Original Research

Parvovirus B19 in Morocco: Seroprevalence of Immunoglobulin G Antibody in Pregnant Women in Marrakesh

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Abstract

Background: Parvovirus B19 (B19V) infection is ever-present and contagious. It is acquired during childhood and adolescence, but can occur at any age. B19V infection occurs in endemic epidemic mode in temperate zones in winter and spring. B19V infections, although often asymptomatic in pregnant women, can be responsible for hydrop fetalis, fetal anemia, and death in utero. This study will evaluate the seroprevalence of immunoglobulin G (IgG) antiparvovirus in pregnant women in Marrakesh city in Morocco, and to find out the possible risk factors associated with B19V infections. **Methods**: We randomly selected 100 pregnant women from the Zerktouni hospital in Marrakesh. Socio-demographic characteristics and background were collected using a questionnaire. Serologic tests were carried out by searching for immunoglobulin G antibodies via the ParvovirusVirclia® IgG Chemiluminescencemonotest kits (Vircell Microbiologist, Granada, Spain) at the Bacteriology-Virology laboratory of the Avicenne Military Hospital in Marrakesh. **Results**: The median age of study participants was 27 (interquartile range (IQR): 17–43) years. Of 100 pregnant women 8%, 38% and 54% were in the first, second and third trimester respectively. The majority 96% of women were from urban areas. Nineteen percent (19%) of them had a history of spontaneous abortion. Of 100 pregnant women, the overall prevalence of IgG was 51 (51%). The average age of participants with positive serology was 26.45 years, and the mean age of those with negative serology was 28.98 years. The immunity against the virus was higher in young pregnant women. Twenty five (25%) women tested positive for B19V antibodies in the third trimester of pregnancy, implying immunity for the virus. The results of logistic regression showed insignificant association between the prevalence of B19V IgG antibodies and the demographic and obstetrical factors except for the having a child under 6 years factor ($\chi^2 = 12.33$, $p = 0.001$). **Conclusions**: Infection with B19V remains important in pregnant women in our region and virological diagnosis must be sought before any suggestive context.

Keywords: seroprevalence; parvovirus B19; pregnant women; immunoglobulin G; Morocco

1. Introduction

Parvovirus B19 (B19V) is a viral pathogen that is widespread all over the world. B19V is an enveloped virus with a single stranded linear DNA belonging to the genus *Erythroparvovirus* of the family *Parvoviridae*. The first discovery occurred in 1975 [1].

B19V can be transmitted through mouth contact, respiratory secretions, transpalcentary transfer and blood transfusion [2].

Seasonal outbreaks occur every 3–5 years. High rates of transmission were reported from late spring to summer [3], and other studies reported highest peaks from late winter to spring. In the general adult population, B19V seroprevalence rates range from 29% to 72% [4,5].

B19V infection is associated with events that vary depending on the immunological and haematological status of the host. Many infected people are asymptomatic or have non-specific symptoms [6].

In pregnant women, B19V may be responsible for hydrop fetalis, fetal anemia, intrauterine death and also spontaneous abortion [7,8]. The incidence of seroconversion during pregnancy is estimated to be between 1% and 1.5% during the endemic period and could be as high as 13% in the epidemic period. Many factors have been associated with B19V infection: number of children, nature of mother's work, and number of abortions [9].

The seroprevalence of B19V in pregnant women varies from country to country. In many developed countries, seroprevalence to B19V in women of reproductive age is well known [10]. However, epidemiological data on B19V infection are generally not available in several African countries. Morocco is one of the African countries where the magnitude of B19V is not known. No report on B19 infection is therefore available in Morocco; this study, for the first time in Morocco, provides basic information on the extent of this infection in pregnant women attending prenatal clinics.

The purpose of this article was to determine the seroprevalence of immunoglobulin G (IgG) antibodies B19V in sera from a group of asymptomatic pregnant women ba-

sic information for future diagnostic and prophylactic measures in Morocco and to compare the results to those of other countries.

2. Materials and Methods

2.1 Study Design

This research was conducted in 2020, at the birthing hospital of Marrakesh, Morocco. It is the preliminary study included 100 healthy pregnant women, who came for routine follow-up at any gestational age and who have accepted to participate in the study. A questionnaire including the demographic information, occupation gestational age, previous history of spontaneous absortion, number of pregnancy and obstetrical characteristics of the study subjects was administered by the research team.

2.2 Blood Samples and Serological Assays

The blood sample was taken for each pregnant woman after informed consent. Serum samples was separated, aliquoted into two eppendorf tubes and stored at –20 °C until testing. Presence of B19V IgG antibodies was determined by using PARVOVIRUS VIRCLIA® IgG Chemiluminescence MONOTEST kits (Vircell Microbiologist, Granada, Spain): according to manufacturer's instructions.

2.3 Statistical Analysis

Collected data were analyzed using statistical package for social science (SPSS) version 26 (IBM Corp., Chicago, IL, USA). A p value of <0.05 was considered statistically significant.

