Seroprevalence of Human Parvovirus B19 Antibodies among Sudanese Patients with Rheumatoid Arthritis

Mohammed I ELsedig*, Wafa Elhag2, Mohammed J.El-Mak1 and Mohammed Abbas3

1Microbiology Department, Faculty of Medical Laboratory Sciences, Al-Neelain University, Sudan (M.Sc students)
2Assistant professor -Microbiology Department, Faculty of Medical Laboratory Sciences, Al-Neelain University, Sudan
3Medical Laboratory Department, College of Applied Medical Sciences, Salman bin Abdulaziz University, Kharj -Saudi Arabia

*Corresponding author e-mail: moh.isameldien@gmail.com

ABSTRACT

Background: In order to find a relationship between the Parvovirus B19 and the extent of its relation with Rheumatoid Arthritis, it was decided to carry out this study with the objective to determine the seroprevalence of both IgM and IgG anti- Parvovirus B19 among Sudanese patients with Rheumatoid Arthritis.

Methods: it was cross sectional hospital based study. 90 blood samples were collected from known Sudanese patients who visited the rheumatology clinic of different hospitals in Khartoum – SUDAN and fulfilled the American College of Rheumatology Criteria for Rheumatoid Arthritis in the period between April and July 2014. The anti-citrullinated cyclic peptide (ACCP) and rheumatoid factor (RF) were done to all patients and ELISA technique was used for detection of IgG and IgM anti-parvovirus B19 in patients' serum.

Result: The results presented herein show the presence of IgM anti-parvovirus B19 in 31 (34.4%) of RA examined patients (27 (30%) female and 4 (4.4%) male). The IgG was detected in 49 (54.4%) of the study subjects (40 (44.4%) female and 9 (10%) male).

Conclusion: our study extends and agrees with the previous observations regarding a high prevalence of B19 antibodies in patients with RA, and a possible role of its infection in the pathogenesis of RA. We recommend the researchers to search in depth at molecular level about the possible relations between parvovirus B19 and RA in Sudanese patients.

Keywords- Parvovirus B19, Rheumatoid arthritis, Khartoum, Sudan.
INTRODUCTION

Rheumatoid Arthritis (RA) is an autoimmune disorder characterized by joint inflammation, it affect around 1% of the general population worldwide and occurs in all races and ethnic groups with predominance in women\(^1,2\). The disease generally is more frequent in older people and this does not mean the impossibility of its occurrence in children; when it in children it called juvenile RA\(^3\). The prevalence of RA in Northern European and North American areas estimated a prevalence of 0.5–1.1%. The reports from the countries of Southern European showed a prevalence of 0.3–0.7%. The lower prevalence noticed was from the developing countries (between 0.1% and 0.5%)\(^4\). To the best of our knowledge there are no scientific publications or declared official statistics to show the prevalence of RA in Sudan.

The etiology of RA is not fully understood\(^5\). Many factors suggested playing roles in the pathogenesis of RA including both genetic and environmental factors\(^6\). Several studies have demonstrated the role of viruses such as rubella, human parvovirus B19, cytomegalovirus (CMV), human T cell leukemia virus1, and HIV in causing an acute onset of polyarthritis\(^7-11\). It was stated that arthropathy associated with B19 infection resembles the diagnostic criteria of rheumatoid arthritis (RA) or juvenile arthritis. Number of studies suggested that B19 can cause RA and destruction in joints, which could be followed by the development of rheumatoid factor (RF) and detection of B19 DNA in the tissues of the affected joints\(^12-15\).

Our objective was to determine the seroprevalence of both IgM and IgG anti-parvovirus B19 among Sudanese patients with RA.

MATERIALS AND METHODS

Ninety Sudanese patients (77 females, 13 males; age between 10 – >45 years) with rheumatic diseases who visited the rheumatology clinic of different Hospitals, Khartoum – Sudan, in the period between April and July 2014 were enrolled in this cross sectional study. A basic selection criteria includes the Sudanese patients who fulfilled the criteria of the American College of Rheumatology1987 (ACR) for RA. Non Sudanese patients with RA and the doubtful diagnosed patients were excluded. The demographic data, titers of RF and anti-CCP antibodies of each patient were recorded. Serum from each subject was tested for Anti-CCP and anti-parovirus B19 (IgM and IgG) by ELISA technique (Euroimmun company – Germany), RF (IgM) was done by latex technique. Assays were performed as recommended by the manufacturer. Serum samples were collected and stored at –80°C until assayed. The study was approved by the Ethics committee of ALNeelain University.

Data was statistically analyzed by Statistical software packages (Excel 5.0, Microsoft, Redmond, WA); and Statistical Package for the Social Sciences 20.0, SPSS, Inc., Chicago, IL).

