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# Seroprevalence of Toxoplasmosis Among Pregnant Women in Kayseri

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**Abstract**

**Objective:** In the present study, we aimed to determine the seroprevalence among pregnant women at risk for taxoplasmosis in Kayseri and contribute to the management of toxoplasmosis in antenatal follow-up of pregnant women in Turkey.

**Methods:** Toxoplasma IgM antibodies were investigated in 1813 pregnant women, 46 (2.5%) of whom were detected to be positive. Toxoplasma IgG antibodies were investigated in 1676 pregnant women, 568 (33.9%) of whom were found to be positive . Regarding the age-related analysis of pregnant women, toxoplasma gondii IgG positivity was observed to increase with age.

**Results:** he results obtained in pregnant women aged between 16-45 years, who were referred to Kayseri Maternity Hospital from January 2006-December 2008, were examined retrospectively for toxoplasmosis. Levels of Toxoplasma gondii specific IgG and IgM were determined by microparticle EIA (Axsym, Abbott, USA) technique.

**Conclusion:** Because of being seronegative for toxoplasma, more than 60% of pregnant women are at risk for toxoplasmosis. Toxoplasma serology and serological surveillance should be performed during obstetrical follow-up of all pregnant women. It is also of high importance to educate seronegative pregnant women about protection from infection.

**Keywords:** Pregnancy, seroprevalence, toxoplasmosis.

*Kayseri'deki gebelerde Toksoplasmoz seroprevalansı*

**Amaç:** Bu çalışmada, Kayseri bölgesinde toksoplasmoz açısından risk altındaki gebelerin seroprevalansının saptanması ve ülkemizde gebelerin antenatal takibinde toksoplasmoz yönetimine katkıda bulunmak amaçlanmıştır.

**Yöntem:** Ocak 2006-Aralık 2008 tarihleri arasında Kayseri Doğumevi'ne başvuran 16-45 yaş aralığındaki gebelerin sonuçları toksoplasmoz yönünden retrospektif olarak araştırılmıştır. Toksoplasma Ig G ve Toksoplasma Ig M değerleri mikropartikül EIA(Axsym, Abbott, USA) yöntemiyle çalışılmıştır.

**Bulgular:** Toksoplasma IgM 1813 gebede çalışılmış, 46 (%2.5)'sında pozitiflik saptanmıştır. Toksoplasma IgG 1676 gebede çalışılmış, 568 (%33.9)'inde pozitiflik saptanmıştır. Gebeler yaş gruplarına göre incelendiğinde, toksoplasma IgG pozitifliğinin yaşla arttığı görülmüştür.

**Sonuç:** Gebelerin %60'dan fazlası seronegatif olduğundan toksoplasmoz açısından risk altındadır. Tüm gebelerin gebelik takibinde Toksoplasmoz serolojilerinin saptanması ve takibi gereklidir. Seronegatif gebelerin enfeksiyondan korunmaları için eğitim verilmesi önem taşımaktadır.

**Anahtar Sözcükler:** Gebelik, seroprevalans, toksoplasmoz.

## Introduction

Toxoplasmosis is a worldwide multi-system infection caused by the protozoan parasite Taxoplasma gondii, which can infect all vertebrates.[1]

The infection follows a 90% asymptomatic course in healthy adults and leaves a life-long immunity. The transmission of the infection to human occurs mainly through raw or rare meat infected with the the tissue cysts, as well as raw

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foods and water contaminated with oocytes.[2] Trophozoites are known to play a major role in the transmission from infected mother to child. Additionally, the infection may also be transmitted through blood transfusion and tissue transplantation from a donor with toxoplasmosis.[3,4]

Toxoplasmosis during pregnancy can lead to not only preterm birth , stillbirth or miscarriage but congenital toxoplasmosis with potentially severe consequences.[1]

