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RESEARCH ARTICLE

Incidence of Cytomegalovirus Infection among Pregnant Women at Alkhoms City

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Abstract

Background: Human cytomegalovirus (CMV) or human herpes virus 5 is one of the major causes of congenital infections. Its clinical manifestations range from asymptomatic forms (90% of cases) to severe fetal damage and, in rare cases, death due to abortion. Actually recurrent infections may be due to reinfection with a new strain or to reactivation, but it is likely that most recurrent infections are due to reinfection. The fetal consequences of CMV infection make it one of the most serious infections contracted during pregnancy, but the scientific community is divided over the proposed implementation of preventive screening for anti-CMV antibodies.

The aim of this study: was to assess the incidence and risk of infection during pregnancy in 285 women who underwent anti-CMV IgG and IgM antibody screening. Also to compare between the sensitivities of both ELISA and rapid test for detection of CMV- IgM antibodies in sera of the investigated cases.

Results: The majority of women (75.1%) were positive CMV-IgG in pregnancy. The rate of positive CMV-IgM, was (24.6%). There were no significant relations between age, personal status, occupational activities, residence, gestation age, educational level, traveling to another countries, blood transfusion, surgical operation and CMV infection. However there was significant relation between history of abortion and pregnancy outcome of congenitally deformed children with IgM seropositive rate. Finally the results proved that ELISA system is more sensitive for detection of CMV-IgM antibodies compared with Rapid test.

Introduction

Cytomegalovirus (CMV), a member of the herpes virus group, is the most common cause of congenital viral infection, and the most common infectious cause of developmental delay and sensor neural hearing loss in the United States. Worldwide, 1% of all live-born infants are infected with CMV. CMV is ubiquitous, highly species specific, and, like other members of its family, infects almost all human beings at some point during their lives. The age at acquisition varies according to geographic and socioeconomic factors resulting in large differences in prevalence among groups[(1)].

The natural history of CMV infection is complex and characterized by lifelong latency punctuated by episodes of recurrent infection following a primary infection. After a primary infection, viral excretion from several different sites may persist for weeks to years before the virus becomes latent. Episodes of recurrent infection with renewed shedding often represent reactivation of latent virus but also can be caused by reinfection by an antigenically different strain of CMV[(2)]. Regardless of stage of infection, most episodes of CMV infection are asymptomatic and do not pose significant health threat to immunocompetent hosts.

However, maternal infection during pregnancy can cause serious, permanent sequelae in the fetus. Despite the potentially devastating nature of congenital infection, there is no effective treatment[(2)]. Cytomegalovirus (CMV), is responsible for a range of infections in humans of all ages. Among the most clinically important forms of CMV

disease is congenital infection. Intrauterine CMV infection occurs in approximately 1% of all live births, with up to 15% of congenitally infected infants showing symptoms at birth. These symptoms include any combination of microcephaly, intracranial calcifications, chorioretinitis, jaundice, hepatosplenomegaly, and purpura[(3)].

The mortality rate among symptomatic infants can be as high as 30%; those symptomatic infants who survive are likely to develop long-term neurologic squeal, including hearing loss, visual impairment, psychomotor delay, and mental retardation. Indeed, intrauterine CMV infection is second only to Down's syndrome as a cause of mental retardation. Of the 85% of congenitally infected infants who are asymptomatic at birth, approximately 15% develop neurologic sequelae by 4 years of age[(4)].

The debilitating effects of congenital CMV infection are strongly linked to maternal primary (new) infection, rather than reinfection or reactivation, during pregnancy. Approximately 50% of women with primary CMV infection during pregnancy transmit CMV to their infants, compared to only 0.5% of women with CMV reinfection or reactivation. Further, among those few infants who become infected following maternal reinfection or reactivation, symptoms and debilitating sequelae are extremely rare[(5)]. Thus, the challenge to the physician caring for a pregnant woman with clinical or serologic evidence of CMV infection is to determine if the infection represents a newly acquired (primary) infection, or, alternatively, represents either reinfection or reactivation of a pre-existing (nonprimary) infection[(5)].

