Estimation of distribution and immunological marker of cytomegalovirus infection in pregnant women

Ayam M. Salih*1

1. University of Babylon, College of Hammurabi Medical, Iraq

*Corresponding author: ms_ay20@yahoo.com (Salih)

Abstract

Cytomegalovirus-1 (CMV) is an important cause of the intra-uterine contagions. Contagions are usually asymptomatic in the immune-competent grown-ups, however, it’s imported at different times elevated in the case where they happen during the pregnancy. Pregnant females that have Cytomegalovirus-1 infection may get congenital malformations or abortions. The presented subject has been directed towards the estimation of the cytomegalovirus virus prevalence in the pregnant females in Babylon city and evaluating some immunological factors in females that have Cytomegalovirus-1. The research has been carried out on (170) pregnant females in the Teaching Hospital of Babylon for Maternity and Children for investigating the CMV prevalence in the city of Babylon. In general, of (145) pregnant females that participated in the research, Cytomegalovirus-specific IgG and IgM antibody have been detected through the minivans-test. Single radial immune diffusion plates have been utilized to assess C-3 and C-41 level in the female patients. Amongst 170 pregnant females, 155 (i.e. 90%) have been seropositive for CMV. 9 women (i.e. 5.80%) have been positive to the IgG and 140 women (i.e. 90.30%) have been positive to IgM, and 6 women (i.e. 3.87%) for each of the IgG and the IgM. The majority of the CMV infections amongst females ages from 27 to 30. It has been discovered that there has been an increased level in complement components C-3 and decreased level of C-4 amongst CMV patients in comparison with the control group (229.30±28.40) and (15.61±4.2) respectively. The presented research has concluded the fact that there is an increased rate of seropositivity for human CMV amongst pregnant females. Cytomegalovirus prevalence has been rather high in our area.

Key-words: Pregnant women, CMV, IgM, IgG, Babylon

How to cite this article: Salih AM (2020): Estimation of distribution and immunological marker of cytomegalovirus infection in pregnant women, Ann Trop Med & Public Health; 23(S19): SP232120. DOI: http://doi.org/10.36295/ASRO.2020.232120

Introduction

Human CMVs are ubiquitous viruses that are contracted in a vertical and/or horizontal way. In addition to that, it may be spread via primary infections; re-infections or reactivations [1] in some of the cases, the virus could cause minor disability, which allows the infected people to stay active for the sake of affording maximal opportunity to encounter the susceptible contacts. It’s excreted from numerous sites like different intimacy levels could result in transmissions [2]. This virus is stated as one of the opportunistic infections in several regions in the world.1 The acute form of the Cytomegalovirus disease occurs in a small number of the infected subjects and is limited by the settings in which the capability of mounting the immune response of the cells is compromised, like the trans-placental transmissions throughout pregnancy which result in fetal damages and re-activation or primary infections of the immuno-compromised subjects.

Transmission infected secretions of the body; which is why patterns virus shedding and hygiene are still significant factors that affect the general population are dependent on the direct contacts with the transmission [1] infection of Cytomegalovirus throughout the pregnancy one of the main causes of possible infections all over the world with a rate of up to 0.20% – 2.20% of the live births.4 about 15% of those children have neurological damages5,6 that include mental retardations, impaired developments, and neuro-sensory deficits in hearing [7]. Fetal or neonatal deaths occur in approximately 10% of the newborns or the fetuses after the intrauterine infection of Cytomegalovirus [8] approximately 80% of the grown-ups worldwide have the anti-body against the Cytomegalovirus.
small number of the pregnant females are checked routinely for routinely infection throughout the pregnancy [7]. Routine serological checks of the pregnant females in Europe was helpful for them to understand infections of Cytomegalovirus amongst pregnant females. Screening of high levels in Belgium resulted in data on the rates of maternal-fetal transmissions during pregnancy. [9] Italians have utilized national serologic screenings for the sake of developing and evaluating approaches for the diagnosis of fetal and maternal infections of Cytomegalovirus, which include avidity assay of Cytomegalovirus IgG, and for testing immunoglobulin interventions of Cytomegalovirus [10,11] in France, they have utilized serologic screenings for the sake of evaluating the maternal education impact on Cytomegalovirus and hygienic intervention impact on the prevention of maternal acquisitions throughout gestation. [12] in Nigeria they have been dealing with insufficient funding in healthcare sectors, in addition to the management of conditions like the congenital Cytomegalovirus, is a major problem, which is why the needs for investigating levels of IgG with a view to guiding lawmakers and the education of pregnant females on how to prevent infections for the sake of reducing the births of otherwise helpless children.

Materials and methods

Nearly 5 ml of the venous blood has been obtained from every one of the patients with the use of a 23-gauge needle and syringe. That blood has been moved to a testing tube and accurately labeled with an ID number of the patient. Each one of the blood samples has been centrifuged for 5 minutes at 3000 g.

The serum has been resulted in the use of Pasteur’s pipette and transferred to a clean cryovial and kept at a temperature of –200C, to the point of obtaining the representative samples. Qualitative determinations of the IgG anti-bodies of Cytomegalovirus have been performed with the use of the Enzyme-Linked Immuno-sorbent Assay (ELISA) method, with the use of the Cytomegalovirus IgG kit (“Dialab®, Austria”). Reagents, calibrators, and samples have been left to reach room temperature prior to testing. The Micro-well plate has been accurately labeled for the sample, control, and blank. Samples have been diluted 1:100 with diluents of the sample. After that, 100 µl of every one of the samples, negative as well as positive controls have been dispensed in wells, which leaves the well blank. The plate has been covered by an adhesive foil (“VWR®, USA”) and they incubated for 60 min at a temperature of 37ºC with the use of incubator (“NAPCO, Thermo Electron Corporation”). Adhesive foil has been detached carefully and the plate has been washed 7 times by 300 µl of the diluted wash buffers (“Biotek® plate washer”).

