

Research Article

Sero-Prevalence of Parvovirus B 19 Infection Among HIV Positive Patients Attending Tertiary Care Hospital in Central India

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Abstract

Objective: The aim of this study was to assess sero-prevalence of Parvovirus B19 among HIV positive patients attending tertiary care hospital from central India.

Methods: This was a hospital based cross sectional study conducted from June 2014 to September 2014. The study population includes 100 HIV positive patients attending ART Clinic with signs and symptoms suggestive of anemia and hemoglobin <10g/dL were included. Blood samples were collected and the sera obtained after centrifugation of clotted samples were stored at -20°C. Enzyme-linked immunosorbent assay was used to detect IgG and IgM antibodies. CD4⁺ count estimation of blood samples was done by Flow cytometry. The demographic information's were collected from patients using structured questionnaire prior to sample collection. Institutional Ethical committee approval has been taken prior to conduct this study. The consent to collect the study data was also obtained from the patients. The data were analyzed using statistical software Epi Info 7.

Results: The mean age of study subjects was 37.44±9.80 years and 55 (55%) were males and 45 (45%) were females. IgG and IgM antibody test showed, 6 (6%) and 11 (11%) cases were positive for anti-parvovirus IgM and

IgG antibodies respectively. Thus, 17(17%) patients were positive for anti-parvovirus IgM or IgG antibodies. Among the 17 positive cases, IgG was more prevalent. There were 14 cases (14%) had Hb % in the range of 5.0-6.9g/dL, 6 (42.8%) of these were seropositive for anti-parvovirus antibody (IgM or IgG) and a single case with Hb% less than 5 g/dL. There was no statistically significant correlation between CD4 count and sero-positivity.

Conclusion: The prevalence of anti-PVB19 IgM and IgG antibodies among HIV-infected patients was 6% and 11% respectively.

Keywords: Sero-prevalence; PVB19; CD4⁺; HIV patient; India

1. Introduction

In 1974 Parovirus B19 (PVB19) was discovered coincidentally while screening of healthy blood donors for Hepatitis B, this virus is the only member of Parvoviridae known to cause infections in humans [1]. The B19 virion has a simple structure composed of only two proteins and a linear single-strand DNA molecule, non- enveloped viral particles are 22 to 24 nm in diameter and show icosahedral symmetry [2]. The virus is distributed worldwide and manifestations of infection vary with the hematologic and immunologic conditions of the host. In healthy immunocompetent children, PVB19 is the cause of erythema infectiosum (EI) [1]. PVB19 infection transmission occurs via the respiratory route display endemicity and occur sporadically in different populations with children, patients with hemolytic disorders, immunocompromised patients such HIV infection and pregnant women being most affected [3].

PVB19 is associated with chronic anemia in immunocompromised patients, especially observed in human immunodeficiency virus (HIV) infected patients [4]. There are many causes of anemia among these patients, including co infection with mycobacteria, fungi, and cytomegalovirus; anti neoplasm lymphoma; drugs such as zidovudine, trimethoprim sulfamethoxazole [5]. Up to 80% of HIV-infected persons are anemic and the percentage increases with advancing stage of HIV infection [6, 7]. There have been many reports on the possible role of human Parvovirus B19 infection in such conditions, but these described mainly in individual cases [8-10]. In immunocompromised patients, persistence of virus replication and the consequent chronic anemia are due to an inability to produce neutralizing antibodies [11, 12]. The presence of anti-Parvovirus B19 IgG in the serum is indicative of an immune response to previous viral challenge [13-15].

In this study area, the data defining the burden of Parvovirus B19 infections in the general population and HIV infected population are scanty. The present study was undertaken to find the sero-prevalence of Parvovirus B19 among HIV positive patients attending tertiary care hospital from central India.

2. Materials & Methods

2.1 Study setting and Design

This was a hospital based cross sectional study conducted in the Department of Microbiology and ART (Anti-Retroviral Therapy) Clinic, Government Medical College and Hospital, Nagpur, a tertiary care teaching hospital in Central India. The study duration was from June 2014 to September 2015.

2.2 Study Population

The study population includes 100 HIV positive patients attending ART Clinic, Government Medical College and Hospital, Nagpur, with signs and symptoms suggestive of anemia and hemoglobin <10g/dL were included. Immunocompromised patients other than HIV positive patients were excluded from the study.

2.3 Sample collection

Blood samples were collected and the sera obtained after centrifugation of clotted samples were stored at -20°C. Enzyme-linked immunosorbent assay (ELISA; Vircell, Granada, Spain) was used to detect IgG and IgM antibodies to PVB19 in the sera. The test uses recombinant VP2 protein antigen to identify PVB19-specific IgG and IgM antibodies. CD4⁺ count estimation of blood samples was done by Flow cytometry (FACS Calibur, Becton-Dickinson). The demographic information's were collected from patients using structured questionnaire prior to sample collection.

2.4 Ethical Consideration

This study was conducted after obtaining approval from the Institutional Ethical committee. The consent to collect the study data was also obtained from the patients. The data was analyzed using statistical software Epi Info 7.

