ISSN: 0975 -8542

Journal of Global Pharma Technology

Available Online at: www.jgpt.co.in

RESEARCH ARTICLE

Estimation of Anti CMV Antibodies in Iraqi Pregnant Women Infected with Chronic Cytomegalovirus

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Abstract

Cytomegalovirus (CMV) is a double-stranded DNA virus that belongs to the Herpesviridae (Herpesvirus) family, and it is the largest herpes virus in size. It affects all age groups and spreads worldwide. Human cytomegalovirus (HCMV) can cause fatal diseases to humans, and it is the most common cause of congenital birth and maternal infections. The study was conducted on 122 Iraqi pregnant women who had chronic CMV infection (with positive IgG antibodies), and 10 healthy women (with negative IgG and IgM antibodies) as control group for comparison purposes at Al-Elwiya hospital from May to August 2017. Venous blood samples were collected from the studied women to evaluate the levels of serum anti CMV IgG and IgM antibodies. The results of the study showed that the highest antibody titers was within the age group (< 25 years) and women without previous abortion showed the highest CMV infection (55%), while no significant difference was shown between the IgG and IgM values within the categories of number of pregnancies.

Keywords: *CMV IgM & IgG antibodies-Pregnancy.*

Introduction

Cytomegalovirus or (CMV) is a DNA virus that can cause a wide spectrum of infections in immune competent hosts. Sites most often involved include the lung (severe community-acquired viral pneumonia), liver (transaminitis), spleen (splenomegaly), GI tract (colitis), CNS (encephalitis), hematologic system (cytopenias), and multisystem. Uncommon sites of CMV infections in immune competent individuals include the kidneys, adrenals, salivary glands, pancreas, and esophagus [1].

The virus will persist life-long and it is debated however CMV continuously slowly replicates or however it should be considered as a latent infection that can reactivate such as in immune suppressed individuals [2, 3]. In immune competent individuals, primary infections are usually mild and frequently occur early during childhood by transmission through breast milk or contact with infections body fluids such as salvia. However, it is thought to account for approximately 8% of all cases of infectious mononucleosis [4].

Symptoms of CMV are persistent fever, Myalgia, headache, cervical lymphadenopathy, splenomegaly, non specific constitutional symptoms, and rash (30%). These symptoms may persist for weeks [5]. In recent years, after the control of rubella, CMV has been the major cause of birth defects (causing neurological damage-like e-g. hearing-deficit, emigrational disturbances cerebral cortical malformations and developmental disability in 10-20% of all children with congenital CMV) with an incidence of 0.2-2.2% per live birth [6, 7].

CMV is also an important pathogen for immune compromised individuals such as transplant recipients and HIV infected individuals. In the latter viral dissemination leads to multiple organ system involvement presented as pneumonia, hepatitis, gastroenteritis, retinitis, and encephalitis [8].In patients undergoing hematopoietic stem cell transplantation (HSC), CMV-disease can appear both early and late after the transplant procedure [9,10].

Some women who contract CMV infection will be a symptomatic, and the diagnosis will only be suspected because abnormal fetal ultra sound finding have been identified. When clinical manifestations are present, they include: malaises, favor, generalized lymphadenopathy, and hepatosplenomegaly. Patients who are immune compromised may develop extremely serious sequelae of infection, including choriortinitis and pneumonitis. A patient with suspected CMV infection should have a serologic assay for IgM and IgG antibody.

Typically, in the acute phase for the infection, IgM antibody is positive and IgG is negative. As the illness proves, IgG antibody become detectable patients who are a cutely infected also will usually test positive by culture or PCR for virus in the blood and urine [11]. Clinicians must be aware that the initial serology for CMV can be confusing because the IgM antibody may remain positive for 9 to 12 months after an acute infection. Moreover, there can be anamnesis increases in IgG in the face of recurrent or reactivated infection. Therefore, IgG avidity testing can be extremely helpful in differentiating between acute and chronic infection. In the setting of the virus is low. In a recurrent or reactivated infection, IgG avidity is high [11].

Aim of the Study

The current study aimed to estimate the levels of anti CMV IgG and IgM antibodies in Iraqi pregnant women infected with cytomegalovirus.

Materials and Methods

In this study, venous blood samples were collected from (122) Iraqi pregnant in whom anti IgM/IgG antibodies were detected, while (10) healthy women (negative for anti CMV IgG/IgM antibodies) were chosen as a control group. The study was carried out at Al-Elwiya maternity hospital in Baghdad during the period from 3 May to 9 August 2017.

All the tests were performed at Dr. Monther Mostafa private laboratory in Baghdad. Blood samples were left to clot and then centrifuged at (3000) RPM for (15) minutes to obtain serum. Estimation of Anti HCV IgG and IgM antibodies was done using the enzyme linked immunosorbent assay (ELISA) Germany. The statistical analysis of this study was performed using the statistical analysis system (SAS-2012) program to study the effect of different factors in study parameters. Least significant difference-LSD test was used to significant comparison between means. Estimation of correlation coefficient between variables was also done in this study.

Results and Discussion

Detection of Cytomegalovirus with ELISA (Enzyme Linked Immune - sorbent Assay)

For the detection of CMV IgG and IgM in pregnant women, 122 serum specimens were tested by using ELISA technique. The results obtained from serological test showed that (40) samples were positive for IgG (22 samples positive for both IgG and IgM while the other 18 samples had only IgG positive and IgM negative). This means the immunity starts to face the virus by producing immunoglobulins or which were considered to be possibly infected with CMV during the current or chronic infection and for sera with only IgG positive may indicate that the infection has already existed and it is a chronic infection [12].