100 µl of the conjugate of the enzyme has been introduced afterward to every well, covered once more and incubated for an additional 60 min at a temperature of 37ºC. It has been washed 7 more times by 300 µl of the diluted wash buffer. After that, 100 µl of the substrate has been dispensed to every well, which also includes the blank. The plate has been covered by a new adhesive and now incubated for 20 minutes at room temperature, kept away of light after which 100 µl stop solution has been ultimately added to each well. The absorbance of every one of the samples, controls, and blanks have been read with the use of the SoftMax Pro5.40 program with “Molecular devices® plate reader” at 450 nm wavelength. The IgG cut-off has been fixed to 0.50 IU/mL by the “World Health Organization (WHO)”. Samples that had concentrations higher than or equal to 0.50 WHO IU/mL have been viewed as positive for the Cytomegalovirus IgG, whereas the samples that had a concentricity level which is lower than the cutoff have been considered negative.

Result and discussion

Table1: Cytomegalovirus infection Distribution in pregnant females by age group according to the.

<table>
<thead>
<tr>
<th>Age</th>
<th>Number of females</th>
<th>Sero-positive (%)</th>
<th>Sero-negative (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>19-22</td>
<td>45</td>
<td>40</td>
<td>5</td>
</tr>
<tr>
<td>23-26</td>
<td>23</td>
<td>20</td>
<td>3</td>
</tr>
<tr>
<td>27-30</td>
<td>45</td>
<td>42</td>
<td>3</td>
</tr>
<tr>
<td>31-34</td>
<td>34</td>
<td>33</td>
<td>1</td>
</tr>
<tr>
<td>35-38</td>
<td>23</td>
<td>20</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>170</td>
<td>155(90.6%)</td>
<td>16(9.3%)</td>
</tr>
</tbody>
</table>
The ultimate principle for the detection of maternal seroconversion regarding the anti-bodies against the Cytomegalovirus is the serological diagnosis. Assay of IgG is almost entirely sensitive and specific, readily available, and automated for the capacities of high volume.

The study was done on the pregnant females for examining the seropositivity level of IgG and IgM antibodies to cytomegalovirus infection. Results show out of 170 pregnant tested to CMV infection 155 have CMV infection, while 160 had no cytomegalovirus infection as shown in the table (1). The maximum rate of seropositivity of the Cytomegalovirus 42(55.5%) has been noticed amongst age group 27-30, whereas other age groups have shown a rate equal to 40(33.3%) for the 19-22 age group, 33(11.1%) for the age group 31-34 years, and 20 in both age group (23-26) and (35-38). There weren’t any significant differences between levels of CMV IgG in the age group of (P>0.05) as shown in the table (1). Also, the result for immune cytomegalovirus revealed 9(5.8%) were positive for IgG while 140(90.3%) show positive for IgM and 6(3.87%) for both IgG and IgM. Table (2). Based on the stage of pregnancy the result show 8(100%) have IgG antibody trimester in first trimester, also in the second trimester the antibody for CMV was 30(85.7%) while in the third trimester the antibody for CMV was 107(95.5%). Table (3). High seropositivity in the second and third trimester was in agreement with a report which has stated that recurrent infections occur most often in last 2 trimesters, in which the marked transient depression cellular immunity for CMV infections may be shown.

In this study, the complement component C-3 and C-4 level was detected in patients and control group with the use of the radial immune diffusion the result show increase in the levels of C3 (229.3±24.4) in the patient group compared to control group (113.08 ±7.56) and decrease in the level of C4 (15.61± 4.20) among patients group compared to control group (29.31 ±7.11) as shown in (Table 4, 5).

Different levels of IgM-positivity have been marked all over the world, 2.50% in Iran, 1% in Turkey, and 1.70% in Korea, and 2.50 in Western Sudan. Positive results of the IgM to) CMVs have been noticed of primitive or repeated infections. IgM (anti-bodies to Cytomegalovirus could last for about (2mon. to 9mon.) following initial infection. Not every patient that has a re-activated infection of Cytomegalovirus has been evident IgM anti-bodies levels. CMV IgGseroprevalence which has been recorded in the present study has been identical to results that have been stated by each of [16] and [17].
The higher CMV-IgG seropositivity percentage have been indicating to the occurrences of earlier infections of Cytomegalovirus, particularly in the case where they have been IgM- negative, those females, as stated earlier, may assume immune and their primary Cytomegalovirus infections have been considered to happen prior to the ongoing pregnancy and have been primarily asymptomatic personnel.

The complement system is progressively viewed as one of the defense or pathology mediators in several virus infections[16-19]. The anti-viral behavior for complementing is often represented by the fact that anti-bodies which detect the viral anti-gens) on virion-envelope or infected cell surfaces, which would, as a result, encourage additional activations in cascades accumulating the complement complexes) which lead to distractions of the membrane, which are referred to as the virolysis or the CDC. Moreover, complement enhances neutralization with no virosis was specified, and one proposed approach for this is that complement gathering on the viral envelop would be preventing for the interplay of the virus with the cellular receptor which is required for the passage of the virus[20-26].

Conclusions
The present research has reached the conclusion that infection of the Cytomegalovirus is often amongst the pregnant females in the local populations and the high seroprevalence reflects insufficient community education and low standards of hygiene. In addition to the numerous viral transmission ways influence the spread of the viral infections, the lack in the sufficient viral treatments significantly impact the viral spread from the mother her fetus and result in the congenital malformations or abortions. Which is why the periodical checkups of the females during the childbearing years for Cytomegalovirus-infection is required for the sake of decreasing serious consequences of pregnancy which appear as a result of CMV infections.

References