3. Results

The demographic data of populations included in this study (N=100) shows that, the mean age was 37.44±9.80 years and 55 (55%) were males and 45 (45%) were females. IgG and IgM antibody test showed that 6 (6%) cases were positive for anti-parvovirus IgM antibody and 11 (11%) cases were IgG positive. Thus, 17 (17%) patients were positive for anti-parvovirus IgM or IgG antibodies. There was not a single case which was positive for IgM and IgG antibodies together. Among the 17 positive cases, IgG was more prevalent.

Hb % (g/dL)	Parvovirus B19 Seropositive cases	Parvovirus B19 Seronegative cases	Total (n=100)
<5	0	1(100)	1
5.0-6.9	6 (42.8)	8(57.2)	14
7.0-10.0	11(12.9)	74(87.1)	85

Chi² =7.56, df = 1, p = 0.005

Table 1: Sero-prevalence association of Parvovirus B19 with hemoglobin % (g/dl)

As shown in Table 1, 14 cases (14%) had Hb % in the range of 5.0-6.9g/dL and 6 (42.8%) of these were seropositive for anti-parvovirus antibody (IgM or IgG). There was a single case with Hb% less than 5 g/dL & was found to be negative for anti-parvovirus antibody (IgM or IgG). Whereas out of remaining 85 cases having Hb% between 7-10g/dL, only 11 (12.9%) cases were seropositive for anti-parvovirus antibodies. There was a non-significant association between PVB19 sero-positivity and hemoglobin level ($p=0.005$). Out of 100 patients, 22 (22%) had CD4 count less than 200 cells/ μ l. 33 (33%) had CD4 count between 200 to 349 cells/ μ l. As shown in Table 2, 19 (19%) of CD4 count was between 350-500 cells/ μ l. Whereas, 26 (26%) patients had CD4 count more than 500 cells/ μ l. There was no statistically significant correlation between CD4 count and sero-positivity ($\chi^2=1.087$, $p=0.2970$).

CD4 ⁺ count (cells/ μ l) range	HIV positive and Parvovirus B19 Positive (n=17)	HIV positive and Parvovirus B19 negative (n=83)	Total (n=100)
<200	2 (9.1)	20 (90.9)	22
200-349	10 (30.3)	23 (69.7)	33
350-500	4 (21.0)	15 (79)	19
>500	1 (3.8)	25 (96.2)	26
Total	17	83	100

Table 2: Sero-prevalence association of Parvovirus B19 with CD4⁺ counts

4. Discussion

To our knowledge, this study is the first to be reported on Parvovirus B19 sero-prevalence among HIV-infected patients from Central India. The age distribution showed a positive linear trend with sero-positivity for PVB19. Sero-prevalence was found to be more in females (17.7%) than in males (16.3%) ($p=0.851$). Abkowitz JL *et al.*, have reported similar findings [5]. The sero-prevalence of IgM against PVB19 was 6% and that of IgG against PVB19 was 11% in our study populations. Gyllensten *et al.*, reported 64% PVB19 sero-prevalence and no difference concerning the prevalence of IgG antibodies between patients in early and late stages of HIV infection [8]. Azevedo KM *et al.*, reported a high sero-prevalence of 62.8% B19 IgG from Brazil [4]. This study shows that, the high PVB19 viral sero-prevalence which is common in western countries has not emerged in this part of the world. Satish Kumar *et al.*, have reported a sero-prevalence of IgM antibodies to human PVB19 as 7.53% and of IgG antibodies as 27.96% [16]. Miao Another study has also reported an IgG sero-prevalence of 15.2% [17]. These variations in sero-prevalence might be explained by seasonal, epidemiological or demographical characteristics that resulted in different rates of exposure to the virus. In our study, there was no significant association between PVB19 sero-positivity and haemoglobin levels ($p=0.005$). Similar finding has been reported among anaemic and non-anaemic HIV-infected patients [18].

There was no significant correlation between CD4 count and sero-positivity. In the study by Vernazza et al., CD4⁺ T lymphocyte count was inversely related to seroprevalence rates, but this trend was not statistically significant [10]. This association was not observed in our study. Azevedo *et al* found an inverse - but non-significant - association between PVB19 seropositivity and plasma HIV load. This unexpected observation may indicate an increased susceptibility to PVB19 infection in patients with low plasma HIV load or perhaps, a greater ability to mount a specific antibody response in individuals whose immune system is not weakened by HIV activity [4]. This seems to occur independently from CD4⁺ T cell counts, as we found no significant association between such counts and PVB19 sero-positivity.

In conclusion, the prevalence of anti-PVB19 IgM and IgG antibodies among HIV-infected patients was 6% and 11% respectively. Based on the outcomes of this study, we recommend a larger epidemiological study of PVB19 using both serological and molecular methods to gain more insight into the epidemiologic and clinico-pathological importance of PVB19 infection among Indian populations.

5. Acknowledgements

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6. Conflict of interest

The author(s) declare(s) that there is no conflict of interest regarding the publication of this paper.

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