Detection of infection by rubella and cytomegalovirus among women exposed to abortion in Ninavah province

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ABSTRACT

The study aims to correlate infection with rubella, cytomegalovirus and abortion at different age groups. Blood samples were collected through the period between beginning of February to the end of September 2017, one hundred and twenty-seven women exposed to abortion and thirty apparently health controls. Serum samples were tested for IgM and IgG antibodies for rubella and cytomegalovirus. The results showed that CMV was the most common infection with high level of IgM antibodies (15.7%) and IgG (12.5%), only 0.7% of the cases gave positive results for rubella IgM, and 6.2% had rubella IgG while the control group only 6.6% had CMV IgM, and 3.3% had CMV IgG antibody. All the age groups did not show infection with rubella except age 25-31 years as 2.1% and 8.5% had IgM and IgG respectively. The highest rate of infection with CMV was at age group 25-31 years (21.2%) then age group 18-24 years (13.7%). Most of the patients experienced two abortions were reported at age group 25-31 years, 1.5% and 4.7% of CMV infected patient experienced 3 and 2 respectively while 1.5% of rubella infected patients had only one abortion, 18.1% of the patients with CMV experienced 2 abortions had cut off >1.25. Hundred % of the patients with rubella had cut off value of > 1.25 experienced one abortions.

Introduction

Rubella virus infection (German measles)
Rubella virus is considered a human pathogen that belongs to the Toga virus family of RNA viruses and is generally a mild disease with nonspecific symptoms[1]. However, it can lead to congenital rubella syndrome (CRS) when infection happens during pregnancy [2]. Rubella virus infection has often been related with adverse pregnancy outcomes in early pregnancy because of its teratogenic effects. It is regarded among the most common reasons of spontaneous abortion aside from causing congenital rubella syndrome [3]. It is a contagious viral infection that in pregnant women leads to the infection of a developing fetus, causing fetal death or congenital rubella syndrome [4]. Infection causes damage in nearly 90% of the surviving infants in the first eight to ten weeks of pregnancy, where multiple defects are common [5]. Congenital rubella happens when the rubella virus in the mother influences the developing fetus at a vital time throughout the first three months of pregnancy. After the 4th month, the mother's rubella infection has a small probability to damage the developing fetus [6].

Cytomegalovirus (CMV) infection
The human cytomegalovirus, (CMV) is regarded as the most widespread congenital viral infection globally and may be asymptomatic forms (90% of cases) to severe fetal harm and, in rare occasions, death because of abortion [7]. Cytomegalovirus is a worldwide pathogen with an estimated 40–70% of the world’s population carrying evidence of infection [8]. Normally, CMV is obtained through contact with infected individuals’ secretions (any fluid can transmit the virus) in childhood or in early adult life, the disease seldom has serious clinical manifestations in immunocompetent individuals. The virus turns
latent after the preliminary immune response, resting mainly in cells of myeloid lineage [9]. Primary maternal CMV infection essentially leads to mother-child transmission, this infection holds a risk of transmission of around 40 %, in the last weeks of gestation, the rate of transmission increases to about 78%. There have been cases reported of CMV transmission caused by nonprimary infection in just 1 – 2.2 % of cases [10]. Primary maternal infection occurred in the first trimester of pregnancy is often related to the extent of fetal-newborn injury, for example severe brain damage [11].

**Aim of the work**
- To determine the presence of rubella and CMV viruses in patient’s serum.
- To evaluate the correlation between the presence of infection with rubella and CMV viruses and abortion at different age groups.

**Study Design**

In the present study blood was collected from one hundred women at child-bearing age exposed to abortion or had repeated abortion. All blood samples were tested for rubella and CMV. Blood samples were taken from the period between beginning of February 2017 to the end of September 2017.

- Three to five ml of blood samples were drawn aseptically from all enrolled cases and controls for routine investigations.
- All the serum samples collected for the study and control groups were tested for rubella and CMV infection by commercially-available (ELISA) kits. The results were read by a Microwell reader and compared in a parallel manner with controls; optical density was read at 450 nm on an ELISA reader.

**Results and Discussion**

The results in Table 1 showed that CMV was the most common infecting agents in this study. The number of infected women had high rate of IgM antibodies were 20 (15.7%), which was more than those with high IgG 16 (12.5%). Rubella IgM accounted for the lowest number of females with just one case (0.7%), on the other hand, rubella IgG was recorded in 8 cases (6.2%). The control group showed that out of 30 subjects, 6.6% of the women infected with CMV had IgM, while only 3.3% of them infected with CMV had IgG.

