

How to Cite:

Al-Kinani, . R. M. H., & Al-Kaabi, A. J. (2022). Serological study of human Cytomegalovirus spread among aborted women in Najaf Governorate and assessment of MCP-1 chemokine effect on the virus. *International Journal of Health Sciences*, 6(S4), 3521–3526. <https://doi.org/10.53730/ijhs.v6nS4.9390>

Serological study of human Cytomegalovirus spread among aborted women in Najaf Governorate and assessment of MCP-1 chemokine effect on the virus

Roaa Mohammed Hussein Al-Kinani

Department of Biology, Faculty of Education for Girls, University of Kufa, Najaf, Iraq

Corresponding author email: mekesaif@gmail.com

Azhar Jasim Al-Kaabi

Department of Microbiology, College of Pharmacy, University of Kufa, Najaf, Iraq¹

Email: azharj.mohsin@uokufa.edu.iq

Abstract---This study aims to determine the prevalence of IgM, IgG, anti-Human *cytomegalovirus* (HCMV) in Najaf women and determining the level of MCP-1 chemokine concentration and its role in the immune response. This study was conducted on 65 were suffering from HCMV infection and were referred to the women's consulting clinic and maternity halls in each of the Al-Zahra teaching hospital and Al-Manathira general hospital and 15 women as a control without any miscarriage, during the period from 6 April to 12 June, and these samples were chosen within the age range is between (18 to 40) years. HCMV IgM, IgG antibody tests were performed using Enzyme-Linked Immunosorbent Assay, and the result showed that the prevalence of IgG and IgM immunoglobulins in pregnant women with miscarriages according to the statistical analysis that there is a high significantly difference with a level $\leq P$ 0.05 in IgG and IgM concentration within different age groups of aborted women compared to the control treatment group of women. The samples under study were also tested to measure the level of chemoattractant using a quantitative technique the enzyme-linked immunosorbent assay technique as well, the results showed that there was a non-significant increase in the the level of its concentration among aborted women, which reached 47.15 ± 7.64 (pkg/ml) compared to women in the control treatment, it reached 49.07 ± 17.41 (pkg/ml) respectively.

Keywords---Cytomegalovirus, IgM, IgG immunoglobulin, MCP-1, aborted women.

Introduction

Abortion is defined as the termination of pregnancy by removal or rejection of the fetus from the uterus before it is able to life there are two types of abortion that lead to this consequence, spontaneous or as termed miscarriage it may be induced also medical and surgical methods are available for abortions in both the first and second trimester (Lim and Singh,2014). Etiologic causes of miscarriage can be include, genetics, immunologic factors, placental abnormality, endocrine disorder, nutritional, environmental factors and infection with microorganisms like *Toxoplasma gondii*, *Cytomegalovirus*, *syphilis*, *rubella*, *herpes* and maternal disease such as diabetes mellitus, thyroid disease (Tang and Quenby,2010), women of childbearing age are often exposed to primary infection with HCMV (which it is more prevalent among pregnant women than non-pregnant women, as the prevalence of the virus is among pregnant women in developed countries, about (3.42-3.68) % (Enders *et al.*,2012),the reason for this may be attributed to the readiness of uninfected women to receive the initial infection with the virus with the onset of pregnancy, as pregnancy is often associated with immunosuppression (which increases risk of acquiring infection), and it is responsible for more than 70% of miscarriages or cause of Congenital infection (Usta *et al.*, 2016),the risk of infection to the fetus increases if occurrence of the primary infection within the first trimester of pregnancy (Faiza *et al.* ,2013).

HCMV virus can create chronic and recurrent infection in the mother, as it has a strong tendency towards cervical mucosa (the mucous membrane of the cervix) meaning it reverses to cause a recurrent miscarriage during pregnancy (Yamamoto-Tabata *et al.*, 2014), the virus can reach the placenta after infection and the syndrome of the mother through the cervix or the transmission of blood, which results in insufficiency of blood vessels, fetal infection and tissue damage and breakdown (Nigro, 2013). MCP-1 is monocyte chemotactic protein (small proteins secreted by cells that influence the immune system) which play a vital role in cell migration through venues from blood into tissue and vice versa, and in the induction of cell movement in response to a chemical (chemokine) gradient by a process known as chemotaxis also regulate lymphoid organ development and T-cell differentiation, mediate tumour cell metastasis, and have recently been shown to have a function in the nervous system as neuromodulators(Dawood,2010). Also the expression of (MCP-1) was also observed in most uterine immune cells during the implantation stage (Qiongyu *et al.*, 2020), therefore, the aim of this study is determining the prevalence of HCMV-specific IgM, IgG antibody in women in Najaf governorate and determining the level of MCP-1 chemokine concentration and its role in the immune response.