The control group (10 women) in this study showed negative result for both IgG and IgM, which means the samples were non-infected with the virus. In this study, the prevalence of HCMV infection was 40(32.78%) among Iraqi pregnant women, which disagreed with the higher prevalence in previous investigation reported in Iraq 57.2% by [13], in Iran 72.1% by [14]. The results of the present study were also lower than those obtained in developed countries for example in Australia 56.9% and France 46.8% [15].

Effect of Patients Age Group on HCMV IgM and IgG Titer

Table (1) shows the distribution of mean IgG and IgM antibody titers within the pregnant women according to their age groups, which revealed that the highest titers were within the age group (< 20) years, and (10%) within the age group (> 30) years. The results show no significant differences between them. It may indicate that the age does not have an effect on the extent of the immune response of the human body in chronic cytomegalovirus infection.

Table 1: Distribution of mean IgG and IgM antibody levels within the age groups of the infected pregnant women

Age group (years)	No. & (%)	Mean ± SE	
		IgM	IgG
Less than 25	20 (50%)	14.08 ± 3.04	45.16 ± 4.55
25-30	16 (40%)	14.11 ± 3.71	48.11 ± 4.22
More than 30	4 (10%)	12.41 ± 3.32	40.80 ± 10.80
LSD value	---	13.279 NS	18.118 NS
NS: Non-Significant.			

The Relationship between Mean anti HCMV IgM and IgG Titers and Number of Abortions

Results obtained from Table (2) demonstrated that women with no previous abortion had the highest number and percentage 22(55%) of CMV IgG (44.41±4.52) and IgM (14.72±2.72) titers, and number and percentage of women with only one abortion was 14(35%) with CMV IgG (47.01 ± 4.30) and IgM (13.90 ± 4.03) titers, while those with two previous abortions were only 4 women with CMV IgG (50.15 ± 4.88) and IgM (7.63 ± 1.82) titers

These results were in line with a French study by (15) who detected (46.8%), [16] in Germany (42.3%) and [17] in India (23.3%).

However, most studies had higher results than ours. [18] Found (97.1%) in Turkey, [19] (98.7%) in Turkey, [20] (97%) in Baghdad.

On the other hand, IgM percentage in this study was consistent with [21] who detected (12.6%) in India, [22] (3.17%) in Kirkuk city, [23] (21%) in Baghdad and [24] who found (18.8%) in Babylon.

Table 2: Relationship between mean HCMV IgM and IgG levels and number of abortions

Abortion No.	No. & (%)	Mean ± SE	
		IgM	IgG
0	22 (55%)	14.72 ± 2.72	44.41 ± 4.52
1	14 (35%)	13.90 ± 4.03	47.01 ± 4.30
2	4 (10%)	7.63 ± 1.82	50.15 ± 4.88
LSD value	---	15.291 NS	20.868 NS
NS: Non-Significant.			

HCMV is an important agent causing abortion, still birth, premature delivery and congenital malformation [19]. The severity of fetal infection is greatest with first and second-trimesters, and congenital defects are rarely seen if the infection occurs after 20 weeks of gestation. This may be due to that the first trimester of the pregnancy is considered as a critical period in which the fetus is not well established in the uterus, and it is threatened for abortion whenever the mother is exposed to any risk factor such as reactivation of latent infection as CMV that results from immunosuppressant concomitant with pregnancy which can lead to placental infection and next placental insufficiency, with subsequent embryonic death [25, 26].

Detection of increasing CMV IgG levels is an unreliable approach for distinguishing primary from non-primary CMV infection, since most seropositive patients showed high IgG levels in the first serum sample collected for testing [27].The highest percentage rates of CMV-IgG seropositive observed in the present study may indicate previous exposures of the aborted women and now they are immune against CMV, especially when they were IgM-negative. These women as mentioned before are assumed to be infected before the current pregnancy. In the present study, the antibody levels showed non-significant differences in abortion numbers.

The reason of variable seropositivity of CMV infection in aborted women from different area could be referred to the hygienic habits, cultural differences related to feeding habits, educational levels, primary health care program and early diagnosis of infections as well as the difference in sensitivity between the various kits used.

The relationship between mean anti HCMV IgM and IgG titers and number of pregnancies

Table 3 has shown that the LSD value did not reveal any difference between the IgG (29.231) and IgM (24.42) values among various categories of number of pregnancies. During pregnancy, an HCMV infection reactivation can still lead to symptomatic congenital infection; however, the risk is reduced significantly as the pre-existing maternal HCMV antibodies provide protection against intrauterine transmission [28, 29].

Table 3: Relationship between mean anti HCMV IgM and IgG titers and number of pregnancies

Pregnancy No.	No.	Mean ± SE (%)	
		IgM	IgG
First	2	7.31 ± 1.86	28.71 ± 14.15
Second	8	13.22 ± 4.87	40.57 ± 7.70
Third	12	20.30 ± 5.19	51.41 ± 2.36
Forth	6	13.33 ± 5.17	45.55 ± 8.48
Fifth	8	11.00 ± 3.48	54.25 ± 3.32
Sixth	8	5.20 ± 0.00	47.30 ± 8.30
Seventh	2	17.25 ± 10.15	57.90 ± 2.50
LSD value	---	24.422 NS	29.231 NS
NS: Non-Significant.			

Conclusion

It can be concluded from our study that the highest antibody titer was within the age group (< 25 years), and women without previous abortion showed the highest CMV infection (55%), while no significant difference was shown between the IgG and IgM values among the categories of number of pregnancies.

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