

Seroprevalence of Major Viral Pathogens during Pregnancy: A Multicenter Study in Turkey

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Abstract

Causes of death in newborn and pregnant women vary by country and are largely related with availability and quality of health care. Rubella, CMV and HSV-II infections which have located in TORCH acronym are a major cause of morbidity and mortality in the neonatal age. Perinatal outcomes from viral infections during pregnancy can range from no effect to pregnancy loss by spontaneous abortion to fetal infection with resulting congenital viral syndromes. The seropositivity values for anti-rubella IgM, anti-rubella IgG, anti-CMV IgM, anti-CMV IgG, anti HSV-II IgM and anti HSV-II IgG were tested with enzyme immunoassay (EIA) method.

Seropositivity rates of IgM and IgG for rubella and CMV were found in the range of 0.6-1.6% and 76-96.4%, 0.2-3.7% and 87.8-100% respectively. Seropositivity rates of IgM for HSV-II, studied in two regions, were 1.3% and 1.7%; seropositivity rates of IgG for HSV-II in these two regions were 4.2%. Rubella and CMV IgM seroprevalence values of study were found high for in all regions but HSV-II seroprevalence was at low values. High seropositivity rates for rubella and CMV in Turkey indicate that most of the women were infected with these viruses before child-bearing age. This study includes data that belongs to seven diverse areas. Because of Turkey's wide geographical structure and significant differences between regions as socioeconomic, it is important to determine the seropositivity of viral agents in pregnant women living in different regions.

Keywords: Cytomegalovirus; Rubella; Herpes simplex virus type II; Pregnancy; Seroprevalence

Background

Primary or recurrent infections of Rubella, CMV and HSV-II often lead to mild or asymptomatic infection in the mother. However, in pregnancy they may result in serious congenital malformation, congenital growth retardation, and even death of the fetus. There is strong epidemiologic evidence that pregnant women are at higher risk of severe illness and mortality from viral infections, The recent viral epidemics and pandemics show how pregnant women suffer worse outcomes than the general population and non pregnant women [1,2]. During pregnancy; the risk of congenital infection following maternal primary infection is higher than following recurrent infection [3].

Rubella infection of pregnant women can have very serious consequences due to transplacental infection of the fetus, causing first trimester miscarriages and severe fetal malformations known as rubella congenital syndrome [4]. The frequency of the infection has decreased with the application of rubella vaccine [5,6]. Even though rubella infection can be prevented by vaccination, it is considered as the most potent teratogenic agent and has still great importance because not all pregnant women are immune to rubella. Certain populations are not immunized because they are missed, refuse immunization, or come from countries where rubella vaccination is not part of the routine immunization program. So active infection during pregnancy can affect the fetus with high probability [1,7].

CMV is the most frequent cause of congenital infection such that 0.2- 2.5% of all newborns are infected by CMV at birth [8]. Infection is more prevalent in underdeveloped countries and among lower socioeconomic groups in developed countries. Although most of congenitally infected infants are asymptomatic at birth, congenital CMV infection is a leading cause of sensorineural hearing loss, mental retardation, and neurologic deficits [8,9].

HSV-II, although extremely rarely the cause of a congenital infection, can infect the newborn during vaginal delivery with poor health [10,11]. Congenital HSV-II infection may lead to external infection of the newborn skin, eyes and mouth as well as causing serious central nervous system infections or disseminated infection involving several organs such as the brain, liver and lungs [12].

In this study, we aimed to evaluation the seroprevalence of rubella virus, CMV and HSV-II in pregnant women in seven regions retrospectively resembling Turkey and to determine ratio in Turkish population.

Objectives

The aim of this cross sectional study was determine the prevalence of cytomegalovirus (CMV), herpes simplex virus (HSV) and rubella virus in pregnant women in seven

different regions retrospectively resembling Turkey and to determine ratio in Turkish population.

Materials/ Patients and Methods

This is a laboratory based study. All patients were chosen who were applied to the clinics of obstetric and gynecological department during antenatal screening. The seropositivity values for anti-rubella IgM, anti-rubella IgG, anti-CMV IgM, anti-CMV IgG, anti HSV-II IgM and anti HSV-II IgG were tested with enzyme immunoassay (EIA) method. While anti-rubella IgM and IgG were studied in six regions of all, anti-HSV-II IgM and IgG were studied in only two regions. All regions have data of anti-CMV IgM and IgG. All databases which included, specimen sources and patient information, were carefully recorded from hospital information management systems. Five of these regions have included results between 1 January and 31 December 2012, the other one has included results between 1 January and 31 December 2013, the last region has results between April 2009 and April 2013. All data were analyzed using Medcalc 12.2 (MedCalc Software, Belgium).

Results

Seropositivity rates of IgM and IgG for rubella were found in the range of 0.6-1.6% and 76-96.4% retrospectively. Seropositivity rates of IgM and IgG for CMV were found in the range of 0.2-3.7% and 87.8-100% retrospectively. Seropositivity rates of IgM for HSV-II, studied in two regions, were 1.3 % and 1.7%; seropositivity rates of IgG for HSV-II were also 4.2% (Table 1).

Discussion

Rubella, CMV and HSV-II could be an important factor of pregnancy and their complications may influence maternal and fetal health. The epidemiology of these infections in women of reproductive age is certainly an important variable in the clinical approach to these problems [13]. In this study the immune status of rubella, CMV and HSV-II infections were reviewed for seven region of Turkey.