Materials and Methods

The study samples were collected from Al-Zahra teaching hospital and Al-Manathira general hospital during the period from 6 April to 12 June. Samples were collected by drawing venous blood as (5 ml) were drawn from the blood by

using medical plastic syringes, the drawn blood was placed in tubes that do not contain an anticoagulant substance, in which blood is placed and left (30) minutes at room temperature for coagulation, then the sera are separated by centrifuge for 5 minutes at a rate of (3000 cycles/min), and the serum was divided into equal amounts (250 μ l) in small tubes and kept at a temperature (-20 C) until use. 65 blood samples were collected from repeated miscarried women and 15 samples of healthy women were used as a control group and within the age range between (18-40) years. IgM, IgG antibody tests for HCMV using ELISA technology (Germany, Human - ELISA) according to the instructions the manufacture company.

Results

The diagnosis of HCMV (serological) was made by detecting antibodies Anti-viral (IgG, IgM) by using enzyme-linked immunosorbent assay (ELISA) technique .The results presented in the (table.1) were obtained, as the results of the statistical analysis for the level of concentrations immunoglobulins (IgG, IgM) were obtained as specifics for the virus, in the sera of aborted women shown that there is a high significantly difference with a level $\leq P 0.05$ in IgG concentration within different age groups of aborted women compared to the control treatment group of women. Also there is a very significant difference with a level of $P \leq 0.05$ between CMV immunoglobulin (IgM) concentration measured in aborted women sera and Control group and that is explained in (Table 1).

Table 1: Presence of specific immunoglobulin (IgG and IgM) in sera of studying groups according to ELISA test

Indicators	Abortion (No. = 65)		Control (No. = 15)		T test	P-value (Sig.)
	Mean	SD	Mean	SD		
IgG(U/ml)	55.62	33.1	35.89	14.97	3.5	0.001(HS)
IgM(U/ml)	0.76	0.38	0.60	0.08	3.05	0.003(HS)

SD: Standard Deviation; S: Significant at P-value <0.05

While the level of chemokine MCP-1(CCL2) in the sera of the study groups showed that there was a non-significant increase in the level of its concentration among aborted women and that explained in Table 2.

Table 2: MCP-1 chemokine concentration levels in the sera of the study groups

Patient group	(MCP-1) chemokine concentration by (Pico km/ml) (average \pm standard deviation)	Morale level P-value
Aborted women	47.15 \pm 7.64	P <0.68
Control	49.07 \pm 17.41	

Discussion

In this study, the prevalence of HCMV infection across a small geographic area, our results proved that there was high incidence of the infection in urban than