Symptomatic individuals can present with a mononucleosis-like illness similar to that caused by Epstein-Barr Virus(EBV). The illness lasts days to weeks and is characterized by fever, extreme fatigue, myalgia, mild pharyngitis, cough, nausea, diarrhea, and headache. Spiking fevers to 39° to 40°C are not uncommon and can last for more than 2 weeks. Fatigue and malaise may persist for 4 weeks or longer[(6)]. Physical examination shows cervical or generalized lymphadenopathy. Rarely, hepatomegaly, splenomegaly, or rash may develop. Jaundice is uncommon. Hepatic enzymes are mildly elevated in 90% of patients with CMV mononucleosis and may remain abnormal for months. During pregnancy, laboratory abnormalities that suggest acute infection include lymphopenia or lymphocytosis associated with atypical lymphocytes, and thrombocytopenia[(7)].

There is no known treatment for CMV infection in pregnancy. Two antiretroviral agents, ganciclovir and foscarnet, are available to treat severe life-threatening or sight-threatening CMV infections in immunocompromised patients. Systemic ganciclovir treatment has not yielded significant clinical benefit for congenitally infected infants and is associated with significant toxicity. The variable nature of congenital CMV and the irreversible damage that occurs prenatally make postnatal treatment trials difficult. A controlled clinical trial of ganciclovir for treatment of congenital CMV is underway[(8)].

Infants born to women with primary CMV infection during pregnancy are more likely to be seriously ill at birth, to have bilateral hearing loss, and to be mentally retarded than infants born to women with recurrent CMV infection during pregnancy. Unlike primary CMV infection, only a small percentage of women with recurrent infection transmit CMV to their infants. Therefore, vaccination of susceptible women to prevent primary CMV infection in pregnancy may provide protection against the damage from congenital CMV infection[(9)].

Materials and methods

Experimental design

The blood samples taken from **285** antenatal females in the Department of Gynecology, at Alkhoms Teaching Hospital, Libya and out-patient Clinics, Alkhoms City. These cases represented different ages, social and educational levels. The cases were divided in three groups;

Group-I: included **95** blood samples from antenatal females in the reproductive age (18-45 years) group with history of previous unfavorable fetal outcome in terms of two or more consecutive fetal deaths, intrauterine growth retardation, still birth, early neonatal death and/or congenital anomalies.

Group-II: blood from **95** antenatal females in the reproductive age (18-45 years) without bad obstetric history were taken which served as control.

Group-III: blood from **95** antenatal females in the reproductive age (18-45 years); who were pregnant for the first time.

Samples collection and preparation:

Blood samples were collected from each person, allow to clot and centrifuged at 2,000 r.p.m for 5 minutes. Sera were separated and divided into three parts and each part was transferred to a plastic separate tube. Each tube was labeled with the data of the participant and stored at -20°C until analysed.

One tube (Sample) was used for detection of anti-CMV IgG (**CMV IgG Enzyme Immunoassay test kit; Biochec Inc. CA, USA)** and another one for CMV IgM (**CMV IgM Enzyme Immunoassay test kit; Biochec Inc. CA, USA).** The third tube used for detection of anti-CMV IgM antibodies using rapid screen test.

Statistical analysis of data

The data obtained in the present study is represented as percentages. The significance of the differences between the percentages were calculated using Z-test; according to Both and Robert [(10)].

Results

Socio-demographic data including age, residence place, occupation, education level were obtained from all participants.

Clinical data including gestational age, obstetric history, miscarriage, sons with congenital problems, type of this problem, blood transfusion, surgical operations ….etc.

Table (1) showed number and percentage of seropositive cases for CMV(IgG) (ELISA test) among pregnant women according to their ages. For age ranges <25, 26-29, 30-34 and 35-39, the percentage of seropositive cases were 73.5, 74, 64.5 and 81% respectively. Meanwhile 82.6% seropositive cases, their ages were more than 40 years old.

However using ELISA test for detection of CMV(IgM) antibodies among pregnant women according to their ages; the results were presented in table (2) and showed that the percentage of seropositive cases were 29.4, 22.35, 24.2 and 25.5% for age ranges < 25, 26-29, 30-34 and 35-39 respectively. Only 21.7% seropositive cases, their ages were more than 40 years old.

Table (1) Number and percentage of seropositive cases for CMV(IgG) (ELISA test) among pregnant women according to age.

Age (years)	Seropositive		Seronegative		Total
	No	%	No	%	
<25	50	73.5	18	26.5	68
25-29	63	74	22	26	85
30-34	40	64.5	22	35.5	62
35-39	38	81	9	19	47
40 or more	19	82.6	4	17.4	23

***% were correlated to the total number of pregnant women in each group**.

Table (2) Number and percentage of seropositive cases for CMV(IgM) (ELISA test) among pregnant women according to age.

