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Evaluation of immunological status in pregnant and aborted women with cytomegalic infection in Thi-Qar Governorate

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Abstract

The current study was conducted on aborted and pregnant women suspected of being infected with cytomegalovirus in The-Qar Governorate. (90) Serum samples of pregnant and aborted women were examined using the Enzyme-linked Immunosorbent assay(ELISA). through the examination, (50) sample of women infected with CMV virus were found, with rate of 55.55%, where it was found that (43) sample of them carried the IgG antibody, with a rate of 48.88%, and(5) sample with the IgM immunoglobulin antibody, with a rate of (5.5%), and (2) sample of Igm+IgG, with a rate of (2.2%.(

Through the study of blood parameters that was conducted on (40) blood samples of women infected with the virus, compared to (10) blood samples of uninfected women there was a decrease in the blood hemoglobin rate (Hb)(11.54%) and compressed blood volume by (0.35) compared to the control group, three were no significant difference($p>0.05$) for the total number of white blood cells. When conducting a differential of white blood cells for infected women it was found that there was an increase in the percentage of lymphocytes by (40.50), While no significant differences were observed ($p>0.05$) in the percentage of monocytes,neutrophils eosinophils, and basophils. As for the phagocytosis factor, an increase in the phagocytosis factor was recorded for infected women compared to the control group, as the phagocytosis factor for infected women reached 12-60% and for the control group 47.10%.

keywords

Diagnosis of cytomegalovirus, Serology, Immune response.

1. Introduction

Human cytomegalovirus (CMV) is a herpes virus that spreads widely among children and adults, especially in developing countries (Gupta, Shorman,2022). Diagnosis is rare in the general population due to a lack of clinical symptoms. In addition, the disease does not require treatment in immunologically competent people. But early diagnosis and proper management are essential for immunocompromised patients during pregnancy and in the postpartum period. (Bennett, *et.al* 2015).

Human cytomegalovirus (HCMV) belongs to the family of Herpesviridae under the the Beta herpes virus family, which is considered a widespread pathogen that infects the vast majority of the world's population before puberty (Mocarski *et al*, 2007). Human cytomegalovirus (CMV) is also the most common cause of Congenital infection, with the rate of morbidity and mortality at birth(Kenneson, cannon, 2007) During CMV infection, there are usually no clinical symptoms of the virus primary, reactivation, and re-infection with different strains of the CMV virus, but infected individuals may transmit the virus through bodily fluids such as saliva, blood, and diseases. Cervix, semen and urine (Munro Hall ,Whybin ,*et.al* 2005)

If the primary infection with CMV occurs before pregnancy or in the first three months of pregnancy, it can affect the growth of the fetus and lead to severe deformities known as congenital infection (Pass,.Arav - Bager,2018), as the diagnosis Infection of both the mother and the fetus often poses a challenge that can be determined directly or indirectly, so the mother's serum test is very important as it can predict the infection of the fetus(Salatn, *etal*, 2017).

Congenital CMV infection is considered the most common non-genetic cause of sensorineural hearing loss in the fetus. The level of transmission and severity of the disease can be reduced and treated in the fetus during and after birth through immunoglobins and their control against the virus for the mother and fetus during pregnancy and in the postpartum period. (kagan, Hanpreoht, 2012) When CMV enters the cells of the body to establish infection, the host recognizes the virus and activates several mechanisms and pathways for the innate immune response, including induction of type I IFN cytokines and regulation of costimulatory molecules that are critical for slowing down the pathogen and thus priming a high-quality adaptive immune response (Locy, Ho Netal 1997). the innate immune response is the first line of defense against CMV and allows the host to take rapid measures against viruses, especially in the postnatal period. It appears that innate immunity is primarily responsible for the host's defenses against CMV infection due to the lack of preparedness of adaptive immunity (Niubo *et, al*(1996)

Symptoms may be mild or non-existent, including fever of unknown origin, skin rash, pharyngitis, and enlarged lymph nodes. Clinical results may show an increase in the number of leukocytes, anemia, thrombocytopenia, an increase in liver enzymes, and sometimes abnormal antibodies, and it can cause

Infection with the virus also causes pneumonia, encephalitis, neuropathy, hepatitis, and acute eye damage (Ramchandar, *etal* 2020).

