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ORIGINAL ARTICLE

Seroprevalence of Varicella-Zoster in the first trimester of pregnancy

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ABSTRACT

Objective: We aimed to evaluate the seroprevalence of Varicella-Zoster Virus (VZV) in pregnant women who applied to our hospital for pregnancy follow-up.

Material and Methods: The results of blood samples sent to Şişli Memorial hospital's microbiology laboratory with VZV IgG and VZV IgM requests from pregnant women who applied to Şişli Memorial Hospital for pregnancy follow-up between January 1, 2012, and December 30, 2019, were examined. VZV IgG test in blood samples was studied by Vidas system, VZV IgM test by the ELISA method. For VZV IgG <0.9 values are negative, >0.9 positive; For VZV IgM<10 values were considered negative and >10 values were considered positive.

Results: Four hundred and eighty-eight pregnant women who met the study criteria were included in the study. The median age of the pregnant women participating in the study was 31 years (19–45). The median gestational age at which blood was collected for VZV IgG and VZV IgM measurements was 7 weeks (5–9). VZV IgG positivity was found in 265 (54.3%) and VZV IgG negativity in 223 (35.7%). VZV IgM positivity was not detected in the samples taken.

Conclusion: VZV IgG sensitivity was found 54.3% in the screened group. Although VZV screening is not recommended in routine pregnancy follow-up; VZV screening in first-trimester pregnancy examination will provide more accurate counseling during pregnancy. Again, there will be an opportunity to vaccinate sensitive pregnant women after pregnancy.

Keywords: Pregnancy, seropositivity, varicella-zoster virus.

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INTRODUCTION

Varicella-Zoster Virus (VZV) is a DNA virus from the alpha herpes virus family that causes varicella infection (chickenpox) in humans. Varicella infection is a rash disease transmitted by contact and respiration. After the incubation period of approximately 10–21 days, high fever and diagnosis can be learned, and vesicupustular rash progresses. If it is passed in adulthood, it causes a more severe picture and progresses with complications. In healthy adults, the most common and severe course is pneumonia.VZV causes a systemic disease and leaves life-long immunity.[1]

The exact incidence of varicella infection in pregnant women is estimated to be around 0.7/1000 even though it is not well-known.[2] Pneumonia is more severe when varicella infection is experienced during pregnancy. Maternal mortality is seen between 14% and 40% when pneumonia develops.[3] The risk of developing Congenital Varicella Syndrome (CVS) with a 30% mortality rate in the fetus as a result of varicella infection in the first and second trimester of pregnancy (5–24 weeks of pregnancy) is 1%.[4] The likelihood of varicella pneumonia, neonatal varicella rashes, or childhood herpes zoster is increased in newborns due to intrauterine infection exposure when the infection is experienced late in pregnancy.[5] Severe varicella infection can be observed in 17–30% of newborns in varicella infections experienced 5 days before birth and 2 days after postpartum.[6] It is suggested that the infection mortality in the newborn during this period is 30%.[7]

VZV IgG antibody positivity is considered protective against infection as it causes a permanent immune infection with varicella. VZV IgG positivity is also used to determine susceptibility to varicella infection in pregnant women. VZV sensitivity ratios of populations can be determined by screening VZV IgG positivity in society.

This study aims to determine the VZV IgG seroprevalence among pregnant women admitted to our clinic for routine pregnancy follow-up and to determine the sensitivity ratio of the population we provide health care to varicose veins and to determine the VZV IgG Positivity distribution according to age groups.

MATERIAL AND METHODS

Patients who applied to the Gynecology and Obstetrics Department of Memorial Şişli Hospital for pregnancy follow-up between January 1, 2012, and December 30, 2019, and who had a 6–10 week pregnancy were included in the study. Pregnant women who received immunosuppression therapy or pregnant women with autoimmune system disease (two cases of Systemic Lupus Erythematosus patients, four cases of pregnancy achieved with cortisone treatment) were excluded from the study. VZV IgG and VZV IgM results of the cases were retrospectively examined.

VZV IgG test Biomerieux was studied using VIDAS® system with enzyme-linked fluorescent immunoassay method and VZV IgM Nova-Tech brand kit was studied with ELISA method. Index <0.60 values for VZV IgG were considered negative, Index: 0.60–0.90 gray zone, and Index: 0.90 and above were considered positive according to the reference ranges of the commercial kits studied. Index <10 values for VZV IgM were considered negative and 10 and above were considered positive.

Table 1: Distribution of VZV IgG positivity rates of pregnant women by age group

Age groups of pregnant women	Total number	IgG (+)	IgG (–)	Positivity (%)
20–24	16	10	6	62.5%
25–29	146	70	76	48%
30–34	236	124	112	52.5%
35–39	78	53	25	68%
40–45	12	8	4	67%
Total	488	265	223	54.3%

VZV: Varicella-Zoster Virus.

Ethics committee approval of the study was obtained from Şişli Memorial Hospital Ethics Committee (29.04.2020/2).

SPSS version 15.0 statistical package software was used to analyze the statistical data. Descriptive statistical analyses were performed.

