

## The prevalence of parvovirus B19 infection among pregnant women of Ardabil in 2013

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### ABSTRACT

**Background and Objectives:** Trans-placental transmission of parvovirus B19 during pregnancy can cause adverse outcomes. Regarding its importance in prenatal care, we decided to study prevalence of parvovirus B19 infection among pregnant women in Ardabil, Iran.

**Materials and Methods:** In a community based study with a cluster sampling, 350 pregnant women that attended in health care centers in Ardabil were selected. Serum samples were collected and Anti-B19 specific IgG was detected using commercial enzyme-linked immunosorbent assays (Euroimmune Elisa kit, Germany). Furthermore, a questionnaire filled for all participants during samples collection.

**Results:** 64.6% (226/350) of participants were Ardabil citizen and the rest were from rural area (124/350). Anti-B19-specific IgG antibody was detected in 69.1% of pregnant women (242/350). Participants' ages ranged from 15 to 34 years with average of 23 years. According to our study, seroprevalence of IgG antibodies had positive significant correlation with the participants' age ( $r=0.268$ ) but there were no significant relations between B19 seropositivity and living area, family member, number of commensals, number of living children, and the amount of hemoglobin ( $p>0.05$ ).

**Conclusion:** Approximately, one-third of the participants were at risk of primary B19 infection. Therefore, health education of pregnant women and screening of infected pregnant women is recommended to prevent fetal complications.

**Keywords:** Seropositive, Infection, Parvovirus B19, Pregnant women

### INTRODUCTION

Parvovirus B19 is a small, uncoated DNA virus

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belonging to the family Parvoviridae (1). There are at least four types of parvovirus that infect human (2). Parvovirus B19 usually infects human through the respiratory system (3). Parvovirus B19 associates with a wide range of clinical symptoms and their pattern is under effect of age and immune status of the host (4). Most of B19 infections are asymptomatic or only associate with mild non-specific illness. This virus can also be transmitted through blood trans-

fusion and blood products (5). B19 infects humans widely and is almost endemic in all parts of the world (2).

Parvovirus B19 can also be transmitted through vertical transformation (from mother to fetus) (6). Its prevalence in pregnancy is about 1-5%, but in epidemic situation it receives to 10% (7-8).

Its incidence in pregnancy is about 1-5% and it can cause complications in 3% of infected pregnant women (9, 10). The virus is transmitted through vertical transmission to the fetus and creates some complications to fetus including anemia, spontaneous abortion, hydrops fetalis, intrauterine fetal death and congenital anomalies (11). Parvovirus infection of mothers is diagnosed using serologic or an Immune assay enzyme B19 IgM and B19 IgG (12). B19 IgG positive serologic evidence of previous infection with the virus that leads to lifelong immunity. In this study, we tried to determine prevalence of serum parvovirus infection in pregnant women and its association with some of the parameters such as number of lived children, number of family members, number of commensals and amount of hemoglobin.

Infection during pregnancy can cause a variety of other signs of fetal damage. The risk of adverse fetal outcome increases if maternal infection occurs during the first two trimesters of pregnancy but may also happen during the third trimester. It is significant cause of fetal loss throughout pregnancy, but has a higher impact in the second half of pregnancy when spontaneous fetal loss from other causes is relatively rare (13). There are several risk factors about its infection in pregnant women. For example, the risk of infection in pregnant women with one child are 3 times more than nulliparous women, but this risk for women with three or more children are 7.5 times more. The other risk factors are working in the school, care centers and other full stress jobs (14-16). Infection is more common during late winter and early spring (17).

IgG antibody levels elevated with the increase of age (17, 18) at the age of 15, about 50% of persons have detectable IgG levels and its amount in older people, has increased to more than 90% (2).

The importance of B19 investigation in pregnant women is due to vertical transmission of this virus. The complications related to this virus are anemia, hydrops fetalis, fetal death, and unintended abortion (11). Intrauterine growth retardation, myocarditis, pleural effusion, pericardial effusion and brain in-

volvement of the fetus may occur following infection with the virus. Although, Parvovirus B19 is not related to congenital malformations (19, 20), in case of pregnant women infection, the prevalence of transmission to the fetus is 30% (21).