RESULTS

The results presented here in show the presence of IgM anti-parovirus B19 in 31 (34.4%) of RA examined patients (27 (30%) female and 4 (4.4%) male). The IgG was detected in 49 (54.4%) of the study subjects (40 (44.4%) female and 9 (10%) male) (Table 1). The IgM and IgG was detected in 7 (7.8%) and 15 (16.7%) of patients on medications, respectively. All patients were anti-CCP and RF positive. A high rate of IgG antibodies was noticed in the age group between 25–45 years (Table 2). Based on patient’s occupation the house wife was representing the peak percentage
DISCUSSION

To the best of our knowledge this study will be the first one in Sudan to determine the seroprevalence of IgM and IgG anti-parvovirus B19 among Sudanese patients with RA. Globally, several studies suggested the link between parvovirus B19 infection and the development of rheumatoid arthritis.\(^7\)\(^{12}\)\(^{13}\)

The presence of B19 in RA synovial cells was suggested to have a role in initiation and perpetuation of RA synovitis by Takahas\(h\)i Y et al\(^14\). Meyer O demonstrated that acute B19 infection can simulate early RA.\(^15\) Cohen et al demonstrated the high prevalence of anti B19 among RA patients.\(^16\)

This study reports a considerable prevalence of anti-parvovirus B19 among Sudanese patients with RA. IgM anti-parvovirus B19 was detected in 34.4% while IgG was detected in 54.4% of the study subjects. In Turkey, R. Caliskan et al also observed the high prevalence of both IgM and IgG anti-parvovirus in patients with RA.\(^17\). In Switzerland, P Cassinotti et al found that 75% of the patients suffering from RA with rheumatoid factor had anti B19 IgG antibodies.\(^18\) Gonzalez et al mentioned the presence of IgM against parvovirus B19 in 20% of the patients with juvenile idiopathic arthritis while IgG was found in 32%.\(^19\) In general, the presence of the IgM indicates recent infection while the IgG indicates the previous and recurrent infection of parvovirus B19 in such patients. The dominance of females was noticed in the current study, the result is in accordance with the result obtained by Teh and Wong, 84.4% of the RA patients in the study were female.\(^20\) The finding was also supported by the findings of Lawrence et al in which female RA patients were four times more common than male.\(^21\)

In conclusion, our study extends and agrees with the previous observations regarding a high prevalence of B19 antibodies in patients with RA, and a possible role of this viral infection in the pathogenesis of RA. We recommend the researchers to search in depth at molecular level about the possible relations between parvovirus B19 and RA in Sudanese patients.

ACKNOWLEDGMENTS

The authors sincerely thank the staff of the rheumatology and laboratory department at hospitals of Khartoum state-Sudan.

The thanks also extend to the K-Bioanalytica Company KH-SUDAN (Euroimmun company products distributors- SUDAN) staff especially the general manager: Dr. Khalifa Kalafallah.

Conflict of interest

There was no conflict of interest.

REFERENCES

**Table 1.** IgM and IgG anti-parvovirus B19 among RA patients in this study

<table>
<thead>
<tr>
<th>Gender</th>
<th>RF</th>
<th>Anti-CCP</th>
<th>IgM anti-parvovirus B19</th>
<th>IgG anti-parvovirus B19</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>+ve</td>
<td>-ve</td>
<td>+ve</td>
<td>-ve</td>
</tr>
<tr>
<td>Male</td>
<td>13(14.4%)</td>
<td>0</td>
<td>4 (4.4%)</td>
<td>9(10.0%)</td>
</tr>
<tr>
<td>female</td>
<td>77(85.6%)</td>
<td>0</td>
<td>27(30.0%)</td>
<td>50(55.6%)</td>
</tr>
<tr>
<td>Total</td>
<td>90(100%)</td>
<td>0</td>
<td>31(34.4%)</td>
<td>59(65.6%)</td>
</tr>
</tbody>
</table>

**Table 2.** IgM and IgG anti-parvovirus B19 in different age groups

<table>
<thead>
<tr>
<th>Age groups</th>
<th>Results</th>
<th>IgM</th>
<th>IgG</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>+ve</td>
<td>-ve</td>
<td>+ve</td>
</tr>
<tr>
<td>10 - 24 years</td>
<td>Count</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>%</td>
<td>3.3%</td>
<td>11.1%</td>
<td>11.1%</td>
</tr>
<tr>
<td>25 - 45 years</td>
<td>Count</td>
<td>16</td>
<td>26</td>
</tr>
<tr>
<td>%</td>
<td>17.8%</td>
<td>28.9%</td>
<td>21.1%</td>
</tr>
<tr>
<td>&gt; 45 years</td>
<td>Count</td>
<td>12</td>
<td>23</td>
</tr>
<tr>
<td>%</td>
<td>13.3%</td>
<td>25.6%</td>
<td>22.2%</td>
</tr>
</tbody>
</table>

**Table 3.** Distribution of study subjects according to their occupation

<table>
<thead>
<tr>
<th></th>
<th>IgM</th>
<th>IgG</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>+ve</td>
<td>-ve</td>
</tr>
<tr>
<td>Solger</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>%</td>
<td>1.1%</td>
<td>2.2%</td>
</tr>
<tr>
<td>Worker</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>%</td>
<td>7.8%</td>
<td>13.3%</td>
</tr>
<tr>
<td>Student</td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>%</td>
<td>4.4%</td>
<td>14.4%</td>
</tr>
<tr>
<td>Housewife</td>
<td>19</td>
<td>31</td>
</tr>
<tr>
<td>%</td>
<td>21.1%</td>
<td>34.4%</td>
</tr>
<tr>
<td>No Work</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>%</td>
<td>0%</td>
<td>1.1%</td>
</tr>
<tr>
<td>Total</td>
<td>31</td>
<td>59</td>
</tr>
<tr>
<td>%</td>
<td>34.4%</td>
<td>65.6%</td>
</tr>
</tbody>
</table>
Figure 1. Age group distribution among study population