<table>
<thead>
<tr>
<th>Type of infection</th>
<th>No. of positive cases IgM</th>
<th>Percentage</th>
<th>No. of positive cases IgG</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Test</td>
<td>Control</td>
<td>Test</td>
<td>Control</td>
</tr>
<tr>
<td>Rubella</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cytomegalovirus</td>
<td>20</td>
<td>2</td>
<td>15.7%</td>
<td>6.6%</td>
</tr>
</tbody>
</table>

This result was in agreement with Nirmal, et.al. [12] in Northern India, who showed that CMV was found to be the most common infecting agent followed by rubella infections. Primary infection in pregnancy has a higher incidence, especially in women of rural population. This infection is usually asymptomatic, thus posing trouble in clinical diagnosis. Kishore, et.al. [13] reported that IgM positivity to cytomegalovirus and rubella were 30% and 15% respectively. None of the controls had IgM antibodies to any pathogen.

The relationship between infection with CMV and rubella virus IgM and IgG in different age groups is illustrated in Table 2. As shown in Table 2, out of 47 patients within the age group 25-31 years, IgM to rubella was found in one case (2.1%) and IgG was found in 4 cases (8.5%). Also, IgG to rubella was found in 4 cases (7.8%) of women within the age group 18-24 years. Alshami, et.al. [14] concluded that 81.7% of women suffering from previous history of recurrent abortions, 4.48% of them had rubella IgM and IgG. The highest rate of infection was detected in those within the age group varied between 17 and 44 years with both IgG and IgM antibodies. Olajide, et.al. [4] also showed a seroprevalence of 38.8% (62 of 160) and 93.1% (149 of 160) for rubella IgM and IgG antibodies respectively among the pregnant women. The highest number of positive cases were found at age group 28–32 years and at age group 23-27 years.

<table>
<thead>
<tr>
<th>Age of years</th>
<th>Total No.</th>
<th>No. of IgM positive</th>
<th>Percentage</th>
<th>No. of IgG positive</th>
<th>Percentage</th>
<th>No. of negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rubella</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-24</td>
<td>51</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>7.8%</td>
<td>47</td>
</tr>
<tr>
<td>25-31</td>
<td>47</td>
<td>1</td>
<td>2.1%</td>
<td>4</td>
<td>8.5%</td>
<td>42</td>
</tr>
<tr>
<td>32-40</td>
<td>29</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0%</td>
<td>29</td>
</tr>
<tr>
<td>Cytomegalovirus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-24</td>
<td>51</td>
<td>6</td>
<td>11.7%</td>
<td>8</td>
<td>15.6%</td>
<td>37</td>
</tr>
<tr>
<td>25-31</td>
<td>47</td>
<td>10</td>
<td>21.2%</td>
<td>4</td>
<td>8.5%</td>
<td>33</td>
</tr>
<tr>
<td>32-40</td>
<td>29</td>
<td>4</td>
<td>13.7%</td>
<td>4</td>
<td>13.7%</td>
<td>21</td>
</tr>
</tbody>
</table>

The highest rate of CMV infection was at the second age group (25-31 years) followed by the first age group (18-24 years) and then the third age group (32-40 years) as 10 (21.2%), 6 (11.7%) and 4 (13.7%) respectively, IgM antibodies for the three age groups, while the patients in the first age group showed IgG antibodies 15.6% followed by age group 3 and 2 in which the result for this immunoglobulin was 13.7% and 8.5% respectively. The results were in agreement with Munro, et.al. [15], who found that out of the 600
Table 3: Number of abortion in relation to the age groups in the studied patients

<table>
<thead>
<tr>
<th>No.</th>
<th>Ages</th>
<th>Total no.</th>
<th>No. of abortions</th>
<th>No. of abortions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>One abortion</td>
<td>Two abortions</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>1</td>
<td>18-24</td>
<td>51</td>
<td>46</td>
<td>14</td>
</tr>
<tr>
<td>2</td>
<td>25-31</td>
<td>47</td>
<td>38</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>32-40</td>
<td>29</td>
<td>25</td>
<td>4</td>
</tr>
</tbody>
</table>

The result in Table 3 showed that most of the patients with two abortions were reported in the second age group (25-31 years) as eight patients out of the 47 (17%) had two abortion and two 4.2% had three abortions, followed by the third age group as 13.7% had two abortions, then the first age group in which only 7.8% had two abortions, while 90.1% of patients in this age group, and 86.2% of patients in the third group experienced one abortion. The results also corresponded with Alshami, et.al. [14], as they showed that the age of the gravidas varied between 17 and 44 years old. Out of 67 cases, the total rate of gravidas with one abortion recorded the highest rate 31(46.27%) patients while the lowest was 7(1.45%) patients recorded by gravidas with ≥4 abortion, 16(23.88%) had two abortions while 13(19.4%) patients had three abortions. Number of abortion times decreased gradually with the increase of gravidas age, in which one abortion recorded 60% and 47.62% among age groups 17-23 and 24-30 years respectively, while 4 times recorded the lowest rates (0% and 9.52%).

Table 4: The cut off value of CMV in relation to the number of abortions

<table>
<thead>
<tr>
<th>No.</th>
<th>Cut off</th>
<th>No. of patients</th>
<th>No. of infected</th>
<th>One abortion</th>
<th>%</th>
<th>Two abortions</th>
<th>%</th>
<th>Three abortions</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1&lt; - 1.25</td>
<td>9</td>
<td>9</td>
<td>6</td>
<td>66.6%</td>
<td>2</td>
<td>22.2%</td>
<td>1</td>
<td>11.1%</td>
</tr>
<tr>
<td>2</td>
<td>&gt;1.25</td>
<td>11</td>
<td>11</td>
<td>8</td>
<td>72.7%</td>
<td>2</td>
<td>18.1%</td>
<td>1</td>
<td>9%</td>
</tr>
</tbody>
</table>

This result agreed with Sherkat, et.al. [17], who studied samples taken from 43 women with recurrent pregnancy loss (RPL), the study showed that 23.3% of them with (titer of 1) positive IgM of the RPL. Those patients had also positive IgG were considered as having recurrent or reactivated maternal infection. There were 39 (90.6%) of the cases of positive IgG in the RPL. The IgG titer below and above the cut-off (>0.8 or 16 IU/ml as positive). Also agree with Hamdan, et.al. [18] who found that out of these 231 pregnant women, 167 (72.2%) and 6 (2.5%) were seropositive CMV IgG and IgM respectively.

Table 5: The cut off value of rubella virus in relation to the number of abortions

<table>
<thead>
<tr>
<th>No.</th>
<th>Cut off</th>
<th>No. of patients</th>
<th>No. of infected</th>
<th>One abortion</th>
<th>%</th>
<th>Two abortions</th>
<th>%</th>
<th>Three abortions</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1&lt; - 1.25</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>2</td>
<td>&gt;1.25</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>100%</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
</tr>
</tbody>
</table>
References


التحري عن الأصابة بفايروس الحصبة الألمانية والفايروس المضخم للخلايا لدى النساء المعرضات للإجهاض في محافظة نينوى

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الملخص

تهدف هذه الدراسة إلى تحديد العلاقة بين الإصابة بفايروس الحصبة الألمانية، الفايروس المضخم للخلايا مع وجود الإجهاض ضمن مجموعات عمرية مختلفة.

تم جمع عينات الدم من بداية شهر شباط ولغاية شهر أيلول عام 2017 من 127 امرأة تعرضت سابقا للإجهاض إضافة إلى 30 امرأة أخرى كعينات سيطرة. تم فحص جميع العينات للكشف عن وجود الكموبيولين المناعي M و G للفيروسات المذكورة.

أظهرت النتائج أن الفايروس المضخم للخلايا كان أكثر الأصابات شيوعا مع نسبة إصابة من الكموبيولين المناعي G وال النوع M (15.7%) و 6.2% من الحالات أعطت نتائج إيجابية للكروموبيولين المناعي M و 6.7% من العينات أعطت نتائج إيجابية لفirus G. بينما مجموع مجموعات السيطرة، فقط 0.7% من الحالات أعطت نتائج إيجابية للفايروس G والمضخم للخلايا G وال النوع M، وأدي 3.3% منهم نتائج إيجابية للفايروس المضخم للخلايا G ماض، G والمضخم للخلايا G والمتوسط منvkوبيولين المناعي M وال النوع G في المحافظة الألمانية لمدة لا يتجاوز الفئة العمرية 31-35 سنة، حيث ابتدي 2.1% و 8.5% منهم مستويات عالية من الكروموبيولين المناعي M و G على التوالي.

كانت أكثر مستويات الإصابة بلفيروس المضخم للخلايا ضمن الفئة العمرية 25-31 سنة بنسبة 21.2، ثم اتبعها الفئة العمرية 18-24 سنة بنسبة 13.7%. عانت معظم المصابات من حالتين إجهاض، تم الكشف عنها في الفئة العمرية 25-31 سنة. سجل العدد الأعلى من الإجهاضات في المرضى المصابين بلفيروس المضخم للخلايا مقارنة مع الإصابات الأخرى، حيث اثبت 1.5% من الإجهاضات على التوالي بينما 1.5% فقط من المصابات بلفيروس الحصبة الألمانية كان قد تعرضن لحالة إجهاض واحدة.

كانت نسبة 18.1% من المصابات بلفيروس المضخم للخلايا قد عانين من حالتين إجهاض ولعبت قيمة ال (cut off: 1.25)، و 100% من المصابات بالحصبة الألمانية كان قد عانين من حالة إجهاض واحدة ولعبت قيمة ال (cut off: 1.25).