

Seroprevalence of parvovirus B19 among pregnant women in Tripoli, Libya

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Abstract

Background: Human parvovirus B19 has been implicated as a primary etiologic agent of erythema infectiosum (fifth disease) and aplastic crisis in patients with chronic haemolytic anemias. Human parvovirus B19 is known to be associated with adverse effects on fetuses such as hydrops fetalis, intrauterine fetal death, and chronic anaemia in immunocompromized individuals. The objective of this study was to assess the seroprevalence of human parvovirus B19 among the pregnant women in Tripoli, Libya.

Methodology: A total number of 150 participants were included in the study, consisting of women of child-bearing age ranging from 18 to 41 years, and divided into age groups as follows: ≤ 21 years, 22-27, 28-32, 33-37, and ≥ 38 years. Specific IgM and IgG antibodies were measured using a commercial ELISA kit.

Results: IgG was observed to be prevalent (61%) among the women of child-bearing age. The sero-prevalence of IgM was found to be 5% overall and there was no detectable IgM in the age group between 33 and 37.

Conclusion: The presence of IgG and absence of IgM indicate immunity to primary infection, but a significant percentage of child-bearing aged women are at risk of primary infection with parvovirus B19 which could adversely affect their pregnancy.

Key Words: Seroprevalence, human parvovirus B19, pregnancy, Libya

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Introduction

Human parvovirus B19 was recently recognized as the cause of non-immune hydrops fetalis and intrauterine fetal death [1]. Parvovirus B19 (B19) is a small, non-enveloped, single-stranded DNA virus in the family Parvoviridae [2]. B19 replication within erythroid progenitor cells leads to apoptosis, which ultimately results in inhibition of erythropoiesis [3]. Erythroblastopenia can then occur as a consequence of B19 replication, causing severe fetal anemia [4]. Transmission occurs most commonly by personal contact via aerosol or respiratory secretions; however, contaminated blood products, such as clotting factor concentrates, are a source of iatrogenic transmission [3,4]. B19 can be transmitted transplacentally from an infected mother to the fetus, which leads to non-immune fetal hydrops (NIHF), spontaneous abortion, or intrauterine fetal death [5].

The fetus seems to be most susceptible to parvovirus B19 infection during the first and second trimester of pregnancy and especially between weeks

10 and 20, which coincide with the major development of the erythroid precursors [6]. Parvovirus B19 has a propensity for infecting rapidly dividing cells, particularly erythroblasts [7]. Between the third and sixth months of pregnancy, the fetal red blood cell mass increases thirty times, with a risk of developing anemia if the fetus is infected by parvovirus B19 [8]. By the third trimester, the fetus is able to mount a more effective immune response to the virus, which may account for the decrease in fetal loss at this stage of pregnancy [9].

Seroprevalence of IgG antibodies to parvovirus B19 increases with age [10,11]. A survey conducted in the United States of America showed a gradual increase in the seropositivity with age ranging from as low as 19% in children under 10 years of age to 67% in individuals over 49 years of age, suggesting continuous exposure to the virus, despite the annual seroconversion rate 1.5% in women of child-bearing age during endemic periods and 13% during epidemics.

Our information regarding the role of parvovirus B19 in Libya is sparse and its role in fetal loss in pregnancy remains unknown. Thus, the objective of this study was to assess the seroprevalence of human parvovirus B19 among the pregnant women in Tripoli, Libya as a preliminary evaluation of the role of this virus in fetal loss.

Materials and methods

The study was conducted between April 2007 and July 2008 at Saint James Hospital, Tripoli, Libya. A total number of 150 pregnant women ranging in age from 18 to 41 years and at various trimesters of pregnancy were included in this study. The women were divided into the following age groups: ≤ 21 years, 22-27, 28-32, 33-37, and ≥ 38 years. Blood samples of 5 to10 ml were collected and stored at - 20°C before subjected to testing.

Seroprevalence of IgM and IgG of different age groups was done using EIAgen parvovirus B19 IgM and IgG (Adaltis, Italy) as described by the manufacturer. Statistical analysis was conducted using SPSS (version 10.0.7). The Chi-square test was applied to assess the association between the categorical variants. A P-value of < 0.05 was used as the cut-off level for significance.

Results

Among the 150 pregnant women tested, 92 (61%) were positive for IgG, whereas only 8 (5%) demonstrated positivity for IgM to parvovirus B19 (Table 1). It was significantly observed that there was no detectable IgM in the child-bearing age group ranging between 33 and 37 (P < 0.001), while the age group ranging from 28 to 32 showed a lower seropositivity of 4%.