The general public rarely requires the diagnosis of infection with the CMV virus, but it is necessary during pregnancy and immunodeficiency disease after the discovery of serum antibodies, which is the most common type of diagnosis. The primary infection is characterized by the presence of antibodies to immunoglobulin LAM in the patient's serum, as it is discovered in As early as four weeks after initial infection and can last a maximum of 20 weeks, viral nucleic acid is released into the blood commonly in positive patients with Antibodies (Mihaela Photogea, *et al.* 2022).

Materials and working methods

Materials used:

Used CMV ELISA cytomegalovirus test kit from company Bio check To detect the presence of immune antibodies IgM and IgG In the patient's serum using an ELISA device The principle of action depends on the interaction between the immune antibodies present in the serum with antigens, The patient's serum was added after it had been diluted to the holes covered with the antigen, then incubated, then the holes were washed using the washer buffer to remove the remaining unbound antibodies, then the conjugated enzyme was added, after which it was washed again and the Tetramethy Ibenzidine was added. The reaction stops after adding the stop solution.

2. Collection of specimens

The study included collecting serum samples from pregnant women, miscarriages, and previous miscarriages in Thi- Qar Governorate Shatra District, and the examination was conducted to confirm the presence of immune antibodies to the virus in them Serum, samples were divided into two groups.

1-Patients group

It included (90) serum samples from aborted women who were suspected of being infected with the CMV virus. draw (5ml) of venous blood and divide it into (2ml) of blood in a test tube containing anticoagulation to study the total and differential count of white blood cells and the phagocytosis process. and (3) ml) blood in a test tube and left to clot for half an hour, then separated using a centrifuge at 3000 rpm for 15 minutes to obtain blood serum, and use this serum to detect immune antibodies using ELISA device.

2-Control group

It included (10) blood samples from normal pregnant women who did not suffer from miscarriage. Total count of leukocytes White blood cells were counted using the Haemocytometer slide, According to the equation next (Beck, 1987):-

The rate of four square cells × the dilution factor is 200 =(cell/mm³)

3. Differential count of leukocytes

The number of each type of white blood cell was calculated according to the following equation (Schaechter *et al.*,1999):-

Number of cells = total number of white blood cells × percentage of the cell type/100

(cell/mm³)

Phagocytosis

The ability of macrophages to devour killed yeast cells was studied, as reported in(Mel-Calf et al.,1986) According to the following equation:-

Phagocytosis factor 100%= current number sold / The total number of balsa currently×100

Statistical analysis

Use test (1) and choose chi-square (de square) to analyze the results of the study using SPSS with a link.

4. Results

Table (1) shows the cases tested and infected with cytomegalovirus and the percentages distributed according to the type of test. The examination was conducted on (90) serum samples from pregnant and aborted women using (ELISA). The infection rate for IgM antibodies was (5.5%), for IgG antibodies it was(48.88%), and for IgM+IgG antibodies it was(2.2%).

Table (1): Percentage of cytomegalovirus infection in pregnant women and miscarriages according to type of examination

The test	Tested samples	Infected samples	Percentage %
ELISA IgM	90	5	5.5
ELISA IgG	90	43	48.88
ELISA IgM+ IgG	90	2	2.2
The total infection rate with virus	90	50	55.55

Blood parameters

The results of the differential count of white blood cells showed that there were no significant differences (P≥0.05) in the percentage of basophils, neutrophils, eosinophils, and monocytes compared to the control group, while the results showed that there were significant differences (P≤0.05) in the percentage of lymphocytes, which was higher in women infected with the CMV virus compared to the control group.

The results showed no significant differences (P>0.05) in the total number of white blood cells (WBC) compared to the control group .

Phagocytosis

The results of the phagocytosis process showed that there were significant differences (P≤0.05) in the rate of phagocytosis coefficient in women infected with the CMV virus, which was higher, reaching (60.12) compared to women not infected with the virus, whose phagocytosis coefficient was (47.10). As shown in the previous Table (2).

Table (2) Hematological parameters and phagocytosis process with a comparison between the results of the tests for the immunological study of women infected with the CMV virus compared to the control group

Test	Group	Number	Mean	SD	t	df	p	α
Basophils	Control group	10	0.40	0.51	1.17	48	0.24	0.05
	Infected group	40	0.65	0.65				
Neutrophils	Control group	10	53.20	5.45	1.79	48	0.79	0.05
	Infected group	40	59.77	11.18				
Eosinophils	Control group	10	2.20	1.22	1.83	48	0.07	0.05
	Infected group	40	3.27	1.73				
Monocytes	Control group	10	3.30	2.0	1.25	48	0.21	0.05
	Infected group	40	4.15	1.90				
Lymphocytes	Control group	10	28.30	4.37	3.51	48	0.001	0.05
	Infected group	40	40.50	10.69				
WBC	Control group	10	4.84	1.73	2.68	48	0.058	0.05
	Infected group	40	6.15	1.81				
Phagocytosis	Control group	10	47.10	4.06	4.70	48	0.001	0.05
	Infected group	40	60.12	8.47				