Acute parvovirus B19 (B19V) infection is a proven risk for pregnant women and their fetus (22). Regarding to complications related to B19 virus infection during pregnancy and lack of study about its infection prevalence in Ardabil County, this study was conducted with the aim of determination of the prevalence of parvovirus and IgG in pregnant women in Ardabil.

## MATERIALS AND METHODS

This study was conducted as a cross-sectional trial. The numbers of samples were calculated 350, based on statistical formula for sample size. These numbers were divided into 39 prenatal care centers, according to population covered by each center. 5 ml of blood was taken from participant in care centers and was referred to the Reference Laboratory, immediately. The serum of blood samples were isolated and were stored at -20 °C, until analysis. A questionnaire was filled at the time of sample collection. The questionnaire consisted of two parts: part I including mother's age, location, number of family members (father, mother, sister, brother), number of children, number of commensals, and in Part II information about blood test of pregnant women, were recorded.

For measurement of IgG antibodies in serum samples against B19 virus, the ELISA kit Euroimmune, (Germany) was used as follows: 100 µl of serum 1/201 diluted patients and 100 µl of each of the standards were added to micro plate wells in which the viral antigen was coated. The samples were incubated for 1 h at room temperature, then the wells were washed and 100 µl goat, anti-human, anti-IgG antibody binded to the peroxide was added to each sample and they kept at room temperature for one more hour. Then, after washing the wells, 100 µl of substrate (3, 3', 5, 5' tetra-methyl benzidine) was added to each well and allowed to create color within 30 minutes at room temperature. Subsequently, 100 µl of fixing solution (sulfuric acid) was added to each well and a maximum light absorption of the double wavelengths of 450/630 nm were read using a plate

reader. Positive cases were recorded according to the kit instruction.

Data then coded and were statistically analyzed using SPSS v16 software. The Chi-square and T-test and descriptive methods were used for data analysis. The significant levels of 0.05 were used for all statistical analysis.

In order to consider the principles of medical ethics, information will be kept confidential and results are reported anonymously. Consent of the participants was taken, orally.

## RESULTS

In this study, of 350 pregnant women, 64.6% (226/350) were Ardabil citizen and the rest were from rural area (124/350). The youngest participant was 15 years old and the oldest was 34 years (average of  $23 \pm 3.92$  years). Participants in the study area, were divided into 4 age groups.

Overall, 242 (69.1%) had positive serology B19 IgG and 124 (30.9%) were seronegative.

Distributions of seroprevalence of parovirus B19 among pregnant women in residence location are shown in Table 1. Of 108 people that living in rural areas, 85 (68.5%) were seropositive and 39 (31.5%) were negative. There was no significant relationship between residence location and prevalence of serum parvovirus B19 ( $p=0.475$ ).

The average age of participants with positive serology was  $24.77 \pm 4.26$  years, and the mean age of those with negative serology was  $22.98 \pm 3.58$  years. Result showed there was a significant correlation between age and the prevalence of parvovirus ( $r=0.268$ ) and the immunity against the virus was higher in older pregnant women (Table 2).

The average number commensalts seropositive pregnant women was  $3 \pm 1.74$  and those with negative serology  $2.83 \pm 1.16$  that showed no significant relationship between the number of commensalts and prevalence of parvovirus ( $p=0.377$ ).

The average family members of participants with positive serology was  $6.86 \pm 2.4$  and those with negative serology was  $6.61 \pm 2.23$ , which showed no significant relation between family size and prevalence of parvovirus ( $p=0.369$ ) (Table 3).

The average number of lived children in participants those with positive serology was  $0.57 \pm 0.655$  and average number of lived children in those with

negative serology was  $0.51 \pm 0.634$  which presented the relationship between family size and sero prevalence of Parvovirus was insignificant ( $p=0.417$ ).

The average amount of hemoglobin in participants with positive serology was  $12.5 \pm 1.12$  ( $p=0.177$ ) and the average amount of hemoglobin in those with negative serology was  $12.26 \pm 1.06$  ( $p=0.169$ ) which showed no significant relationship between hemoglobin and serum parvovirus.