rural and that is proved according to (Table.1) according to the concentration of IgM and IgG and that concentration rate of globulin was increasing with the progression of age, this increase may reflect the accumulation of chronic infection with age (Gonzalez-Quintela, *et al.*,2008), (IgG) Immunoglobulin produced during the initial infection and its concentration level begins to increase with time, and thus be indicative of a chronic infection; Therefore, the measurement of immune globulin (IgG) for the HCMV virus it is important for diagnosing recurrent infections (Abdul wahab, 2012), and this result is in agreement with the findings of the researcher AL-Khilkhali (2014) in Iraq, which revealed a significant relationship between the concentration of (IgG) immune globulin in the serum measured in unit (aU/mL) and between age groups, and that highly significant difference with a level of $P \leq 0.05$ between CMV immunoglobulin (IgG) concentration measured in aborted women sera (55.62 ± 33.1) aU/mL and Control group (35.89 ± 14.97) aU/mL indicates the presence of recent infections with the virus in women who have aborted. Also there is a very significant difference with a level of $P \leq 0.05$ between CMV immunoglobulin (IgM) concentration measured in aborted women sera (0.76 ± 0.38) aU/mL, and Control group (0.60 ± 0.08) aU/mL, and this result agreed with what was mentioned by (Usta *et al.*, 2016) in his study, which included pregnant women in the Aegean region of Turkey, which showed the high rates of virus spread during the first trimester of pregnancy, the reason for this may be attributed to the fact that HCMV infection is a common infection in pregnancy, and pregnancy is a state of suppression so immunosuppression which increases the risk of acquiring infection Kenneson and Cannon (2007) especially the first three months of pregnancy is a very critical period that accompanies many immune changes or physiological adaptations to meet the needs of the fetus, and to provide maternal health requirements (Jiang *et al.*,2012), immunoglobulin (IgM) appears when the occurrence of the primary infection, which is an indicator of a recent or acute infection, but it disappears after a period of time.as short as a few weeks (Goodrich *et al.*, 2004),also IgM may appear in the case of secondary infection, reactivation of the old infection, or by interactions with some viral infections only but it can be due to the previous reasons (Benoist *et al.*, 2013). But in the Table-2 there is an absence of a significant difference between groups in the levels of chemokine MCP-1(CCL2) concentration, the reason for may be attributed to its unique multitude of immune-modulatory strategies by modulates the innate as well as adaptive immune response at every step of its life cycle it dampens the induction of antiviral interferon-induced genes by several mechanisms further striking is the multitude of genes and strategies devoted to modulating and escaping the cellular immune response several genes are independently capable of inhibiting antigen presentation to cytolytic T cells by downregulating MHC class I (Powers *et al.*, 2013), also MCP-1 is a potent chemoattractant chemokine for monocytes, macrophages and other leukocytes to sites of inflammation (powers *et al.*, 2007). and produced during all stages of gestation which involved in endometrial angiogenesis, regulation of trophoblast invasion and proliferation, cellular differentiation and apoptosis (Renaud *et al.*, 2009). In addition, the HCMV virus was detected in uterine- placental interface, which works to invade the Cytotrophoblast and disruption of its differentiation, as it shows the infected blastula with the virus are expressed viral interleukins that decrease the activity of fetal growth in women infected with the virus and increases the depth of the blastocyst invasion (Yamamoto-Tabata *et al.*,2004).

Conclusions

According to the small population, there was high prevalence of IgG and IgM HCMV. among pregnant women in Najaf province also there is no significant effect of MCP-1 chemokine in the serum of aborted women that infected with the virus.

