

Investigation of toxoplasma, cytomegalovirus and rubella seroprevalence in pregnant women admitted to our hospital

Yusuf Madendağ¹, Mefkure Eraslan Şahin², İlknur Çöl Madendağ¹, Erdem Şahin²,
Gökhan Açmaz³, İptisam İpek Müderris³

¹Gynecology and Obstetrics Clinic, Kayseri Training and Research Hospital, Health Sciences University, Kayseri, Turkey

²Gynecology and Obstetrics Clinic, Sivas Şarkışla State Hospital, Health Sciences University, Sivas, Turkey

³Department of Gynecology and Obstetrics, Faculty of Medicine, Erciyes University, Kayseri, Turkey

Abstract

Objective: The aim of the study is to evaluate serologically the positivity of toxoplasma, rubella and cytomegalovirus (CMV) infections in pregnant women who admitted to the Gynecology and Obstetrics Clinic of a Training and Research Hospital, and to investigate the necessity of the screening for the current region.

Methods: Serological results of pregnant women who were between 18 and 45 years old, at their first trimesters and admitted to the Gynecology and Obstetrics Clinic of Kayseri Training and Research Hospital between January 1, 2017 and January 1, 2018 were evaluated retrospectively in terms of *Toxoplasma gondii*, CMV and rubella infections. Anti-toxoplasma IgM, anti-toxoplasma IgG, anti-CMV IgM, anti-CMV IgG, anti-rubella IgM and anti-rubella IgG results of the pregnant women were evaluated. The serum samples collected from the patients were centrifuged for 15 minutes at 10,000 rpm and analyzed by ELISA method.

Results: The records of a total of 10,200 patients were accessed. We found in our study that anti-CMV IgM positivity was 0.2% and anti-CMV IgG positivity was 98.2%, anti-toxoplasma IgM positivity was 1% and anti-toxoplasma IgG positivity was 28.9%, anti-rubella IgM positivity was 0.59% and anti-rubella IgG positivity was 97.3%.

Conclusion: The results of our study are consistent with many seroprevalence studies carried out in Turkey. Considering the high seronegativity rates of toxoplasma found for our region, we recommend the investigation of the immune condition of pregnant woman in the first gestational visit in terms of toxoplasma, and providing necessary health training if the results are seronegative. It should be the primary purpose to make individuals immune before the reproductive period by maintaining vaccination programs for rubella infection which is an approach of higher priority than the gestational screening to prevent congenital rubella syndrome. Considering the high rate of CMV IgG seroprevalence in the pregnant women of our region, routine serological screening seems unnecessary.

Keywords: Cytomegalovirus, rubella, *Toxoplasma gondii*, TORCH seroprevalence.

Özet: Hastanemize başvuran gebelerde toksoplazma, sitomegalovirüs ve rubella seroprevalansının araştırılması

Amaç: Çalışmanın amacı bir Eğitim ve Araştırma Hastanesi Kadın Hastalıkları ve Doğum Kliniğine başvuran gebelerde toksoplazma, rubella (kızamıkçık) ve sitomegalovirüs (CMV) grubu enfeksiyonların serolojik olarak pozitifliğini değerlendirerek mevcut bölge için taramanın gerekliliğini araştırmaktır.

Yöntem: Çalışma, Kayseri Eğitim ve Araştırma Hastanesi Kadın Hastalıkları ve Doğum Kliniğinde, 01/01/2017-01/01/2018 tarihleri arasında başvuran, 18-45 yaş arasında ve birinci trimesterlerinde bulunan gebelerin *Toxoplasma gondii*, CMV ve rubella enfeksiyonları açısından serolojik sonuçlarının retrospektif olarak değerlendirilmesi ile yapıldı. Gebelerin anti-toksoplazma IgM, anti-toksoplazma IgG, anti-CMV IgM, anti-CMV IgG, anti-rubella IgM ve anti-rubella IgG sonuçları değerlendirildi. Hastalardan alınan serum örnekleri 10.000 rpm hızda 15 dakika santrifüj edilerek ELISA yöntemi ile analiz edildi.

Bulgular: Toplam 10.200 hasta bilgisine ulaşıldı. Çalışmamızda anti-CMV IgM pozitifliğini %0.2 ve anti-CMV IgG pozitifliğini %98.2; anti-toksoplazma IgM pozitifliğini %1 ve anti-toksoplazma IgG pozitifliğini %28.9; anti-rubella IgM pozitifliğini %0.59 ve anti rubella IgG pozitifliğini %97.3 olarak tespit ettik.

