Prevalence of rubella and cytomegalovirus antibodies among pregnant women in northern Turkey

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SUMMARY

Primary infections caused by rubella and cytomegalovirus (CMV) can lead to serious complications in pregnancy. Rubella and CMV screening of pregnant women is not routinely carried out in Turkey. The purpose of this study was to determine the prevalence of rubella and cytomegalovirus among pregnant women. The study was carried out in Samsun Maternity and Women's Disease and Pediatrics Hospital in Samsun province, Turkey. Between September 2004 and September 2005, 600 pregnant women aged 17-40 years were enrolled in this study. The results of the antenatal screening for rubella and CMV during the first trimester of pregnancy were evaluated. Anti-IgG against rubella seropositivity was found in 566 (94.3%) and rubella IgM seropositivity in 10 (1.7%). The positivity for anti-CMV IgG antibody was found in 584 (97.3%), while 6 (1.0%) were positive for the anti-CMV IgM antibody. Pregnant women seronegative for rubella and CMV are susceptible to rubella and CMV primary infections. Preventive measures must be taken to decrease the mortality and morbidity related to congenital rubella and CMV infections. The rubella status should be investigated before pregnancy and seronegative females can be advised vaccination.

KEY WORDS: Pregnant women, Rubella, Cytomegalovirus, Antibody, Prevalence

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INTRODUCTION

Diseases caused by rubella virus and cytomegalovirus (CMV) infections are worldwide health problems. The major public health concern posed by rubella is its teratogenicity, with maternal infection early in pregnancy leading to the congenital rubella syndrome (CRS) in infants. The time at which infection occurs during gestation can influence the outcome. The earlier in gestation the maternal infection occurs, the more severe is the damage to the fetus. Maternal infection during the first 8 weeks after the last menstrual period results in nearly all fetuses becoming infected and most of infected fetuses developing congenital defects (Lee *et al.,* 2000; de Santis *et al.,* 2006) Primary CMV infection occurs in 0.15 to 2.0% of all pregnancies and may be transmitted to the fetus in up to 40% of cases. Up to 15% of intrauterine CMV infections result in symptomatic congenital disease at birth, and 10 to 15% of those born with asymptomatic congenital CMV will develop significant clinical sequelae in infancy. Perinatal infections can result through virus transmission from many parts of the birth canal; however, the majority of these infections are asymptomatic (Stagno *et al.,* 1986; Boppano *et al.,* 1992).

Rubella infection is a common cause of exanthamatous disease predominantly of childhood and its importance for public health relates to the teratogenic effects in pregnant women. There is

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a great variation in the age specific seroprevalence of rubella among different countries. Estimates of susceptibility to rubella infection in reproductive-aged women in the United States range from 10-18% (Best *et al.*, 2004; Haas *et al.*, 2005). Rubella seropositivity has been reported between 54.1%-95.2% in different countries in the world (Bukbuk *et al.*, 2005; Palihawadana *et al.*, 2003; Odland *et al.*, 2001; Tolfvenstam *et al.*, 2000).

The risk of congenital malformations in the fetus is 90% in case of primary rubella infection during the first trimester of pregnancy. This is defined as congenital rubella syndrome that has been associated with congenital cataracts, deafness, mental retardation and cardiac defects (Best *et al.*, 2004).

Rubella is a systemic disease that can be prevented by vaccination. Rubella vaccine use varies by stage of economic development: 100% for industrialized countries, 71% for countries with economies in transition, and 48% for developing countries. Rubella vaccination was introduced into the national immunization program after year 2006, but before this date families could buy the vaccine from the market and vaccinate their children. A safe and effective rubella vaccine is available, and there are proven vaccination strategies for preventing rubella and CRS (Robertson *et al.,* 2003; de Santis *et al.,* 2006).

The American College of Obstetricians and Gynecologists (ACOG) currently recommends screening pregnant women only for immunity to rubella infections (American Academy of Pediatrics, 2002).

CMV is endemic all over the world. Seroprevalence of CMV varies in different populations and countries. Its prevalence rate ranges from 40% to 60% in many countries where the population has good socioeconomic conditions (Ho, 1990). CMV infection is usually asymptomatic in adults, but its significance is many times increased when it occurs during pregnancy. CMV is one of the most common causes of congenital infections.

Primary cytomegalovirus infection occurs in 0.7% to 4.1% of pregnancies (Alford *et al.,* 1990; Stagno *et al.,* 1986). The risk of fetal transmission is 30% to 40% in pregnancies following primary maternal infection, whereas this ratio is less than 2% after a recurrent maternal CMV infection (Stagno *et al.,* 1986; Griffiths *et al.,* 1985). Intrauterine damage caused by CMV is more severe in infections occurring during the first half of pregnancy. CMV infection frequently causes sensorineural hearing loss and mental retardation (Best *et al.*, 2004).

The aim of our study was to assess the prevalence of rubella and CMV antibodies in pregnant women in Samsun province, Northern Turkey and compare our findings with those of other studies.

MATERIALS AND METHODS

Between September 2004 and September 2005, 600 pregnant women in their first trimester who had come for their first antenatal visit to Samsun Maternity and Women's Disease and Pediatrics Hospital in Samsun province, Turkey were included and laboratory results were retrospectively evaluated in this study.

From each pregnant woman a 5 ml blood sample was collected and stored at -20 °C until testing. Sera were analyzed for anti-rubella and anti-CMV IgG and IgM antibodies by a chemiluminescent enzyme immune assay method (Liaison, DiaSorin, Italy). The assays were performed according to the manufacturer's instructions. All reactive samples were repeated in duplicate for IgM tests and accepted as positive.