RESULTS

Four hundred and eighty-eight pregnant women who met the study criteria were included in the study. The median age of the pregnant women participating in the study was 31 years (19–45). The median gestational age at which blood was collected for VZV IgG and VZV IgM measurements was 7 weeks (5–9).

Distribution of pregnant women by age groups: 16 cases were determined between the ages of 20–24. VZV IgG positive was observed in ten pregnant women and VZV IgG negative was observed in six pregnant women. Blood results of 146 pregnant women between the ages of 25–29 years were obtained. Seventy pregnant women were VZV IgG positive and 76 pregnant women were VZV IgG negative in this age group.

The results of 236 pregnant women in the 30–34 age group were screened. VZV IgG result was positive in 124 pregnant women and VZV IgG result was negative in 112 pregnant women in this age group (Table 1).

Seventy-eight pregnant women in the 35-39 age group were included in the study. VZV IgG positive was observed in 53 pregnant women and VZV IgG negative was observed in 25 pregnant women (32%).

Twelve pregnant women in the 40–45 age group were included in the study. VZV IgG results were positive in eight pregnant women and negative in four pregnant women (33%).

VZV IgG positive (54.3%) results were observed in 265 pregnant women and VZV IgG negative (45.7%) results were observed in 223 pregnant women according to IgG results of 488 pregnant women without considering age variability.

No VZV IgM positivity was detected in any of the pregnant women.

DISCUSSION

VZV infection is an infection with high transmission rates (90%) by contact with the respiratory tract and lesions. VZV IgG seronegative individuals are at risk for primary varicella infection. Varicella infection may cause intrauterine infection if it is experienced during any period of pregnancy. Maternal varicella infection can cause viremia and transmit to the fetus through transplacental route or by ascending from lesions in the birth canal.[8]

Intrauterine infection may occur in one-fourth of infected pregnancies if primary VZV infection is experienced in the first two trimesters of pregnancy according to the literature.[9,10] Fetus death, extremity anomaly, ocular defect, microcephaly, IUGR, hearing loss, and cognitive dysfunction can be seen in CVS, which is mostly seen in infected fetuses in the first two trimesters.[11,12]

VZV IgG antibody positivity has a protective effect against varicella infection, which poses serious potential risks for maternal and fetal health. Studies do not indicate a protective anti-VZV antibody level, but high maternal VZV antibodies are considered protective for mothers and newborns.[13,14] Therefore, VZV IgG titers are used to determine the group susceptible to VZV infection.[15]

The prevalence of VZV IgG in pregnant women varies among countries. Saadatian-Elahi et al.[15] determined the IgG positive prevalence as 98% in France and Socan et al.[16] determined the IgG positive prevalence 97% in Slovenia in 2010. Sauerbrei et al.[17] pointed out the importance of pre-pregnancy vaccinations in their study conducted in Germany in 2005 and reported the VZV IgG seropositive rate as 96.VZV IgG seropositivity rates are observed in the rest of Europe as 95% in Spain, 95% in Finland, and 92% in Ireland and England.[18–21] The seropositivity rates of women (15–39 years) at the age of having children in European countries are monitored between 95% and 98% thanks to the vaccination protocols applied in European Union countries.[22] On the other hand, figures between 50% and 70% are encountered when the seropositivity rates of countries outside Europe are monitored.[23] The main reason for this change in the prevalence of VZV IgG among countries is thought to be the differences in socioeconomic and childhood and adolescent vaccination protocols of the countries.

Since the possibility of varicella infection in women of reproductive age increases with advancing age, it is recommended that seroprevalence be evaluated according to age groups.[24] In our study, we determined the VZV seroprevalence by age groups by dividing pregnant women according to age groups.

VZV IgG seropositivity was observed as 55% in total between 6 and 10 weeks of pregnancy in our study. This rate was found to be well below the evaluations made in Europe. The fact that varicella vaccination was included in the national vaccination program in 2013 in Turkey explains the low prevalence rates of VZV IgG in today's pregnancy.

When the literature was searched, no study showing VZV seroprevalence in pregnant women in our country was found. However, Dilli et al.[25] There is a study that determined VZV seroprevalence in adolescence, conducted in 2008. About 59.2% of 255 cases included in this study were girls. The mean age of the cases was 11.8 and the VZV seroprevalence was determined as 55.7%.

CONCLUSION

The results of the study do not allow us to make definitive evaluations about the prevalence of pregnancy VZV IgG in Turkey because the data were obtained from a single private hospital. However, the VZV IgG seropositivity rate was found to be low in pregnant women according to our study results. The history of varicella vaccine and infection should be questioned in the pregnant woman and VZV antibody titer screening should be recommended when necessary in the first pregnancy examination. Again, pregnant women should be questioned at birth and seronegative cases should be vaccinated immediately after delivery.

Statement

Ethics Committee Approval: The Memorial Şişli Hospital Ethics Committee granted approval for this study (date: 29.04.2020, number: 2).

Informed Consent: Written informed consent was obtained from patients who participated in this study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – AS; Design – AS; Supervision – AS; Resource – AS, KK; Materials – AS, KK; Data Collection and/or Processing – KK; Analysis and/or Interpretation – AS, KK; Literature Search – AS; Writing – AS; Critical Reviews – AS, KK.

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