Sonuç: Çalışmamızın sonuçları, Türkiye genelinde yapılan pek çok seroprevalans çalışması ile uyumludur. Bölgemizdeki toksoplazma için saptanan yüksek seronegatiflik oranları göz önüne alındığında, gebelik takibinde ilk vizitte gebe kadının toksoplazma yönünden immun durumunun tetkik edilmesini ve seronegatif ise gerekli sağlık eğitiminin verilmesini önermekteyiz. Konjenital kızamıkçık sendromunu önlemede gebelikte yapılacak taramadan daha öncelikli yaklaşım olarak kızamıkçık enfeksiyonu için aşılama programlarına devam ederek bireylerin reproduktif dönemden önce bağışık hale gelmelerini sağlamak ön planda olmalıdır. Bölgemiz gebelerinde CMV IgG seroprevalansının yüksek olması göz önüne alındığında, CMV için rutin serolojik tarama gereksiz gibi görünmektedir.

Anahtar sözcükler: TORCH seroprevalansı, *Toxoplasma gondii*, rubella, sitomegalovirüs.

Correspondence: Yusuf Madendağ, MD. Clinic of Obst. & Gyn., Kayseri T&R Hospital, Health Sciences University, Kayseri, Turkey. e-mail: yusufmadendag@gmail.com

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Introduction

Since the infections of *Toxoplasma gondii*, cytomegalovirus (CMV) and rubella groups have a clinical impact on fetus similar to the gestational primary infections, they should be evaluated together during pregnancy.^[1] Although current infections are often undergone asymptotically, they may cause perinatal morbidity and mortality by resulting in fetal congenital malformations particularly during the first trimester of pregnancy.^[2]

The routine screening of this group of infections during pregnancy is still controversial while there are studies arguing to perform the screening according to the seropositivity rate especially on the site of infection.^[1,3,4] It is known that seropositivity varies according to the regions in many studies performed in different regions of Turkey, and that it is given particular importance among different countries.

The aim of this study is to evaluate serologically the positivity of *Toxoplasma gondii*, CMV and rubella infections in the Gynecology and Obstetrics Clinic of Kayseri Training and Research Hospital, which is a tertiary center and receives approximately 12,000 new pregnant women annually, and to investigate the necessity of the screening for the current region.

Methods

In this study, the serological results of pregnant women who were between 18 and 45 years old, at their first trimesters and admitted to the Gynecology and Obstetrics Clinic of Kayseri Training and Research Hospital between January 1, 2017 and January 1, 2018 were evaluated retrospectively in terms of *Toxoplasma*

gondii, CMV and rubella infections. The approval of ethic committee of Erciyes University was obtained for the study, and all steps of the study were performed in accordance with Helsinki Declaration.

Anti-toxoplasma IgM, anti-toxoplasma IgG, anti-CMV IgM, anti-CMV IgG, anti-rubella IgM and anti-rubella IgG results of the pregnant women were evaluated. The serum samples collected from the patients were centrifuged for 15 minutes at 10,000 rpm and analyzed by ELISA test. While <0.5 was considered index negative and ≥ 0.6 U/ml index positive for toxoplasma IgM, and <1.6 was index negative and ≥ 3.0 U/ml was index positive for toxoplasma IgG; <1.2 U/ml was index negative and ≥ 1.6 U/ml was index positive for rubella IgM, and <5 U/ml was index negative and ≥ 10 U/ml was index positive for rubella IgG; <0.85 U/ml was index negative and ≥ 1 U/ml was index positive for CMV IgM, and <6 U/ml was index negative and ≥ 6 U/ml was index positive for CMV IgG.

Results

The records of a total of 10,200 patients were accessed. In the study, the mean age of the pregnant women was 25.4 ± 4.1 (range: 18 to 45) years, and the mean number of pregnancy was 2.1 ± 1.3 . We found in our study that anti-CMV IgM positivity was 0.2% and anti-CMV IgG positivity was 98.2%, anti-toxoplasma IgM positivity was 1% and anti-toxoplasma IgG positivity was 28.9%, anti-rubella IgM positivity was 0.59% and anti-rubella IgG positivity was 97.3%. The results of anti-toxoplasma IgM, anti-toxoplasma IgG, anti-CMV IgM, anti-CMV IgG, anti-rubella IgM and anti-rubella IgG of the pregnant women evaluated in the study are shown in **Table 1**.

Table 1. The distribution of *Toxoplasma gondii*, cytomegalovirus and rubella infections of the pregnant women during the first trimester.

