Screening of anti-cytomegalovirus IgG antibodies in blood donors in Al-Najaf governorate

Abstract:

The aim of this study was to investigate the prevalence of human cytomegalovirus (HCMV) IgG antibody in blood donors. Screening of blood donors for (HCMV) IgG antibodies are usually performed by the detection of specific IgG antibody. The study included a collection of venous blood samples from one hundred twenty male donors whose ages ranged from (15-55) years, 61 urban and 59 rural blood donors in Al-Najaf governorate. Enzyme-linked immunosorbent assay (ELISA) was used to detect IgG antibodies in the samples. ELISA test reflected 56 seropositive (46.6%) blood donors out of 120 samples. The seroprevalence was significant as regards to the residence, while insignificant as regards the age of blood donor and history of blood transfusion. Our preliminary data suggested that HCMV antibody screening of blood donors should be performed, for example, by detection of specific IgG antibodies to avoid donor-recipient transmission of infection.

Introduction:

Human cytomegalovirus (HCMV) is a widespread pathogen responsible for generally asymptomatic and persistent infections in healthy people. The virus poses a significant health threat to immunocompromised individuals and is a significant cause of morbidity and mortality specially in organ allograft and bone marrow transplant patients (1,2). HCMV may cause disease upon primary infection. Seronegative recipients are therefore at high risk, especially if the donor organ is from a seropositive individual (3,4,5, 6, 7,7,8,9).
Monocytes have been identified as the major site of latency of HCMV in peripheral blood of healthy carriers and is more likely to transform latent infection (10,11,12). Allogeneic stimulation of peripheral blood mononuclear cells by T cells provides an immunologic stimulus that facilitates reactivation of latent HCMV (13,14). Thus HCMV may be reactived from latently infected cells after blood transfusion. In general; transfusion of unscreened cellular components leads to HCMV incidence of approximately 30% in seronegative recipients (15).

HCMV antibody screening of blood donors can be performed reliably by detection of specific IgG. Acute cytomegalovirus infections in blood donors are detected by immunostaining of peripheral blood leukocytes along with ELISA detection of antibodies, (16) or by increased serum neopterin concentration (17).

Subject and Methods
Study design: This is a screening study. It was performed in Al-Najaf blood bank. One hundred twenty blood donors male aged between (15-55) years were recruited during 2008 and were divided into two groups: First group comprised 61 urban blood donors. Second group comprised 59 rural blood donors. For all blood donors, the following data have been collected:
- Age .
- Residence.
- History of blood transfusion .
Sample collections: Three ml of blood was collected from each donor by vein puncture, serum samples were separated and kept at-20 C° until the time of processing.

Anti-HCMV IgG detection: ELISA technique used to detect HCMV IgG antibodies in samples by using HCMV ELISA IgG kit (Vircell, Pza. Dominguez Ortiz1.Granada, Spain). Kit for detection of IgG antibodies to HCMV virus in human serum is enough for 96 tests.

Statistical analysis: T-test was used to compare different results during this study.

Results:
HCMV Specific IgG antibodies were investigated using ELISA in one hundred twenty random blood donors aged 15 - 55 years old (61 urban and 59 rural), table (1). The seroprevalence was (46.6%) in all blood donors (18.3%) of urban were seropositive compared to (57.6%) in rural donors.
A significant difference was present between urban and rural donors regarding HCMV seroprevalence, table (2).
The seroprevalence of HCMV-IgG was insignificant as regards to the age and history of blood transfusion, tables (1,3).
Table (1) : Incidence of anti-cytomegalovirus IgG antibodies seropositivity
According to the age groups
<table>
<thead>
<tr>
<th>Age groups(years)</th>
<th>Total blood donors</th>
<th>Anti-HCMV IgG +</th>
<th>Anti-HCMV IgG -</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 - 24</td>
<td>35</td>
<td>17</td>
<td>18</td>
</tr>
<tr>
<td>25 - 34</td>
<td>44</td>
<td>19</td>
<td>25</td>
</tr>
<tr>
<td>35 - 44</td>
<td>26</td>
<td>15</td>
<td>11</td>
</tr>
<tr>
<td>45 - 55</td>
<td>12</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>120</strong></td>
<td><strong>56 (46.6%)</strong></td>
<td><strong>64 (53.3%)</strong></td>
</tr>
</tbody>
</table>

P>0.05

Table (2): Relationship between residence of blood donors and anti-cytomegalovirus IgG antibodies seropositivity

<table>
<thead>
<tr>
<th>Blood donors</th>
<th>Residence</th>
<th>IgG +</th>
<th>IgG -</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Urban</td>
<td>22</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>Rural</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>61</strong></td>
<td><strong>(50.8%)</strong></td>
</tr>
</tbody>
</table>

P<0.05

Table (3): Relationship between History of blood transfusion and anti-cytomegalovirus IgG antibodies seropositivity

<table>
<thead>
<tr>
<th>Blood donors</th>
<th>History of blood transfusion</th>
<th>IgG +</th>
<th>IgG -</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Positive history</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Negative history</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>13</strong></td>
<td><strong>(10.8%)</strong></td>
</tr>
</tbody>
</table>

P>0.05

Discussion:
HCMV-IgG is transmitted by blood transfusion from healthy seropositive donors to susceptible recipients (12,16,18). In this study, HCMV-IgG antibodies were detected in 46.6% of all blood donors, this agrees with the results (10) (59.9%), (20) (52.5%) and (16) (52.38%). Higher incidence of HCMV-IgG antibodies was reported by (21) (68.9%), and (22) (97.14%). Lower incidence of HCMV-IgG was reported by (23) (32.1%), (24) (38% ) and (25) (34% ).
The variation of Seroprevalence of HCMV-IgG antibodies between different countries may be due to the differences in socioeconomic levels in the studied areas. (10) mentioned that people who are from lower socioeconomic areas show a higher HCMV-IgG seroprevalence than do people from an upper or middle income levels. In the present study, there was significant difference of HCMV-IgG seroprevalence level between rural and urban donors (rural being significantly higher than urban seroprevalence).

Regarding the relation between HCMV-IgG seroprevalence and age of donors, the range varied from 46.3% in age group 20-30 years to 61.9% in age group 40-49 years. (10) mentioned that the HCMV-IgG seroprevalence increases with age. (16) reported that, the highest incidence in HCMV-IgG was in the age group 41-50 years. In this study the seroprevalence of HCMV-IgG was insignificant as regards the age and history of blood transfusion.

From the previous results, it was found that prevention of TT- HCMV infection is recommended for HCMV seronegative immunocompromised patients and this can be achieved by using HCMV-seronegative blood and blood products. Also large scale screening of blood donors for HCMV using different assays is recommended.

References:


