Iranian Journal of Virology 2020;14(2): 1-5
©2020, Iranian Society of Virology

Original Article

Prevalence of Varicella-Zoster IgG Antibodies Among Pregnant Women Living in Yazd, Iran

Moghimi M [1], Javaheri A [2], Doosti M [3,4], Lalehzari M [5*]

1.Department of Pathology, School of Medicine, Shahid Sadoughi University of Medical Sciences, Yazd, Iran.
2.Department of Obstetrics and Gynecology, School of Medicine, Shahid Sadoughi University of Medical Sciences, Yazd, Iran.
3.Infectious and Tropical Diseases Research Center, Shahid Sadoughi University of Medical Sciences, Yazd, Iran.
4.Department of Medical Virology, Faculty of Medical Sciences, Tarbiat Modares University (TMU), Tehran, Iran.
5.Shahid Sadoughi Hospital, Shahid Sadoughi University of Medical Sciences, Yazd, Iran.

Abstract

Background and Aims: Varicella-zoster virus (VZV) infection during pregnancy can treat the health of mother and fetus. The present study was aimed to determine the prevalence of VZV IgG antibodies among pregnant women living in Yazd, Iran.

Materials and Methods: In this cross-sectional, all pregnant women referred to the Baghayipour clinic of Yazd city were participated. IgG Antibodies against VZV were detected by the enzyme-linked immunosorbent assay (ELISA) test. Demographic data of each woman, including age, self-reported history of chickenpox, education, and place of residency were collected using a questionnaire. The collected data was analyzed by SPSS software version 20.

Results: A total of 300 pregnant women with a mean age of 28±6 years (age range: 18-46 years) were screened for VZV antibodies that 283 cases (94.3%) were seropositive. The prevalence of VZV antibodies among pregnant women in age groups of 14–23, 24–33, 34–44 years was 96.8%, 93.3%, and 95%, respectively. The prevalence of VZV antibodies was not significantly associated with the educational level, place of residence, and history of infection with chickenpox. Positive predictive value (PPV) and negative predictive value (NPV) of self-reported history of varicella were 94.2% and 4.4%, respectively.

Conclusion: The prevalence of varicella-zoster IgG antibodies among pregnant women living in Yazd was higher than in other regions of Iran. Performing the routine vaccination against VZV is suggested to protect mother and fetus from possible complications caused by the virus.

Keywords: Antibodies; Chickenpox; Prevalence; Pregnant Women

Introduction

Varicella-zoster virus (VZV) is a DNA virus that causes varicella (chickenpox) in children and herpes zoster (shingles) in adults (1). VZV causes usually a self-limited disease, but it can make life-threatening complications in immunocompromised patients, pregnant women, and infants (2). Primary infection with VZV during pregnancy can have some complications for both the mother and the fetus. Varicella infection within the first trimester of pregnancy can cause birth defects in 0.5-1% cases (3). The risk of congenital varicella syndrome (CVS) following VZV infection in mother during the first 20 weeks of

*Corresponding author:
Mitra Lalehzari. School of Medicine, Shahid Sadoughi University of Medical Sciences, Yazd, Iran.
Email: mitralalezari94@gmail.com.

gestation is 2%. The baby may be born with low weight (23%) and have skin lesions (73%), limb abnormality (46%), neurological diseases (62%), and vision problems (cataracts, chorioretinitis) (52%) (4). It is estimated that the incidence of CVS is 1–5 cases per 10,000 pregnancies that have a mortality rate of about 30% (5).

VZV is more prevalent in regions with a temperate climate than the tropical or cold area (6). Iran is a vast country with different types of climate, including hot, temperate, and cold. The prevalence of VZV in the Southeast region of Iran with a tropical climate is about 94%, but in the West region with a cold climate is 85 % (7). Prevalence of VZV- Antibody among the Iranian general population has been reported from 71.4% to 78.5% (8).