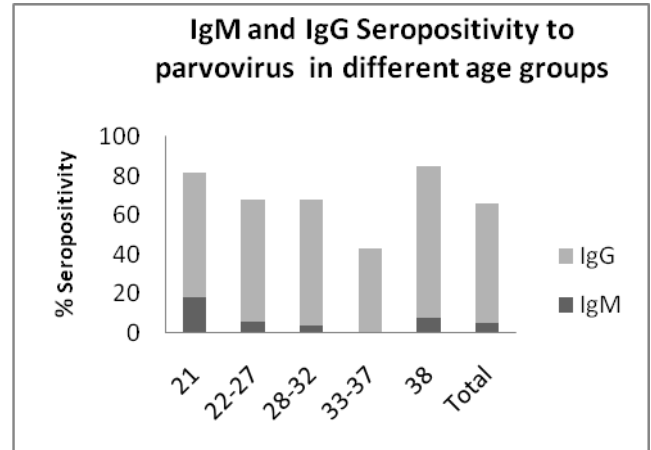
Table 1. Prevalence of IgM and IgG antibodies in different age groups.

Age (Years)	IgM		IgG	
	Positive (%)	Negative (%)	Positive (%)	Negative (%)
≤ 21	2 (18%)	9 (82%)	7 (64%)	4 (36%)
22 – 27	3 (6%)	47 (94%)	31 (62%)	19 (38%)
28 – 32	3 (4%)	51 (96%)	34 (64%)	19 (36%)
33 – 37	-	23 (100%)	10 (43%)	13 (57%)
≥ 38	1 (8%)	12 (92%)	10 (77%)	3 (23%)
Total	8 (5%)	142 (95%)	92 (61%)	58 (39%)

These results indicate a very low seropositivity (6%) for IgM in the age group of 22 to 27 (P = 0.040); however, their IgG levels were comparatively higher (62%) (Figure1). Seroprevalence of IgG antibodies was observed to increase with the increase in age, except for the age group of 33- 37, who were IgM negative.

Figure 1.

Discussion



Human parvovirus B19 infection has been detected in a number of developed countries throughout the world with adult prevalence rates varying from 30-60% [12]. However, few prevalence investigations have been conducted in developing countries. In a study of urban and remote rural populations in northern Brazil, the B19 parvovirus seroprevalence in the urban population of Belem was found to be similar to that of developed countries (42.6%), while it was considerably lower among the remote rural tribes (4.7 – 10.7%) [13]. In an African study, prevalence of 58.4% and 55.0% were found in Malawi and Mauritius respectively, compared with a very low prevalence of 2.2% on remote Rodriguez Island. The 61% prevalence of parvovirus B19 antibodies in our sample was in compliance to the 50-60% reported for Malawi and Mauritius and also matches the figures from developed countries [13]. A study done on Kuwaiti pregnant women showed that the seroprevalence of IgG and IgM to human parvovirus B19 was 53.3% and 2.2% respectively, signifying that our results are well in agreement with the regional reports [14].

IgM seropositivity has been found to be associated with the event of late spontaneous abortion and stillbirth [14,15]. Nevertheless, the prevalence of IgM antibodies indicative of acute infection was

significantly lower in the samples studied. However, none of the IgM positive women showed any signs of anaemia or any other evidence of intra-uterine infection, which is consistent with other reports of low risk (9%) of fetal loss or damage from parvovirus infection in pregnancy [12,13].

A large number of populations acquire parvovirus B19 infection during childhood [16]. However, primary infection with the parvovirus B19 infection in pregnant women might cause fetal damage [17]. Depending on the gestational age, the complications vary from asymptomatic infections to abortions [9]. Our study showed that IgG and IgM negative patients are at greater risk of acquiring parvovirus B19 infection, and that the higher IgG seroprevalence could be attributed to the greater exposure of parvovirus B19 infections among the child-bearing women in Libya. Also, the seroprevalence of IgG antibodies to parvovirus B19 increases with age, ranging from a low level of 62% in women between 22 to 27 years of age and as high as 77% in individuals of over 38 years of age, suggesting continuing exposure to the virus. Further investigations of parvovirus infection in pregnancy including an avidity test to distinguish primary and secondary infection are needed to ascertain whether relatively uncommon primary infection carries a greater risk of fetal infection and damage.

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Conflict of interest: No conflict of interest is declared.