References

- AbdulWahab, S.A. (2012). Cytomegalovirus Incidence in Pregnant Women with Recurrent Abortion. *J. Bioanal. Biomed.*, 4 (6): 101-103.
- AL-Khilkhali, H. J. B. (2014). The role of CMV in Autoimmune Hepatitis among Chronic Cases of HBV. Ph. D. Thesis, Faculty of Science / University of Kufa.
- Benoist, G.; Leruez-Ville, M.; Magny, J.F.; Jacquemard, F.; Salomon, L.J. and Ville, Y. (2013). Management of Pregnancies with Confirmed Cytomegalovirus Fetal Infection. *Fetal. Diagn. Ther.*, 33(4): 203-14
- Dawood AL-Taie AA. (2010). Serological Study for TORCH Infections in Women with High Delivery Risk Factors in Mosul. *Tikrit Journal of Pure Science*.15 (1) :1813 – 1662.
- Enders, G.; Daiminger, A.; Lindemann, L.; Knotek, F. and Bader, U. (2012). Cytomegalovirus (CMV) Seroprevalence in Pregnant Women, Bone Marrow Donors and Adolescents in Germany, 1996– 2010. *Med. Microbiol. Immunol.*, 201: 303-309.
- Faiza, L.; Hula, Y.; Deena, M.; Maysoon, A. and Faisal, G. (2013). Survey for CMV , HSV-2 Infection and their Association with Congenital Anomalies. *Baghdad. Inter. J. Advan.*, 1 (10):310 316.
- Gonzalez-Quintela, A.; Alende ,R.; Gude, F.; Campos, J.; Rey, J.; Meijide, L. M. ; Fernandez-Merino, C. and Vidal, C .(2008). Serum Levels of Immunoglobulins (IgG, IgA, IgM) in A General Adult Population and their Relationship with Alcohol Consumption, Smoking and Common Metabolic Abnormalities. *Clin Exp Immunol.*, 151(1): 42–50.
- Goodrich, M. and Mori, M. (2004). Opportunistic Infections among. Bone Marrow Transplant Recipients. *New. Engl. J. Med.*, 325, 1601-7.
- Jiang, X.; Bar, H. Y.; Yan, J.; West, A. A.; Perry, C. A.; Malysheva, O. V.; Devapatla, S.; Pressman, E.; Vermeulen, F. M. and Caudill, M. A. (2012). Pregnancy Induces Transcriptional Activation of the Peripheral Innate Immune System and Increases Oxidative DNA Damage among Healthy Third Trimester Pregnant Women. *Plos One.*, 7 (11): 1-10.
- Kenneson, A. and Cannon, M.J. (2007). Review and Meta-analysis of The epidemiology of Congenital Cytomegalovirus (CMV) Infection. *Rev. Med. Virol.*, 17:253–76.
- Lim, L.M. and Singh, K. (2014). Methods of Abortion in First and Second Trimester. *Open Journal of Obstetrics and Gynecology*, National University Hospital, Singapore City 4, 924- 929.
- Masoodi, T.; Sardana R.; Hassan A.; Jasuja S.; Aggarwal D.K; Dawar R.; Mufti, G.N.; Mendiratta, L. and Masoodi K.Z. (2013). A study on The timeline of Onset of Opportunistic Cytomegalovirus. *Inter. J. Mol. Med. Sci.*, 3(6):41-49.
- Nigro, G.; Anceschi M.; and Cosmi, E. (2013). Congenital Cytomegalic Disease Collaborating Group Clinical manifestations and Abnormal Laboratory Findings in Pregnant Women with Primary Cytomegalovirus Infection. *Br. J. Obstet. Gynaecol.*, 110:572–577.

- Powers.C. V, DeFilippisD, MalouliK. Früh. (2013). Cytomegalovirus Immune Evasion. *Microbiol. Immunol.* Page 325, 333–359.
- Qiongyu Hao, Jaydutt V. Vadgama and Piwen Wang. (2020). CCL2/CCR2 signaling in cancer. *Cell Communication and Signaling*, 18, Article number: 82.
- Renaud SJ, Sullivan R, Graham CH. (2009). Tumour necrosis factor alpha stimulates the production of monocyte chemoattractants by extravillous trophoblast cells via differential activation of MAPK pathways. *Placenta* 30: 313–319.
- Suryasa, I. W., Rodríguez-Gámez, M., & Koldoris, T. (2021). The COVID-19 pandemic. *International Journal of Health Sciences*, 5(2), vi-ix. <https://doi.org/10.53730/ijhs.v5n2.2937>
- Suryasa, I. W., Rodríguez-Gámez, M., & Koldoris, T. (2022). Post-pandemic health and its sustainability: Educational situation. *International Journal of Health Sciences*, 6(1), i-v. <https://doi.org/10.53730/ijhs.v6n1.5949>
- Tang A. W. and Quenby S. (2010), Recent thoughts on management and prevention of recurrent early pregnancy loss. *Current Opinion in Obstetric Gynecology*. 22(6): 446–451.
- Usta, A; Taskin, M. I; Usta, C. S; Dalkiran, E. S; Kilinc, O.and Dus, E.(2016) Screening Cytomegalovirus Infections in First Trimester of Gestation among High Prevalence Population. *Acta. Med. Anatol.*, 4(3):101-106.
- Yamamoto-Tabata ,T.; Mc Donagh, S.; Chang, H.T.; Fisher, S. and Periera, L. (2014). Human Cytomegalovirus Interleukin-10 Downregulates Metalloproteinase Activity and Impairs Endothelial Cell Migration and Placental Cytotrophoblast Invasiveness in Vitro. *J. Virol.*, 78(6): 2831-40.