Statistical Package for Social Sciences (SPSS, version 10.0) software was used to calculate descriptive statistics.

RESULTS

The mean age of the participants in this study was 29.12 year (min. 17 y, max. 40 y). The seropositivity for anti-rubella IgG and IgM was found in 566 (94.3%) and 10 (1.7%) of the 600 pregnant women, respectively. Among the serum samples, 8 were found to be positive for both Rubella IgM and IgG (1.3%).

The positivity for anti-CMV IgG antibody was found in 584 (97.3%), while 6 (1.0%) were found positive for the anti-CMV IgM antibody. Among the 600 serum samples, 6 were found to be positive for both CMV IgM and IgG (1.0%). The rates of seropositivity for rubella and CMV IgG and IgM are showed in Table I.

TABLE I - *The rates of seropositivity for rubella and CMV IgG and IgM antibodies.*

Viruses	*IgG (%)*	*IgM (%)*	*IgG + IgM (%)*
Rubella	94.3	1.7	1.3
Cytomegalovirus	97.3	1.0	1.0

DISCUSSION

Cytomegalovirus and rubella are frequently causative agents of prenatal and perinatal infections. These infections can lead to important complications on pregnancy for maternal and fetal health (Best *et al.*, 2004; Griffiths *et al*., 2004). Rubella infection is mostly common childhood, but can occur at any age worldwide (Griffiths *et al.,* 2004; Santis *et al.,* 2006). Anti-rubella IgG seropositivity varies widely in different countries in the world.

A number of studies reveal a rubella seroprevalence of 54.1% in Nigerian pregnant women (Bukbuk *et al.,* 2002), 76% in pregnant women from Sri Lanka (Palihawadana *et al.,* 2003), 77.5% in Russian pregnant women (Odland *et al.,* 2001) and 93% in pregnant women from Eritrea (Tolfvenstam *et al.,* 2000). Haiti is without a vaccination program against rubella like Turkey. Desinor *et al.* (Desinor *et al.,* 2004) found 95.2% rubella seropositivity in pregnant women in Haiti. In our country, the rubella seroprevalence has been found between 86.5% and 100.0% among pregnant women in different studies reported in the last five years.

Rubella seroprevalence was reported to be 86.5% and 93.6% from Ankara (Cengiz *et al.,* 2005, Yücel *et al.,* 2002), 95.0% from Hatay (Ocak *et al.*, 2007) and 95.1% from Aydin (Yilmazer *et al.*, 2004) in pregnant women. Karakoc *et al.* (Karakoc *et al.*, 2003) found rubella seropositivity in 92.5% of pubertal girls and 100.0% in pregnant women in Adana, south of Turkey. 93.8% rubella seropositivity was found in an unvaccinated pregnant population in Malatya, eastern Turkey (Pehlivan *et al.,* 2007). Aksit (Aksit *et al.,* 1999) reported that the proportion of susceptibility to rubella was 10.3% and 8.4% in unvaccinated areas in the age groups of 15-19 and 20-29, respectively. In Samsun province, Leblebicioglu *et al.* (Leblebicioglu *et al.,* 1992) reported 91.1% anti-rubella IgG seropositivity in women in 1992. Our findings are similar to the above results.

While rubella vaccine was not incorporated into the national immunization programme in Turkey until 2006, it can be suggested that the 94.3% seropositivity we found was caused by the past natural infection.

The seropositivity of CMV varies widely in the world. A number of studies reveal a CMV seroprevalence of 56.3% in Finnish pregnant women (Alanen *et al.,* 2005), 78.0% in Russian pregnant women (Odland *et al.,* 2001), 87.5% in pregnant women from Singapore (Wong *et al.,* 2000) and 92.1% in pregnant women from Saudi Arabia (Ghazi *et al.,* 2002). Gratacap-Cavallier *et al.* (Gratacap-Cavallier *et al.,* 1998) found that CMV seroprevalence was significantly higher in women born in southern France (51.6%) than in those born in northern France (37.4%).

In our country, the prevalence of CMV has been reported between 84.3 and 97.3% among pregnant women within the last five years. CMV seroprevalence was reported to be 84.3% from Afyon (Altindis *et al.,* 2002), 92.6% from Ankara (Yücel *et al.,* 2002), 92.6% from Aydin (Yilmazer *et al.,* 2004), 94.9% from Antalya (Satilmis *et al.,* 2007) and 97.3 % from Hatay (Ocak *et al.,* 2007). Our CMV seroprevalence rate was found similar to that of other studies in Turkey. On the other hand, the result of this study was similar to developing countries such as Singapore [87.5%] (Wong *et al.,* 2000) and Saudi Arabia [92.1%] (Ghazi *et al.,* 2002).

Unfortunately, rubella screening of pregnant women is not routinely carried out in Turkey. Routine MMR immunization program was started in Turkey in 2006.

The vaccine failure cases or decreasing of the protective level of antibodies may occur in the next few years. Therefore, future screening for rubella antibodies will be more important in childbearing age.

For CMV infections, communal living and poor hygiene conditions facilitate early spread. If the pregnant women are seronegative for CMV contact precautions must be taken.

The results for rubella and CMV seropositivity in our study in Samsun are similar to those found in other regions of Turkey. Seronegative pregnant women are susceptible to rubella and CMV pri-

mary infections. Preventive measures must be taken to decrease the mortality and morbidity related to congenital rubella and CMV infections. Seronegative women can advised to have rubella vaccination in order to avoid CRS before pregnancy.

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