Congenital toxoplasmosis occurs as a consequence of placental transmission of the parasite to the fetus after a primary or recurrent parasitemia during pregnancy. In pregnant women with untreated acute infections, the risk of congenital fetal infection was detected to be 25% in the first trimester, 54% in the second trimester, and 65% in the third trimester.[5] This rate exceeds 90% during the last two weeks of pregnancy. Due to increased placental surface area and placental blood flow, the risk of infection increases in direct proportion to the duration of the pregnancy; however, the rate of occurrence of severe sequels is directly proportional to the infection in early gestational weeks.[6,2]

90% of infants with congenital toxoplasmosis are asymptomatic during neonatal period. In time, serious conditions such as cataract, glaucoma, hepatitis, pneumonia, myocarditis, myocyte and mental retardation in addition to hydrocephaly characterized by a classic triad of symptomatic congenital toxoplasmosis, intracranial calcifications and chorioretinitis are observed. To prevent these life-threatening sequels which have a significant effect on the quality of life, antenatal treatment as well as screening and follow-up pregnant women for toxoplasmosis are of great importance.[7]

In the present study, we aimed to determine seroprevalence among pregnant women at risk for toxoplasmosis and contribute to the management of toxoplasmosis in antenatal follow-up of pregnant women.

## Methods

The results obtained in pregnant women aged between 15-45 years who were referred to Kayseri Maternity Hospital between January 2006 and December 2008, were examined retrospectively for toxoplasmosis. Levels of Taxoplasma gondii-specific IgG and IgM that are routine antenatal screening tests in asymptomatic pregnant women, were determined using microparticle EIA (Axsym, Abbott, USA) technique. IgM index values of ≥0.600 were defined as positive, values between 0-0.499 as negative and those between 0.500- 0.599 as equivocal . IgG index values of ≥3.00 IU/ml were defined as positive, values between 0-1.99 IU/ml as negative and those between 2.00-2.99 IU/ml as equivocal. Of over 3000 registered patients in the hospital database, those aged between 15-45 years were selected and recurrent cases were excluded. Data from 1813 patients were collected for Toxoplasma IgM and data from 1676 patients for Toxoplasma IgG and entered into SPSS version 17.0 for Windows for the statistical analysis.

## Results

Toxoplasma IgM antibodies were investigated in 1813 pregnant women, 46 (2.5%) of whom were detected to be positive. In 16 (0.9%) patients, IgM values were found to be between 0.5 and 0.599 and defined as equivocal. Toxoplasma IgM antibodies were reinvestigated in these patients three weeks later, which however, was not included in the study. In 36 of 46 pregnant women who were positive for toxoplasma IgM antibodies, Toxoplasma IgG was also found to be positive.

Since only IgM is evaluated in acute infection assays in several pregnancy follow-up studies, the number of patients in whom Toxoplasma IgG antibodies were investigated was smaller than that in whom Toxoplasma IgM antibodies were measured and Toxoplasma

IgG antibodies were investigated in 1676 cases, 568 (33.9%) of whom were detected to be positivite.

When 1676 pregnant women in whom Toxoplasma IgG antibodies were investigated, were evaluated after being divided into 3 age groups, IgG positivity was determined as 28.1% in those aged between 15-25 years, 35.2% in those between 26-35 years, increasing up to 46.7% in those between 36-45 years (Table 1).

**Table 1.** Toxoplasma gondii IgG positivity according to age in pregnant women.

| Age | The number of pregnant women | Positive |
|---|---|---|
| 15-25 | 622 | 175 (28.1%) |
| 26-35 | 859 | 302 (35.2%) |
| 36-45 | 195 | 91 (46.7%) |
| Total | 1676 | 568 (33.9%) |

## Discussion

Seroprevalence of toxoplasmosis varries throughout the world depending on age, socioeconomic conditions, eating and hygiene habits, climate and geographic location. The infection is more common in societies with low socioeconomic level, lack of hygiene during feeding and frequent contact with soil and cats. The seroprevalence increases with age.[8]

Table 2 and 3 present the rates of Toxoplasma gondii IgG positivity obtained from studies on pregnant women and women of reproductive age in Turkey and in the world.