In our country, previous studies have shown different results for rubella seroprevalence, probably because of different study populations, age of participants or laboratory methods. But in most of the previous studies from Turkey, rubella Ig G seropositivity was reported over 90% [14-17]. Similarly in this study all regions except Ordu have over 90% seroprevalence rate for rubella. The lowest rate (76%) of rubella IgG seropositivity was detected in Ordu region. But rubella seroprevalence was reported as 76.5% in Mardin[18], 76.6 % in Trakya[19], 66.9% in Kirikkale[20] similar to Ordu region.

Table 1: Results of antibodies to rubella, CMV and HSV-II in seven different regions

Regions in	Date	Rubella IgM		Rubella IgG		CMV IgM		CMV IgG		HSV II IgM		HSV II IgG	
		Total cases	Positive cases (%)	Total cases	Positive cases (%)	Total cases	Positive cases (%)	Total cases	Positive cases (%)	Total cases	Positive cases (%)	Total cases	Positive cases (%)
Turkey													
Afyon	1Jan-31Dec 2012	422	7 (%1.6)	422	398 (%94.3)	422	2 (%0.5)	422	410 (%97.1)	422	7 (%1.7)	422	18 (%4.2)
Erzincan	1Jan-31Dec 2012	1031	16 (%1.56)	1031	980 (%95.1)	1031	38 (%3.7)	1031	1016 (%98.6)	-	-	-	-
Konya	1Jan-31Dec 2012	960	8 (%0.8)	960	926 (%96.4)	960	17 (%1.8)	960	922 (%96)	960	12 (%1.3)	960	40 (%4.2)
Ordu	1Jan-31Dec 2013	546	5 (%0.9)	546	415 (%76)	546	1 (%0.2)	546	479 (%87.8)	-	-	-	-
Sakarya	1Jan-31Dec 2012	154	1 (%0.6)	154	146 (%95)	154	2 (%1.1)	154	154 (%100)	-	-	-	-
Sivas	April 2009- April 2013	-	-	-	-	871	29 (%3.3)	871	871 (%100)	-	-	-	-
Van	1Jan-31Dec 2012	4410	21 (%0.5)	118	111 (%94.1)	4075	117 (%2.9)	113	113 (%100)	-	-	-	-

Jan: January Dec: December -: Not carry out

But rubella seroprevalence was reported as 76.5% in Mardin[18], 76.6 % in Trakya[19], 66.9% in Kırkkale[20] similar to Ordu region. Seropositivity rates of IgM for rubella were found between 0.6-1.6% and this is consistent data with the literature in Turkey. The prevalence of antibodies for those agents in pregnant women differs based on geographic area and socioeconomic status [14]. Rubella is a systemic disease that can be prevented by vaccination. Rubella vaccine has been included in the national vaccination program in Turkey since September 2006. The necessity of rubella vaccination in the childbearing age group remains controversial because of high seroprevalence rate in our country. But the vaccination should be performed in all seronegative women before planning pregnancy for preventing the fetal anomalies [21,22].

CMV infections are closely related to the level of community. CMV infects 60% of women of childbearing age in developed countries and 90% in developing countries. The remaining 40% of women in developed countries (such as the United States) are susceptible to infection [23]. CMV infections are highly associated with poor hygienic conditions. Therefore, hygiene information has a positive impact and could significantly reduce the incidence of maternal CMV infection during pregnancy for seronegative patients [24]. In this study, seropositivity rates of IgG for CMV were found in the range of 87.8%-100%. Seroprevalence of CMV was 100% in three of seven regions. Previous studies from different locations of Turkey showed CMV seroprevalence rate in the range of 92.6%-97.3% [25, 26].

Therefore high seroprevalance rates of CMV in our country save highly our population being susceptible to infection during pregnancy and its detrimental effects. In other ways, seropositivity rate of CMV IgM found as 0.5% in Afyon and as 3.7% in Erzincan. Some of previous studies reported that seropositivity rates in Turkey in the range of 0.4%-3.2% [27].

HSV-II is widespread in sexually active populations worldwide. HSV-II is transmitted genitally or during birth to the baby by herpetic lesions in the birth canal, leading to genital or neonatal herpes infections [10]. In our study, HSV-II IgM and IgG were studied in only two regions, Konya and Afyon. HSV-II seroprevalence levels were found 4.2% and 4.2%. In another study in Konya region, Özdemir et al. [28] were noted 4.4 % seroprevalance of HSV-II similarly our study. Limited data about HSV-II seroprevalence in Turkey are available, up to now. Dolar et al. [29] investigated different groups in a study performed in 2006 in Turkey; they reported that the prevalence of HSV-II antibodies was 4.8 % in sexually active adults; 5.5 % in blood donors; 5 % in pregnant women, 17.3 % in patients with genital warts; 8.3 % in hotel staff; and 60% in sex workers. It has indicated that HSV-II infection has a high

prevalence especially in high-risk populations. Topbaş et al. [30] reported the HSV-II seroprevalance as 7.6% among adults aged 20-49 in the Trabzon region. On the contrary some studies conducted in Turkey, HSV-II seroprevalance was found a high rate as 53.5% in women over 15 years old in around Ankara region of Turkey by Maral et al. [31]. This result may be regarded as high for Turkish populations. A study from India reported the HSV-II seroprevalance as %33.58 in pregnant women [32]. In a different study a region of southern Asia, HSV-II IgG seropositivity rate was found 10% in antenatal women of reproductive age who experienced spontaneous abortions [33]. Al-Marzoqi et al. [34] remarked 22.2% rate for HSV-II in pregnant women in Babylon region of Iraq. According to our study results, which collected from 1382 patients, the seroprevalance of HSV-II in Turkey is seen at lower values.

Data available in the scientific literature are limited, and need to be periodically updated. We hope that our data provide some insight both the immune status for rubella, CMV and HSV-II of pregnant women and exhibiting the reasons of active rubella infection in pregnant women in spite of vaccination in different region of Turkey.

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