Seroprevalence of VZV among women of childbearing age in Iran has been reported from 76.5% to 86.9% (9). The immunity against the Varicella-zoster virus is important for women of childbearing age. If pregnant women have not immunity to VZV, they are at risk of getting the virus through exposure to an infectious patient. Therefore, it is important that all women be screened for VZV antibody before or during pregnancy. Varicella-zoster immunoglobulin (VZIG) should be administrated for women with poor immunity to VZV (10).

Vaccination program against VZV is carried out in many developed countries, but the current immunization program in Iran does not include varicella vaccine. Knowing the status of immunity to VZV among pregnant women can help the healthcare system to reduce the possible complications of varicella in mother and baby.

To date, only three studies have evaluated the prevalence of VZV antibodies among Iranian pregnant women. Besides, studies on VZV seroprevalence among women in the central regions of Iran are not enough. The present study aimed to evaluate the preva-lence of varicella-zoster antibodies among pregnant women living in Yazd province, Iran.

Methods

This cross-sectional study included all pregnant women referred to Baghayipour Clinic of Yazd city between April 2019 and February 2020. All subjects sign an informed consent form to participate in this research.

The present study was approved by the Research Committee of Yazd Shahid Sadoughi University of Medical Sciences.

A blood sample was collected from each participant. Serum was separated by centrifugation and stored at -20°C until performing tests. Demographic data of women, including age, history of varicella, education, and place of residency were collected using the questionnaire. The VZV IgG antibodies were detected in serum samples by a commercial kit (Vircell, Granada, Spain) based on the enzyme immunoassay (ELISA) method that had 96% sensitivity and specificity.

Tests were performed according to the manufacture protocol. Negative and positive controls were used in each working run.

The collected data were analyzed by the Chi-square and Fisher exact tests using SPSS software version 20 (Chicago, IL, USA). A p-value of less than 0.05 was considered statistically significant.

Results

Three hundred pregnant women were enrolled in the present study. Participants had mean age (±SD) of 28±6 years (age range: 18-46 years). Seroprevalence data are summarized in Table 1 according to variables under study. VZV-antibodies were detected in 283 (94.3%) pregnant women while 17 participants were serologically negative (5.7%). The participates were divided to three age group, including, 14-23, 24-33 and 34-44 years. The most of women (59%) were in the age group of 24-33 years. There was no statistically significant correlation between anti-VZV prevalence and age group (p=0.51, Table 1). The prevalence of VZV antibodies was 96.8% in pregnant women aged 14 –23 years, 93.3% in women aged 24–33 years and 95% in those aged 34–44 years.

Table 1. Prevalence of varicella-zoster antibodies among pregnant women living in Yazd.

Variable		Number	Anti-VZV IgG		P value
			Positive	Negative	
Age group (year)	14-23	62	60 (96.8%)	2 (3.2%)	0.57
	24-33	178	166 (93.3%)	12 (6.7%)	
	34-44	60	57 (95%)	3 (5%)	
Place of Residence	Urban	268	252 (94%)	16 (6%)	0.51
	Rural	32	31 (96.9%)	1 (3.1%)	
level of education	Diploma	92	87 (96.7%)	3 (3.3%)	0.33
	Bachelor	199	184 (92.4%)	14 (7.6%)	
	Master of Science and higher	9	9 (100%)	0	
history of varicella infection	Yes	275	259 (94.2%)	16 (5.8%)	0.99
	No	23	22 (95.6%)	1 (4.4%)	
	VZV Vaccination	2	2 (100%)	0	

Additionally, seroprevalence of VZV between pregnant women living in rural areas of Yazd with those living in the urban area was not significantly different (p=0.51, Table 1).

Two hundred fifty-nine (94.2%) of 275 women who reported a positive history of chickenpox infection were seropositive, while 16 (5.8%) participants were seronegative. In addition, of the 23 participants with a self-reported negative history of chickenpox, 22 women (95.6%) were seropositive. Therefore, positive predictive value (PPV) and negative predictive value (NPV) of self-reported history of varicella were 94.2% and 4.4%, respectively.

VZV prevalence was not statistically correlated to the history of varicella infection (p=0.99, Table 1).