The rates of Toxoplasma IgG gondii positivity in pregnant women and women of reproductive age vary across countries and regions througout the world. Similarly, regional differences manifest themselves in rates for our country.

In the present study, seroprevalence of toxoplasmosis was found to be 33.9% in pregnant women, which is consistent with other results obtained in Turkey. However, this rate is lower when compared to those obtained in particularly Hatay and Şanlıurfa, which is considered to be caused by cultural differences in eating habits.

When 1676 pregnant women who were screened for Toxoplasma IgG antibodies, were evaluated after being divided into 3 groups according to their ages, it was observed that the seropositivity increased in direct proportion to the age.

In the present study, because of being seronegative for toxoplasma, more than 60% of pregnant women are at risk for toxoplasmosis. These pregnant women should be given education about the transmission of toxoplasmosis and ways to protect against the infection.

In the present study, IgM positivity was found to be 2.5%. However, false-positive results may be obtained in IgM testing and the

**Table 2.** Toxoplasma IgG positivity (%) in women of reproductive age.

| In other countries(9) | | In Turkey | |
|---|---|---|---|
| Spain, 2000 | 43.8 | Ankara, 2002[10] | 31.7 |
| Indonesia, 2003 | 60 | Şanlıurfa, 2007[11] | 69.5 |
| Netherlands, 2004 | 35.2 | Isparta, 2008[12] | 25.2 |
| Brasil, 2004 | 51.2 | Malatya, 2008[13] | 32.5 |
| USA, 2007 | 11 | | |
| Switzerland, 2007 | 8.2 | | |
| İran, 2007 | 63.9 | | |
| Greece, 2008 | 21.2 | | |
| Romania, 2008 | 57.6 | | |

**Table 3.** Toxoplasma IgG positivity (%) in pregnant women

| In other countries | | In Turkey | |
|---|---|---|---|
| Argentina, 2003[9] | 48.7 | Ankara, 2001(14) | 38.1 |
| Britain, 2005[9] | 9.1 | Sivas, 2002(15) | 46.6 |
| Brasil, 2006[9] | 61.1 | Şanlıurfa, 2004(16) | 60.4 |
| Switzerland, 2006[9] | 35 | Afyonkarahisar, 2004(17) | 30.7 |
| Mexico, 2006[6] | 6.1 | Aydın, 2005(18) | 30.1 |
| Morocco, 2007[9] | 50.6 | Hatay, 2007(19) | 52.1 |
| India, 2007[9] | 45 | Van, 2009(20) | 36 |
| Poland, 2008[21] | 55.5 | Kocaeli, 2009(22) | 48.3 |
| Colombia, 2008[23] | 45.8 | **Kayseri (This study)** | **33.9** |
| France, 2009[24] | 43.8 | | |
| Albania, 2009[25] | 48.6 | | |
| China, 2009[26] | 10.6 | | |

positivity may continue for nearly a year. Therefore, IgM positivity does not always predict an acute infection whereas IgM negativity does not exclude the infection because of the fact that IgM positivity may not be detected at the onset of the infection or when tested at the late stage of pregnancy, the result might have become negative although the mother had been infected during the pregnancy. For this reason, IgG avidity test in addition to IgM and IgG antibody testing should be performed in the first trimester of pregnancy. High avidity results, particularly, are suggested to represent the acquisition of the infection at least 3-5 months ago.[15,27]

Since the diagnosis of toxoplasmosis is established when a pregnant women who is seronegative for toxoplasmosis prior to the pregnancy becomes positive during the pregnancy, a basal serologic test should be performed before a planned pregnancy.

## Conclusion

Toxoplasmosis is of critical importance because of leading to serious complications when acquired as primary infection during pregnancy. In examinations of women of reproductive age before and after pregnancy, serologic tests for toxoplasmosis should be performed, which should be followed by required treatments and follow-up according to the obtained result. Pregnant women who have not been infected with t. gondii, should be educated about protection methods.

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