3. Results

3.1 Characteristics of the Study Population

A total of 100 pregnant women were enrolled into the study. The median age of the women was 27 (interquartile range (IQR): 17–43) years. The general demographic and obstetrical characteristics of the 100 pregnant women are listed in Table 1. Out of 100 women 54 (54%) were in third trimester, 38 (38%) in second trimester and 8 (8%) in first trimester. A total of 96 (96%) women represented the urban population. In terms of their education, 79% had primary-secondary-school education, while 10% were illiterate. Moreover, 19 (19%) women had a history of spontaneous abortion.

3.2 Prevalence of B19V IgG Antibodies

The seroprevalence of B19V IgG antibodies among all 100 women was 51% (Fig. 1). The average age of pregnant women with positive serology was 26.45 years and with negative serology was 28.98 years.

The prevalence of B19V antibodies in relation to age groups is presented in (Table 2). The seropositivity was variable in different age groups, but generally the highest prevalence was observed in age group more than 22–26 years.

Table 1. Demographic and Obstetric Characteristic of the pregnant women (n = 100) in the study.

| Characteristics	No (%)
Age Group (Years)	
17–21	18
22–26	31
27–31	25
32–36	15
37–41	7
>42	4
Residential area	
Urban	96
Rural	4
Education	
Illiterate	10
Primary, secondary	79
University	11
Occupation	
Employed	9
Housewife	91
Gestational Age	
1st trimester	8
2nd trimester	38
3rd trimester	54
Gravidity	
Primigravida	43
Multigravida	57
History of spontaneous abortion	
Yes	19
No	81
Number of living children	
0	43
1 to 2	43
3 to 4	14
sup 5	0
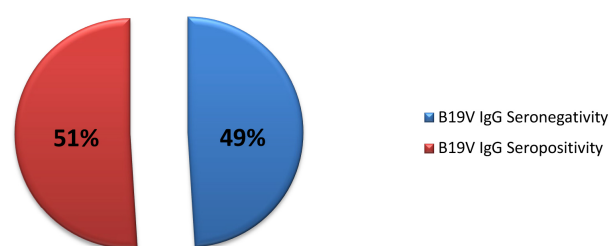
Fig. 1. IgG antibody seropositivity for B19V pregnant women in Marrakesh in Morocco. B19V, parvovirus B19; IgG, immunoglobulin G.

The seropositivity of the IgG B19V antibody relative to the gestational age of pregnant women is presented in (Fig. 2). Pregnant women in their second and third trimester had higher IgG seropositivity (22% and 25% respectively) rates than those in the first trimester 4%.
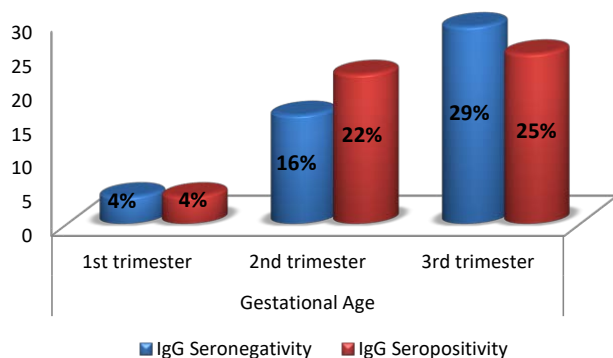
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Fig. 2. Anti-parvovirus B19V IgG immunoglobulin status according to gestational age. B19V, parvovirus B19; IgG, immunoglobulin G.

Table 2. Distribution of B19V serological prevalence by age group of pregnant women in Marrakech, Morocco.

		Negatif	Positif	Total
	17–21	8 (44.44%)	10 (55.55%)	18 (18%)
	22–26	12 (38.7%)	19 (61.29%)	31 (31%)
	27–31	13 (52%)	12 (48%)	25 (25%)
Age	32–36	8 (53.33%)	7 (46.66%)	15 (15%)
	37–41	4 (57.14%)	3 (42.85%)	7 (7%)
	>42	4 (100%)	0 (0%)	4 (4%)
Total		49 (100%)	51 (100%)	100 (100%)

B19V, parvovirus B19.

3.3 Risk Factors Associated with B19V Seroprevalence

Twenty five (25%) women showen to be positive for B19V antibodies in the third trimester of pregnancy, implying immunity for B19V. The majority (48%) of theme were of urban origin.

8% of women tested positive of IgG B19V had at least one spontaneous abortion and only one woman had a history of death in utero. 4% of the cases tested positive for anti B19 IgG were employed, one of them working in a day care centre and also 4% of them had a history of blood transfusion. 29% of the women with a child under 6 years were tested positive. The husband's regular occupation was noted in 39% of cases. The absence of schooling was described in 4% of women.

The results of logistic regression demonstrated a non-significant association between the prevalence of B19V IgG antibodies and the demographic and obstetrical factors except for the having a child under 6 years factor ($\chi^2 = 12.33$, $p = 0.001$) (Table 3).

4. Discussion

B19V infection is widespread. The prevalence of B19V varies in different part of the word. Acute B19V infection a threat to pregnant women.

This is the first epidemiological research conducted in Marrakesh investigating the seroprevalence of B19V IgG,

which will provide an understanding of the pregnant women immunity to B19V.