Age (years)	Seropositive		Seronegative		Total
	No	%	No	%	
<25	20	29.4	48	70.6	68
25-29	19	22.35	66	77.65	85
30-34	15	24.2	47	75.8	62
35-39	12	25.5	35	74.5	47
40 or more	5	21.7	18	78.3	23

***% were correlated to the total number of pregnant women in each group**.

The educational level profile was as follows; only elementary school education 27%, secondary school 28%, college 38.6 % and non-educated 6.4%. The effect of education level on seropositivity for CMV among the studied cases were obtained in tables (3 & 4).

The results showed that, the highest percentage of seropositive cases for CMV(IgG) (ELISA test) in pregnant women was 77.77% in un educated women and the lowest percentage of seropositive cases for CMV(IgG) (ELISA test) in pregnant women was 72.5% among high school pregnant women. The same results were also observed with CMV(IgM) (ELISA test), where the highest percentage of seropositive cases was 27.77% in un educated women and the lowest percentage of cases 20% among high school pregnant women.

Table (3) Number and percentage of seropositive cases for CMV(IgG) (ELISA test) among pregnant women according to the school level.

School level	Seropositive		Seronegative		Total
	No	%	No	%	
Un educated	14	77.77	4	22.22	18
Elementary	58	75.3	19	24.7	77
College education	80	72.7	30	27.3	110
High school	58	72.5	22	27.5	80

***% were correlated to the total number of pregnant women in each group**.

Table (4) Number and percentage of seropositive cases for CMV(IgM) (ELISA test) among pregnant women according to the school level.

School level	Seropositive		Seronegative		Total
	No	%	No	%	
Un educated	5	27.77	13	72.3	18
Elementary	20	26	57	74	77
College education	30	27.3	80	72.7	110
High school	16	20	64	80	80

***% were correlated to the total number of pregnant women in each group**.

Concerning the effect of occupation on seropositivity for CMV among the studied cases were obtained in tables (5 & 6). The highest percentage of of seropositive cases for CMV(IgG) (ELISA test) in pregnant women was 74.6% in case of house wife women and the lowest percentage of of seropositive cases for CMV(IgG) (ELISA test) in pregnant women was 50 % among hospital worker pregnant women. An opposite results were observed with CMV(IgM) (ELISA test), where the highest percentage of of seropositive cases was 26.4% in women with administrative jobs and the lowest percentages of seropositive cases 24.4% and 25% among house wife and hospital worker pregnant women respectively.

Table (5) Number and percentage of seropositive cases for CMV(IgG) (ELISA test) among pregnant women according to the occupation.

Occupation	Seropositive		Seronegative		Total
	No	%	No	%	
House wife	153	74.6%	52	25.4%	205
Administrative	53	73.6%	19	26.4%	72
Hospital worker	4	50%	4	50%	8

***% were correlated to the total number of pregnant women in each group**.

Table (6) Number and percentage of seropositive cases for CMV(IgM) (ELISA test) among pregnant women according to the occupation.

Occupation	Seropositive		Seronegative		Total
	No	%	No	%	
House wife	50	24.4%	155	75.6%	205
Administrative	19	26.4%	53	73.6%	72
Hospital worker	2	25%	6	75%	8

***% were correlated to the total number of pregnant women in each group**.

Table (7 & 8) showed number and percentage of seropositive cases for CMV(IgG) (ELISA test) among pregnant women according to residence. The results indicated that the percentage of seropositive cases for CMV(IgG) (ELISA test) is higher in pregnant women living in urban areas (77.55%) than those living in rural areas (71.65%). An opposite results were observed with CMV(IgM) (ELISA test), where the percentage of seropositive cases for CMV(IgM) (ELISA test) is lower in pregnant women living in urban areas (21.4%) than those living in rural areas (26.7%).

Table (7) Number and percentage of seropositive cases for CMV(IgG) (ELISA test) among pregnant women according to residence.

Residence	Seropositive		Seronegative		Total
	No	%	No	%	
Urban	76	77.55%	22	22.44%	98
Rural	134	71.65%	53	28.34%	187

***% were correlated to the total number of pregnant women in each group**.

Table (8) Number and percentage of seropositive cases for CMV(IgM) (ELISA test) among pregnant women according to residence.