Discussion

In the present study, 94.3% of pregnant women living in Yazd had anti-varicella antibody. We found that 5.7% of them were seronegative and hence vulnerable to VZV. The most seronegative pregnant women were in the age group of 24-33 years.

Similar studies conducted in different regions of Iran have been obtained various results. A study from Babol, north of Iran showed that 90.2% of pregnant women had varicella-zoster antibodies (10). A study reported that 78.4% of pregnant women living in Hamadan were VZV-seropositive (8). In a study conducted in Tehran, the seroprevalence of VZV among pregnant women was 90.3% (11). Seroprevalence of VZV among women before marriage was estimated to be 71.2% in Sanandaj (6), 72.7% in Jahroum (9), 74.5% in Bushehr (12), and 79.3% in Kerman (13). These different findings can be the result of climate diversity in different regions of Iran.

Prevalence of varicella antibodies in the present study was higher than in the study of Zeynali et al. They reported that 73.7% of women before marriage in Yazd were seropositive for VZV (3). The mean age of women in our study was 28 years and in their study was 23 years. Therefore, the deterrence in VZV-prevalence between two studies can be related to the age of participants.

Seroepidemiological studies conducted on pregnant women living in undeveloped tropical regions have shown a lower prevalence of VZV antibodies than those living in developed countries. A study performed on 7980 pregnant women from various countries of the world estimated that 93.1% of women living in Western European countries and 80.3% of those living in Asia and Africa were seropositive for VZV (14). The seroprevalence of VZV among pregnant women in France was 98.8% that is higher than the prevalence reported in Iran and the present study (15).

Also, Other developed countries such as Germany, Spain, Finland, Canada, UK, and the US have reported higher seroprevalence among pregnant women than those estimated in Iran and the present study (16, 17). Vaccination against VZV is carried out in many developed countries that can be explained this discrepancy. It seems that VZV vaccine must be added to routine vaccination programs in developing countries such as Iran to protect mother and fetus against varicella.

In the present study, similar to some previous studies (3, 8), a significant association was not obtained between VZV antibody prevalence and educational levels or place of residence. History of chickenpox mentioned by women of child bearing is a criterion noticed for screening and immunization of them (18). In the current study, 91.7% of pregnant women mentioned a history of varicella infection that 94.2% of them were seropositive for VZV IgG. Also, 95.6% of pregnant women who didn't mention a history of chickenpox had antibodies against VZV. The PPV (94.2%) was a strong predictor while the NPV (4.4%) was a poor predictor of VZV immunity among pregnant women. Similar to our finding, the NPV in the study of Linderet al and Talebi-Taher et al. was 6.8% and 13.8%, respectively as a poor predictor of VZV immunity (11, 18).

In contrast to our data, the NPV in the study of Hosseininasab et al. and Zeynali et al. were obtained equal to 85% and 81%, respectively as a strong predictor of immunity against VZV (3, 13). Majidi and et al. were estimated a PPV of 94.5% and an NPV of 50.7% for the self-reported history of varicella in women before marriage (6). In the study of Pourahmad et al., the PPV and the NPV of self-reported history of varicella were reported 79.5% and 30.5%, respectively (9). Socio-cultural factors and vaccination may affect self-reporting of the history of chickenpox and cause differences in the NPV reports among various studies.

Conclusion

The most pregnant women in Yazd were protected against VZV, and only a small population of them was susceptible to varicella-zoster infection (5.6%). The prevalence of varicella-zoster IgG antibodies among pregnant women living in Yazd was higher than in other regions of Iran.

However, developing a VZV vaccine is suggested to protect mother and fetus from possible complications caused by the virus.

Acknowledgment

Not applicable

Conflict of interest

The authors declare that they have no conflict of interest.

Funding

This research was funded by Shahid Sadoughi University of Medical Sciences.