Statistics on B19V epidemiology in Morocco are unknown. To our understanding, this research is the first of its type on the seroprevalence of B19V in pregnant women in Marrakesh. In this study, 51% of women who participated were positive for B19V IgG antibodies, which was the same to the reported seroprevalence in pregnant women in several other countries such as Croatia (62.6%) [11], Spain (66%) [12], Italy [13].

These results are also similar to those obtained in the Saudi (50%) [14], Iran 69.1% [15], India 43% [16] with lower prevalence in the Asian region [17]. The prevalence of B19V in pregnant women in the African continent is otherwise rare:Tunisia (76.2%) [18], Libya (61%) [19], Nigeria (44.3%) [20],Sudan (61, 4%) [21].

Seroprevalence of IgG-B19V antibodies is known to be age-dependent [22]. Similarly, our research showed an age effect, with prevalence (3%) being lowest among pregnant women aged 37 to 41, but reaching 19% among women aged 22 to 26. In England, B19V IgG was detected in women aged 20 to 39 in 60% of cases in the year 2000 by Gilbert [23]. In Nigeria B19V IgG was detected in 26.2% and 9% respectively in 26–35 and 36–45 year women [20]. In Tanzania, the seroprevalence of B19 to IgG B19V was 21% for the age group 19–26 [24].

The seroprevalence of B19V in the pregnant women population can be affected by various demographic and obstetrical variables. Here in this research, we found a significant association between B19Vseroprevalence and the having a child under 6 years ($p = 0.01$). Because B19 infection occurs primarily in childhood, children are a major origin of transmission of the virus. The risk of infection in pregnant women with one child is 3 times higher than in nulliparous women, but this risk for women with three or more children is (are) 7, 5 times higher [25]. In a German research, it was described that in women of childbearing age increased seroprevalence was in those from households with two or more children (81.6%) and in women having contact with children aged <6 years at work (88.9%) [10].

5. Conclusions

In conclusion, our research provided data from Marrakech city in Morocco, for the seroprevalence of B19 in asymptomatic pregnant women.

In this study, 51% of the participating women were positive for B19V IgG antibodies indicating a considerable circulation of B19V in Marrakech city. As B19 infection is not vaccine preventable, the only way to prevent it is to reinforce hygienic precautions. Pregnant women must be warned of this infection, its effects and prevention methods.

However, more research on the prevalence of B19V in women in Marrakesh and in different cities of Morocco, particularly in those with complications and adverse outcomes of pregnancy are suggested.

Table 3. Logistic regression analysis for B19V IgG across demographic factors in 100 pregnant women in Marrakesh in Morocco.

Demographic Factor	B19V IgG seropositivity (%) n = 51	OR (95% CI)	p-value	χ^2
Age				
17–21	10	1.785 (0.388–8.213)		
22–26	19	1.395 (0.251–7.753)		
27–31	12	1.427 (0.232–8.788)	0.984	6.015
32–36	7	1.102(0.125–9.742)		
37–41	3	0.000		
Gestational Age				
1st trimester	4			
2nd trimester	22	0.834 (0.358–1.947)	0.675	1.204
3rd trimester	25			
Residential area				
Urban	48	4.944 (0.394–61.990)	0.215	0.960
Rural	3			
Education				
Illiterate	4			
Primary, secondary	41	0.710 (0.239–2.104)	0.536	0.565
University	6			
Occupation				
Employed	4	1.115 (0.234–5.306)	0.892	0.170
Housewife	47			
Social class				
High	3			
Middle	39	1.997 (0.727–5.480)	0.18	1.073
Low	9			
Gravidity				
Primigravida	24	1.742 (0.074–40.920)	0.730	1.579
Multigravida	27			
History of spontaneous abortion				
Yes	8	0.482 (0.134–1.731)	0.263	0.743
No	43			
Having Children				
Yes	26	0.260 (0.008–8.641)	0.451	1.539
No	25			
Number of living children				
0	25			
1 to 2	20	1.537 (0.338–6.988)	0.578	1.595
3 to 4	6			
>5	0			
Having a child under 6 years				
Yes	29	0.220 (0.092–0.524)	0.001**	12.33
No	22			
Medical and surgical history				
Yes	11	1.495 (0.447–5.007)	0.514	0.514
No	40			

** p-value < 0.05 consider significant.

B19V, parvovirus B19; IgG, immunoglobulin G; OR, odd ratio; CI, confidence interval; χ^2, chi square.

Abbreviations

B19V, parvovirus B19; IgG, immunoglobulin G; IQR, interquartile range; OR, odd ratio.

Availability of Data and Materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Author Contributions

MB—extracting, drafting, analysis of data, statistical analysis of the manuscript, SZ and KW— design and revision. LA and YE—manuscript revision. All authors read and approved the final manuscript.

Ethics Approval and Consent to Participate

The study was approved by the institution's research and ethics committee and the informed written consent was signed by all pregnant women who participated in the study. The code of ethics is no. 17/2022 issued by the ethics committee of the university hospital in Marrakesh, Morocco.

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Conflict of Interest

The authors declare no conflict of interest.

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