Residence	Seropositive		Seronegative		Total
	No	%	No	%	
Urban	21	21.4%	77	78.6%	98
Rural	50	26.7%	137	73.3%	187

***% were correlated to the total number of pregnant women in each group**.

The effect of receiving blood transfusion on seropositivity for CMV among the studied cases was obtained in tables (9 & 10). Lower percentage (66.7%) of seropositive cases for CMV(IgG) (ELISA test) were found with those pregnant women received blood transfusion more than one time, compared with pregnant women that did not received blood transfusion (74.4%).

Higher percentage (33.3%) of seropositive cases for CMV(IgM) (ELISA test) were found with those pregnant women received blood transfusion more than one time, compared with pregnant women that did not received blood transfusion (24%).

Table (9) Number and percentage of seropositive cases for CMV (IgG) (ELISA test) among pregnant women according to blood transfusion.

Blood transfusion	Seropositive		Seronegative		Total
	No	%	No	%	

Cases did not receive blood	**189**	**74.4**	**65**	**25.6**	**254**
Received blood for one time	**19**	**67.85**	**9**	**32.14**	**28**
Received blood for more than one time	**2**	**66.7**	**1**	**33.3**	**3**

***% were correlated to the total number of pregnant women in each group**.

Table (10) Number and percentage of seropositive cases for CMV(IgM) (ELISA test) among pregnant women according to blood transfusion.

Blood transfusion	**Seropositive**		**Seronegative**		**Total**
	No	**%**	**No**	**%**	
Cases did not receive blood	**61**	**24**	**193**	**76**	**254**
Received blood for one time	**9**	**32.14**	**19**	**67.85**	**28**
Received blood for more than one time	**1**	**33.3**	**2**	**66.7**	**3**

***% were correlated to the total number of pregnant women in each group**.

Studying the effect of surgical operation on seropositivity for CMV among the studied cases were obtained in tables (11 & 12).

Higher percentages (88.2%) of seropositive cases for CMV(IgG) (ELISA test) and (29.4%) for CMV(IgM) (ELISA test) were found with those pregnant women suffering from surgical operation for more than one time.

Table (11) Number and percentage of seropositive cases for CMV(IgG) (ELISA test) among pregnant women according to the surgical operations.

Surgical operations	**Seropositive**		**Seronegative**		**Total**
	No	**%**	**No**	**%**	
No operations	**178**	**73.55**	**64**	**26.44**	**242**
One operation	**17**	**65.4**	**9**	**34.6**	**26**
More than one operation	**15**	**88.2**	**2**	**11.8**	**17**

***% were correlated to the total number of pregnant women in each group**.

Table (12) Number and percentage of seropositive cases for CMV(IgM) (ELISA test) among pregnant women according to the surgical operations.

Surgical operations	**Seropositive**		**Seronegative**		**Total**
	No	**%**	**No**	**%**	
No operations	**60**	**24.8**	**182**	**75.2**	**242**
One operation	**6**	**23**	**20**	**77**	**26**
More than one operation	**5**	**29.4**	**12**	**70.6**	**17**

***% were correlated to the total number of pregnant women in each group**.

In the present study The effect of gestation age on percentage of the seropositivity (IgG), ranged from 72.3% to 82.35%, as shown in table (13). Studying the effect of gestation age on seropositivity for CMV(IgM) among the studied cases were obtained in table (14). Higher percentages (35.3%) of seropositive cases were observed with those pregnant women at second trimester compared with lower seropositivity for pregnant women at first and third trimesters; 25.45% and 24% respectively.

Table (13) Number and percentage of seropositive cases for CMV(IgG) (ELISA test) among pregnant women according to the gestation age.

Gestation age	Seropositive		Seronegative		Total
	No	%	No	%	
First trimester	42	76.36	13	23.6	55
Second trimester	14	82.35	3	17.65	17
Third trimester	154	72.3	59	27.7	213

***% were correlated to the total number of pregnant women in each group**.

Table (14) Number and percentage of seropositive cases for CMV(IgM) (ELISA test) among pregnant women according to the gestation age.

Gestation age	Seropositive		Seronegative		Total
	No	%	No	%	
First trimester	14	25.45	41	74.54	55
Second trimester	6	35.3	11	64.7	17
Third trimester	51	24	162	76	213

***% were correlated to the total number of pregnant women in each group**.

The relation between the seropositivity for CMV(IgG) and CMV(IgM) (ELISA test) among pregnant women investigated and their traveling abroad to another country were presented in tables (15 & 16). No clear evidence that traveling to another countries had any apparent effect on seropositivity.

