Immunological Indicators in Aborted Women Infected with Human Cytomegalovirus in Karbala City, Iraq

Noor H. Alkharsan*, Alaa A. Aljanabi, Zahraa M. Alshammari

Department of Medical Laboratory Technologies, AlSafwa University College, Karbala, Iraq

*Corresponding author: Noor H. Alkharsan, Mobile: (+964) 771 903 4809, Email: noorh.alkharsain@alsafwa.edu.iq

ABSTRACT

Introduction: In affluent countries, human cytomegalovirus (CMV) is the most common cause of congenital malformations caused by viral intrauterine infection. HCMV infection is the infectious cause of deafness, visual loss, mental retardation, and other neurodevelopmental disorders in children, causing significant morbidity and mortality in infants.

Objective: The work was conducted to identify the rates of spontaneous abortion occurrence among the age groups, stages of pregnancy, and detection of the type of abortion that most frequently occurred in the pregnant women community.

Patients and Methods: 65 Blood samples were collected from abortifacients women at the moment of miscarriage. Each pregnant woman had five milliliters of blood collected to separate the sera. The CMV-IgM and CMV-IgG antibody levels in the patient's serum were determined using an ELISA assay.

Results: The outcome of antibodies against CMV were found in 50 of 65 (76.92%) aborted mothers, while 15 (23.07%) of 65 women had abortions for unknown reasons. Meanwhile, most pregnant women who had abortions tested positive for CMV-IgG, with 36 (72%) of them being positive, the number of people who tested positive for CMV-IgM was 14 (28%). The age group 25–34 years old was the most infected with CMV infection, accounting for 25 (50%) of the cases. 96% and 4% of patients were infected in urban and the countryside regions, respectively.

Conclusion: Based on this research, spontaneous abortion rates are increasing within young age groups, particularly for missed abortions during the first trimester of pregnancy.

Keywords: Human Cytomegalovirus, CMV, Congenital infection, HCMV

INTRODUCTION

The prototypical member of the Betaherpesvirinae subfamily Herpesviridae is Cytomegalovirus (CMV) (1). In most parts of the world, CMV is endemic. The seroprevalence of HCMV varies by geographic region, ranging from 30 to 100 percent (2).

This virus is transmitted by sexual intercourse, organ transplantation, or blood transfusion in the perinatal period and infancy, as well as in adults (3). HCMV, like other herpesviruses, causes a long-term infection, and its reservoir is primarily monocytes and polymorphonuclear leukocytes, from which the virus is shed many years later (present in the throat and urine). The appearance of so-called "Owl-eyes" is caused by the presence of distinctive intracellular inclusions surrounded by a halo of poor reflection. The virus infects the salivary gland, the breast epithelium, the prostate, the endometrium, the kidney tubules, and other organs such as the bone marrow and the lungs.

Milk, sperm, cervical secretions, blood products, and urine can all be used to isolate it. HCMV infection can be latent (non-productive), lytic (productive), asymptomatic (non-symptomatic), or symptomatic (4).

PATIENTS AND METHODS

1. Patients:

The research included 50 pregnant women who had an abortion and were between the ages of 15 and 45. Age, parity, gynecologic and medical history of abortion, and domicile were all covered in a structured interview utilizing a standard mother questionnaire. The research participants had a clinical examination and laboratory tests to rule out other reasons for fetal loss, such as hypertension, diabetes mellitus, syphilis, Rh (rhesus) incompatibility, and physical causes of abortion.

2. Immunological Assays:

Immunological Assays: The ELISA method was used to detect CMV-IgM and CMV-IgG utilizing kits. Sigma Diagnostics USA provided the kits, and the methods were done according to the manufacturer's instructions.

Principle of the assay

The surface of tiny wells is covered with purified CMV antigen. The wells are filled with diluted patient serum, and the Cytomegalovirus IgG specific-antibody, if present, attaches to the antigen. Everything that isn't bound is washed away. The HRP-conjugate is introduced to the Ab-Ag complex and binds to it. The remaining HRP-conjugate is rinsed away, and a TMB reagent solution was then added.

The catalytic process of the enzyme conjugate is halted at a particular time. The quantity of CMV IgG-specific antibodies in the sample determines the intensity of the color generated. The findings are read using a small well reader in tandem with calibrators and controls.
Ethical Consideration:
The study was approved by the Ethics Board of AlSafwa University College. All participants in the research agreed, and the work was carried out according to the Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

RESULTS
The present study looked for HCMV IgG and IgM antibodies in 65 pregnant women who had abortions and found that 50 of them 76.92% were seropositive, whereas 15 (23.07%) were seronegative, as shown in Figure 1.

Table (1): describes the serological status of pregnant mothers, including the frequency of IgG Ab 36 (72%) cases per 50 seropositive HCMV cases and IgM Ab 14 (28%) cases per 50 seropositive HCMV cases.

<table>
<thead>
<tr>
<th>Seropositive</th>
<th>NO.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>IgG</td>
<td>36</td>
<td>72</td>
</tr>
<tr>
<td>IgM</td>
<td>14</td>
<td>28</td>
</tr>
<tr>
<td>seronegative</td>
<td>15</td>
<td>23.07</td>
</tr>
</tbody>
</table>

The average age of pregnant mothers who had abortions induced by CMV, with the more affected age group being between 25 and 34 years old.