***Tabular (t) value(α=0.05, df=(48)=1.671**

5. Discussion

The study showed that the rate of infection with the CMV virus in pregnant women and aborted women was 55.55%, and this is consistent with a study conducted in southwestern Finland (Alanen *et al*., 2005) which recorded an infection rate of 56.3% and is similar to other studies in France, which recorded an infection rate of 46.8%Picon et al.,(2009). While other studies showed a significant increase in the rate of CMV infection, such as the study by AL-Khfaji and AL-zubaidi (2010) in Dhi Qar Governorate, reaching 100%. A study in Türkiye by(Inci *et al*., 2009) with a rate of 97.3%, And a study by Tamer *et al*., (2009) with a rate of 96.4%, the study of Ghazi et al., with a rate of 92.1% in Saudi Arabia, the study of Aksakal *et al.*, (2000) with a rate of 93.1, and the study of Odlenol *et al*., (2001) with a rate of 78 in Russia, and this indicates that the rate of infection with the CMV virus It ranges from one country to another and from one region to another .

The study found that there was an increase in the percentage of infection with the IgG immune antibody, which indicates the presence of previous infection in the patient, reaching 48.88%, while the percentage of infection with the IgM immune antibody, which indicates the presence of recent infection in the patient's blood, reached 5.5%, while Munra *et al*., (2005) the rate of infection with the antibody was 56.8 in Australia, where the rate of chronic infection was 56.8 and the acute infection was 5.5. In a study conducted in Sudan by Handan *et al* (2011), it was found that the rate of infection with the antibody was 72.2%, and in Other studies, such as the study AL Shimmory, (2011) in Diwaniyah, found that the infection rate for IgG antibodies was 59.2%, while for IgM antibodies it was 16%.

In a study in Kirkuk (2014), Hassan et al. found that the rate of infection with IgG antibody was 91.2 and antibody 3.8, and in a study conducted in Nasiriyah by Tuama (2015), it was found that the rate of infection with IgG 1 was 97% and antibody 10, and another study recorded in Baghdad (Albaiati ,2014) Antibody infection rate 100% For the virus using ELISA technology

Another study (Aljurani, 2014) revealed the rate of infection with IgG antibodies reached 100% for 100 children. In a study conducted in Sulaymaniyah by Hama and (2014), the rate of infection with IgG antibodies was 90% (Abdurahan, 2013). Another study conducted in Iran, the researcher found (Abdurahan, 2013). Bagheri et al., 2012. The IgG antibody rate is 2.5 72.1%, and the IgG antibody rate is 2.5 72.1%

e study does not agree with other studies conducted in Iraq by Majed (2011), as he found a higher rate of acute IgM infection than IgG, as the rate of infection with IgM antibody reached 45.9%, while the rate of infection with IgG antibody was 20.7% .

As for the total count of white blood cells, the study found that the total number of white blood cells falls within the normal range for affected women compared to the control group. This does not agree with

another study conducted in Iran by the researcher Taqbal (2007). Arabpour et al found an increase in The number of white blood cells in infected women, while the study agrees with a study conducted in Dhi Qar by Al-Abadi and Al-Ghazi (2013).

Through the differential count of white blood cells in the blood of women infected with CMV, the study found a high percentage of lymphocytes, and this agrees with Al-Abadi and Al-Ghazi 2013, while another study in Iran (2007), Arabpour et al, found that there is a significant correlation between lymphocytes and monocytes with infection with the CMV virus. This indicates the role played by blood cells especially lymphocytes, when infected with CMV, according to the current study .

As for studying the percentage of phagocytosis factors, the study found that there is a relationship between the high rate of phagocytosis factors in the case of infection compared to the control group, and this is evidence of the immune role played by phagocytic cells when infected in resisting the virus This is consistent with the study of Al-Abadi and Al-Ghazi (20013).

6. Conclusion

The results of the ELISA-IgM test were significantly higher compared to the ELISA-IgM test, and this is evidence of a previous infection in aborted women. The study showed a significant increase in the percentage of lymphocytes when infected with CMV and an increase in the percentage of phagocytosis compared to uninfected women. This explains the role of the phagocytosis process in resisting viral infection.

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