	Number of negative patients n (%)	Number of positive patients n (%)	Total
Anti-toxoplasma IgM	10,098 (99%)	102 (1%)	10,200
Anti-toxoplasma IgG	7253 (71.1%)	2947 (28.9%)	10,200
Anti-rubella IgM	10,139 (99.41%)	61 (0.59%)	10,200
Anti-rubella IgG	276 (2.7%)	9924 (97.3%)	10,200
Anti-CMV IgM	10,180 (99.8%)	20 (0.2%)	10,200
Anti-CMV IgG	183 (1.8%)	10,017 (98.2%)	10,200

Discussion

In our study, we investigated serologically the positivity of *Toxoplasma gondii*, CMV and rubella infections of pregnant women who admitted to the Gynecology and Obstetrics Clinic of Kayseri Training and Research Hospital between 2017 and 2018 during the trimester of their pregnancies. In our study, anti-CMV IgM positivity was 0.2% while anti-CMV IgG positivity was 98.2%. In similar studies carried out in Turkey, CMV IgG seropositivity was found between 84% and 98%.^[1,4,5] Our result is consistent with other regions. As known, prevalence of gestational primary CMV infection varies depending on the geographical region, ethnic origin and socioeconomical status.^[6] There are also different studies reporting the incidence of primary CMV infection between 0.7% and 4% among seronegative pregnant women.^[7]

CMV is the most common congenital infection complicating 0.2–2.2% of all newborns.^[7,8] In up-to-date study bulletins, it is estimated that the annual cost to treat permanent dysfunctions and complications caused by CMV infection is more than 1.86 billion USD in the USA.^[9] Although routine screening is not recommended for primary CMV infection,^[10] routine screening of pregnant women during their first trimester periods can be recommended considering the fact that the risk of fetal transmission is about 30–40% in the presence of CMV infection.

In our study, we found anti-toxoplasma IgM positivity 1% and anti-toxoplasma IgG positivity 28.9%. In similar studies carried out in Turkey, anti-toxoplasma IgG seropositivity was found between 28% and 60%.^[1,4,5] Our result is consistent with other regions. While the vertical transmission rate of *Toxoplasma gondii* is 10–15% during the first trimester, it is 25% during the second trimester, and more than 60% during the third trimester.^[11,12] The severity of fetal infection depends on the week of gestation at transmission time, and the severity of the disease will increase as the fetus is infected earlier.^[11,12]

According to the up-to-date study bulletins, routine screening is not recommended for pregnant women in terms of *Toxoplasma gondii* infection, and it is recommended to limit the screening with women whose immune systems are weak or who are positive for human immunodeficiency virus (HIV).^[9] The results of our study show that the rate of anti-*Toxoplasma gondii* IgG

negativity is 71.1% (7253 pregnant women) for the last year, and it can be said that all these pregnant women are under risk in terms of *Toxoplasma gondii* infection. We believe that screening pregnant women in terms of *Toxoplasma gondii* infection should not be planned for all cases but should be planned according to the seroprevalence values both among the countries and in relatively smaller regions.

In our study, anti-rubella IgM positivity was 0.59% and anti-rubella IgG positivity was 97.3%. In similar studies carried out in Turkey, anti-rubella IgG seropositivity was found between 90% and 99%.^[1,4,5] Our result is consistent with other regions. While rubella is a mild viral infection seen typically during childhood, primary infection developing during pregnancy results in with congenital rubella syndrome.^[9] When analyzing the results of our study, we saw that the majority of the pregnant women were immune to rubella infection. It should be the primary purpose to make individuals immune before the reproductive period by maintaining vaccination programs for rubella infection which is an approach of higher priority than the gestational screening to prevent congenital rubella syndrome.

Conclusion

Although the routine screenings of *Toxoplasma gondii*, rubella and CMV infections are not recommended during the pregnancy, it is controversial around the world. The results of our study are consistent with many seroprevalence studies carried out in Turkey.

Considering the high seronegativity rates of toxoplasma found for our region, we recommend the investigation of the immune condition of pregnant woman in the first gestational visit in terms of toxoplasma, and providing necessary health training if the results are seronegative. It should be the primary purpose to make individuals immune before the reproductive period by maintaining vaccination programs for rubella infection which is an approach of higher priority than the gestational screening to prevent congenital rubella syndrome. Considering the high rate of CMV IgG seroprevalence in the pregnant women of our region, routine serological screening seems unnecessary.

Conflicts of Interest: No conflicts declared.

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