References

1. Muller WJ, Herold BC. Herpes Simplex and Varicella-Zoster Viruses. Transpl Infect Dis. 2020:134.
2. Jones G, Whittle N. Understanding the health risks of varicella zoster virus in pregnancy. Prim Health Care. 2020;3(2):1-5.
3. Zeynali L, Ayatollahi J, Sharifi MR, Tayebzadeh MA, Ahmadi AS, Doosti M. Seroprevalence of Antibodies against Varicella Zoster Virus among Women before Marriage in Yazd, Iran. Iran J Virol. 2016;10(2): 1-6.
4. Sauerbrei A, Wutzler P. Fetales Varizellen syndrom. Monatsschrift Kinderheilkunde. 2003;151(2):209-13.
5. Villota VA, Delgado J, Pachajoa H. Congenital varicella syndrome in a monochorionic diamniotic twin pregnancy. J Res Med Sci. 2014;19(5):474-6.
6. Majidy P, Khodabandehloo M, Azadi N-A. Seroprevalence of Varicella zoster virus antibody among young women before marriage in Sanandaj, Iran. Iran J Microbiol. 2016;8(2):147-52.
7. Hoseini SG, Kelishadi R, Kasaeian A, Ataei B, Yaran M, Motlagh ME, et al. Seroprevalence and Risk Factors of Varicella Zoster Infection in Iranian Adolescents: A Multilevel Analysis; The CASPIAN-III Study. PLoS One. 2016;11(6):e0158398.
8. Mamani M, Zamani M, Hashemi SH, Akhtari M, Niayesh A. Seroepidemiology of varicella-zoster virus among pregnant women in Hamedan, Iran. Afr J Microbiol Res. 2012;6(8):1829-32.
9. Pourahmad M, Davami MH, Jahromi ARS. Evaluation of anti-varicella antibody in young women before their marriage: A sero-epidemiologic study in Iran. J Clin Virol. 2010;48(4):260-3.
10. Bayani M, Siadati S, Esmaeilzadeh S, Asgari S, Salmani S. Seroprevalence of Varricella Zoster Antibodies among Pregnant Women in Babol, Northern Iran. Iran J Pathol. 2013;8(3):171-7.
11. Talebi-Taher M, Kashanian M, Khalili K. Seroprevalence of varicella-zoster virus among pregnant women in two teaching hospitals, Tehran, Iran. Iran J Microbiol. 2014;6(1):37-40.
12. Barazesh A, Zandi K, Hadavand F, Moatamed N, Hefzollah F, Hefzollah B, et al. Seroepidemiology of Rubella, Cytomegalovirus, Herpes simplex & Varicella zoster virus in college women of Bushehr. ISMJ. 2014; 16(6):459-66.

13. Hosseininasab A, Arabzadeh A-M, Haghdoost AA, Helmi Z. Immunity against varicella zoster virus based on history of previous chickenpox: a study in premarital Iranian women. Int J Infect Dis. 2013;17(7):e568-e9.
14. Knowles S, Grundy K, Cahill I, Cafferkey M. Susceptibility to infectious rash illness in pregnant women from diverse geographical regions. Commun Dis Public Health. 2004;7(4):344-8.
15. Saadatian-Elahi M, Mekki Y, Del Signore C, Lina B, Derrough T, Caulin E, et al. Seroprevalence of varicella antibodies among pregnant women in Lyon-France. Eur J Epidemiol. 2007;22(6):405-9.
16. Plans P, Costa J, Espuñes J, Plasencia A, Salleras L. Prevalence of varicella-zoster antibodies in pregnant women in Catalonia (Spain). Rationale for varicella vaccination of women of childbearing age. BJOG. 2007; 114(9):1122-7.
17. Talukder Y, Kafatos G, de Moira AP, Aquilina J, Parker S, Crowcroft N, et al. The seroepidemiology of varicella zoster virus among pregnant Bangladeshi and white British women in the London Borough of Tower Hamlets, UK. Epidemiol Infect. 2007;135(8):1344-53.
18. Linder N, Ferber A, Kopilov U, Smetana Z, Barzilai A, Mendelson E, et al. Reported exposure to chickenpox: a predictor of positive anti-varicella-zoster antibodies in parturient women. Fetal Diagn Ther. 2001;16 (6):423-6.