgM antibodies were tested with a commercial ELISA kit (Abcam, United Kingdom) according to the manufacturer's instructions and the absorbance was read at 450 nm using an automatic ELISA reader. Three different concentrations of standards were used to ensure that the kits and our procedures were reliable. The chi-squared test was used to analyze the data in SPSS software.

#### 4. Results

A total of 156 sera samples obtained from pregnant women were tested for anti - *T. gondii*-specific IgM and IgG antibodies. The mean age of the women was 19.68 years. IgG and IgM anti-*Toxoplasma* antibodies were positive in 44/156 cases (28.2%) and 4/156 cases (2.56%), respectively. No significant relationship was seen between toxoplasmosis and other tested factors.

#### 5. Discussion

This study revealed a seroprevalence of 28.2% (44/156) and 2.56% (4/156) for IgG and IgM antibodies against *T. gondii* in pregnant women in Urmia city, respectively. Our study showed that 28.2% of pregnant women were seropositive. This prevalence rate was less than the previous studies in Iran and geographically similar countries. However, IgM positivity rate was highly close to the results of other similar studies in Iran. For example, in a seroprevalence study on *T. gondii* infection among pregnant women in Mashhad, Iran, 144 of 419 cases were reported positive for *Toxoplasma* IgG antibodies, indicating a seroprevalence of 34.4% (5). The rate of seroprevalence of *Toxoplasma* IgG antibodies in Tehran, Iran was reported 42.2% in a 35 - 50 age group (6).

In another study in Ilam, Iran, of 553 pregnant women, 247 were positive for *T. gondii* IgG antibodies and 306 were negative. The mean age of women was 21 and the seropositivity rate of latent *T. gondii* infection was 44.8% (7).

Hajsoleimani et al. showed that anti - *Toxoplasma* IgM and IgG were positive in 1.4% and 37.2% of pregnant women, respectively. In their study, there was no significant relationship between the seroprevalence of *T. gondii* infection and socio-demographic factors (8).

In Zahedan, 30.8% of sera were positive for anti - *Toxoplasma* IgG and the highest rate of infection was found

in uneducated women (44.4%). Sharifi et al. found a significant correlation between education status, unwashed/unpeeled vegetables and seropositivity ( $P < 0.05$ ) (9).

In a similar study in Hamadan performed by Maghsood et al. from 350 pregnant women 30% had anti - *Toxoplasma* IgG and 2.9% were positive for IgM (10).

Another study in Tehran showed interesting results; among 300 studied sera, 28.3% were positive for IgG, 1.3% for IgM, and 1% for both (11). In Babol, Iran, 60.6% of pregnant women had anti - *Toxoplasma* antibodies (IgG) and 36.6% were seronegative (12).

The seroprevalence of toxoplasmosis in Iranian pregnant women differs from 54.2% in Kashan (13) and 48.3% in Rafsanjan (14) to 20.1% in Isfahan (15) and 19.2% in Sabzevar (16).

The seroprevalence rate of infection in the world is also very different. The prevalence of infection in other countries includes 42.47% in Malaysia (17), 30.1% in Turkey (18), and 7.01% in China (19).

According to our study, a considerable number of pregnant women in our area were susceptible to infection of acute *T. gondii* during pregnancy. Therefore, toxoplasmosis regular screening program in pregnancy and pre-marriage tests are strongly recommended. Considering preventive methods such as avoiding consuming raw or undercooked meat and keeping cats away from home could also be very helpful.

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#### Footnote

**Authors' Contribution:** Zakieh Rostamzadeh Khameneh and Alireza Rostamzadeh developed the original idea and the protocol and was the guarantor. Haleh Hanifian abstracted and analyzed the data and wrote the manuscript.

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