Table 2 shows that the age group between 15 and 24 years had 25 (50%) instances, the age group between 35 and 44 years had 13 (26%) cases, and the age group between 35 and 44 years had 12 (24%) cases.

Table (2): displays the average age of pregnant women who had abortions owing to CMV infection.

<table>
<thead>
<tr>
<th>Age group (year)</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-24</td>
<td>13</td>
<td>26</td>
</tr>
<tr>
<td>25-34</td>
<td>25</td>
<td>50</td>
</tr>
<tr>
<td>35-44</td>
<td>12</td>
<td>24</td>
</tr>
<tr>
<td>Total No.</td>
<td>50</td>
<td>100</td>
</tr>
</tbody>
</table>

Figure 2 shows the most infected pregnant mothers with abortion had Cytomegalovirus infection in the urban region 48% and the rural area 4%, respectively.

Figure 2: Prevalence of HCMV infection in aborted mothers by residence.

Figure 3 depicts the prevalence of Cytomegalovirus infection in pregnant women based on the timing of abortion. The largest risk of infection occurred in the first trimester 78%, followed by the second trimester 8%, and finally the third trimester 3%, 6%.

Figure (3): Pregnant mothers with CMV infection are distributed according to the amount of time their fetus spends in the womb.
**Figure 4** illustrates the prevalence of Cytomegalovirus infection in pregnant women based on the type of abortion. Missed abortion has the highest risk of infection 66%, followed by incomplete abortion 12%, and inevitable abortion 6%, although threatened abortion has the lowest prevalence, 2 (4%).

**DISCUSSION**

We attempted to establish the percentage levels of CMV-IgG and IgM seropositivity among pregnant mothers who had abortions in the completed study. This test revealed that 50 (76.92%) of the 65 instances were seropositive, with 15 (23.07%) having a condemnatory serotype or having additional reasons for abortion.

These results are consistent with the findings of the researcher Salih in 2013 (5), in Sulaymaniyah governorate, where he found that the IgG percentage was 90.2% and the IgM percentage was 9.18%. The results are also consistent with a study conducted in the province of Mosul, the prevalence of CMV-IgG and IgM viral infection among pregnant mothers was 90 % and 2.5 %, respectively, according to the study (6). In addition, a study done in the Baghdad province in 2014 revealed that the proportion of IgG was 85 % greater than the exhibited IgM, respectively, among abortive women (7). CMV-IgG positive was found in 92.8 % of pregnant women's serum, whereas IgM positivity was found in 5.8% (8).

In addition, additional investigations in Iran found that CMV-IgG was more prevalent than CMV-IgM, with 93 % of patients seropositive for HCMV-IgG and only 5.4 % seropositive for HCMV-IgM. Another research in Iran found that 94 % of the women had CMV-IgG, whereas only 5.2 % had CMV-IgM (9,10).

The researchers found a rise in the serum prevalence of CMV-IgG antibodies in this and other studies, and the explanation for this is due to past exposure to pregnant mothers, who now have immunity to CMV, especially when they have been exposed to CMV (negative IgM). These ladies might be considered immune, as their initial CMV infection happened before they were pregnant.

Furthermore, pre-pregnancy immunity to Cytomegalovirus provides only protective effects against intrauterine transmission, and infected children delivered to mothers who were allergic before pregnancy may suffer severe effects (11,12). Previous Cytomegalovirus protection isn't 100% effective against re-infection or direct transfer from the mother to the fetus (13,14). According to other studies, the incidence of neonatal CMV infection rises as maternal CMV seroprevalence rises. CMV transmission through the placenta in immunocompromised women may be due to viral reactivation (15), or during pregnancy, infection with a new strain of CMV (re-infection) (16).

**Figure 5** depicts the prevalence of Cytomegalovirus infection in pregnant women based on the timing of abortion. First-time abortion has the highest incidence of infection 54 %, whereas recurrent abortion has the lowest rate 23 %, 46 %.

<table>
<thead>
<tr>
<th>Type of Abortion</th>
<th>Prevalence</th>
</tr>
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<tbody>
<tr>
<td>Missed abortion</td>
<td>66%</td>
</tr>
<tr>
<td>Incomplete abortion</td>
<td>12%</td>
</tr>
<tr>
<td>Inevitable abortion</td>
<td>6%</td>
</tr>
<tr>
<td>Threatened abortion</td>
<td>2%</td>
</tr>
</tbody>
</table>

**Table 2** illustrates the age distribution of mothers who have miscarried. With 25 (50 %) cases, the age group 25-34 years was the most afflicted, followed by 15-24 years with 13 cases 26 %. With 12 instances, the lowest age group affected was 35-44 years old 24 %.

These results are consistent with the findings of the
CONCLUSION

1. Seropositive of pregnant women with CMV high at 25-34 years of age from urban areas especially in the first trimester.
2. Missed abortion is the most common type of miscarriage.

**Conflict of interest:** The authors state that there is no conflict of interest.

**Sources of funding:** There was no entity from the private or public sector funding for this research, as the research did not receive a supporting grant.

**Author contribution:** Each of the researchers has a contribution rate equal to the rest of the researchers in the study.

**REFERENCE**