## DISCUSSION

Results of this study showed that the prevalence of B19 in pregnant women in Ardabil was 69.1%. The result indicates high prevalence of this virus in Ardabil region. Similar results was reported by others. Ziyaeyan et al. (2005) in Shiraz showed that Parvovirus infection prevalence was 69.01% (17). In a cross-sectional study, Sohrabi et al. (2007) reported that 55.7% of pregnant women referred to Ahvaz Imam Khomeini hospital were B19 positive (had specific IgG of B19). According to their findings, more than 40% of pregnant women had not IgG B19 and were at the risk of the virus infection and its fetus complications (23). In a study conducted in Nigeria by Emiasegen et al. (2011) parvovirus infection prevalence among

**Table 1.** Distribution of serology parvovirus B19 prevalence among pregnant women based on residence location

Serology Location	Positive	Negative	Total
Urban	157(69.5%)	69(30.5%)	226(64.6%)
Rural	85(68.5%)	39(31.5%)	124(30.4%)
Total	242(69.1%)	108(30.9%)	350(100%)

**Table 2.** Distribution of serology parvovirus B19 prevalence among pregnant women according to age group

Serology Age group	Positive	Negative	Total
15-19 years	37(67.27%)	18(32.73%)	55(15.71%)
20-24 years	67(56.77%)	51(43.23%)	118(31.71%)
25-29 years	107(74.8%)	36(25.2%)	143(40.28%)
30-34 years	31(91.1%)	3(8.9%)	34(9.71%)
Total	242(100%)	108(100%)	305(100%)

**Table 3.** Relationship between the number of people breaking bread together, family size and the number of children living with an outbreak of Parvovirus B19

Variable	Serology	Mean (person)	Standard Deviation	P Value
No. of Commensalt	positive	3	1.74	0.377
	negative	2.83	1.16	
No. of family members	positive	6.86	2.40	0.369
	negative	6.61	2.23	
No. of Lived Children	positive	0.57	0.655	0.417
	negative	0.51	0.634	

pregnant women attending to prenatal care clinics and its relation to occupation, number of children and transfusion history were studied. They reported that 273 pregnant women were studied and 27.5% of them had IgG antibody for B19 and the relationship between the numbers of living children, occupation and achieved transfusion history were significant (24).

In another study, Elnifro (2009) found that its prevalence in Libya was 69% (25). These studies are in agreement with our findings. On the other hand, Khameneh (2014) reported that in Orumiyeh prevalence of parvovirus was 75.6% (26), that was further from the results of our study. Some researcher reported lower prevalence. For example, Sohrabi in a study in Ahvaz showed that its incidence was 55.7% (19); Abiodun (2013) reported 20% in Nigeria (27), and Cohen (1995) declared 53% of pregnant women are immune to the virus (28).

The difference between rural and urban areas in the prevalence of B19 virus was not significant. Of 226 people lived in Urban area, 157 patients (69.5%) were positive while 68.5% of people (85 of 108) lived in rural areas were positive in serology.

Mode of seropositive was observed in the 30-34 years age group. The significance of difference among mean age between positive serology and negative serology indicates that relationship between age and the prevalence of parvovirus. Therefore, its incidence was higher in older women.

In the Ziyaeyan (2005) and Sohrabi (2007) studies, there was no significant correlation between age and the prevalence of parvovirus, that is contrast to our results (17,23).

In this study, the relations between seropositive incidences with number of children, number of family members, number of commensalts, and hemoglobin content were not significant. This result is in agree-

ment with the results of Shahraki et al. (2001) (29). In a study from Nigeria, Emiasegen et al. (2011) showed that the number of children was related to the outbreak of parvovirus (24) that is not consistent with the results of our study.

Comparison between the average number of seropositive children and seronegatives revealed that the number of children didn't related to the prevalence of parvovirus that is in accordance with the Shahraki et al. (2001) (29).

In a study of Emiasegen et al. in Nigeria the relation between the number of children and outbreak of parvovirus was significant (24) that is not consistent with our results.

## CONCLUSION

The results of this study showed a high susceptibility of pregnant women to parvovirus B19 in Ardabil region and immunity to the virus increases with age. In our study, a significant correlation was not found between the prevalence of parvovirus and the number of living children, number of family member, number of commensalts and hemoglobin content.

Considering that a high percentage of infected pregnant women with Parvovirus B19 in the Ardebil region, health education and screening for the virus, especially in pregnant women with anemia is recommended to prevent fetal complications.

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