Table(15) Number and percentage of seropositive cases for CMV(IgG) (ELISA test) among pregnant women according to traveling to another countries.

Traveling times	Seropositive		Seronegative		Total
	No	%	No	%	
Cases didn't travel	169	72.22	65	27.77	234
Cases traveled for one time	23	79.3	6	20.7	29
Cases traveled for more than one time	18	81.8	4	18.2	22

***% were correlated to the total number of pregnant women in each group**.

Table(16) Number and percentage of seropositive cases for CMV(IgM) (ELISA test) among pregnant women according to traveling to another countries.

Traveling times	Seropositive		Seronegative		Total
	No	%	No	%	
Cases didn't travel	58	24.8	176	75.2	234

Cases traveled for one time	**6**	**20.7**	**23**	**79.3**	**29**
Cases traveled for more than one time	**7**	**31.8**	**15**	**68.2**	**22**

***% were correlated to the total number of pregnant women in each group**.

Collectively grouping of pregnant women involved in the study into those with bad medical history (including repeated miscarriages and outcome of pregnancy for congenitally deformed children), those without bad history and those pregnant for the first time indicated that there is clear and significant differences observed between those groups in relation to seropositivity to CMV.

Pregnant women with bad medical history (including repeated miscarriages and outcome of pregnancy for congenitally deformed children).

Table (17) showed number and percentage of seropositive cases for CMV(IgG) (ELISA test) among pregnant women according to their medical history. Only 69.5 % showed seropositive test in both pregnant women without bad medical history and those which are pregnant for the first time, while 82% of pregnant women with bad medical history showed seropositive test.

The effect of medical history of the pregnant women under investigation on seropositivity to CMV(IgM), were presented in table (18). The percentage of the seropositivity ranged from 51.6% to 11.8%. High difference was notice in detection rate of IgM in pregnant women with bad medical history compared with the others.

Table (17) Number and percentage of seropositive cases for CMV(IgG) (ELISA test) among pregnant women according to their medical history.

Medical history	Seropositive		Seronegative		Total
	No	%	No	%	
Group-I (Bad history)	78	82%	17	18%	95
Group –II Without bad history	66	69.5%	29	30.5%	95
Group –III (pregnant for first time)	66	69.5%	29	30.5%	95

***% were correlated to the total number of pregnant women in each group**.

Table (18) Number and percentage of seropositive cases for CMV(IgM) (ELISA test) among pregnant women according to their medical history.

Medical history	Seropositive		Seronegative		Total
	No	%	No	%	
Group-I (Bad history)	49	51.6	46	48.4	95
Group -II Without bad history	11	11.8	84	88.2	95
Group-III (pregnant for first time)	11	11.8	84	88.2	95

***% were correlated to the total number of pregnant women in each group**.

Number and percentage of seropositive cases for CMV(IgG) and CMV(IgM) (ELISA test) among pregnant women according to occurring of miscarriages were included in tables (19 & 20). Higher percentage; 88.9% of IgG seropositive cases was noticed in case of women suffered from miscarriage for more than time; compared with those suffered miscarriage for only one time and/or those women without history of miscarriage.

This is not the case when IgM antibodies were tested. High difference was notice in detection rate of IgM in pregnant women with bad medical history compared with the others. Women suffering from repeated miscarriages showed high seropositivity (CMV IgM) 69.4% compared with those suffered miscarriage for only one time (30.8%) and those women without history of miscarriage (15.2%).

Table (19) Number and percentage of seropositive cases for CMV(IgG) (ELISA test) among pregnant women according to occurrance of miscarriages.

Miscarriages.	Seropositive		Seronegative		Total
	No	%	No	%	
No miscarriage	138	70	59	30	197
One time miscarriage	40	76.9	12	23.1	52
More than one time	32	88.9	4	11.1	36

***% were correlated to the total number of pregnant women in each group**.

Table (20) Number and percentage of seropositive cases for CMV(IgM) (ELISA test) among pregnant women according to occurrance of miscarriages.

Miscarriages.	Seropositive		Seronegative		Total
	No	%	No	%	
No miscarriage	30	15.2	167	84.8	197
One time miscarriage	16	30.8	36	69.2	52
More than one time	25	69.4	11	30.6	36

***% were correlated to the total number of pregnant women in each group**.

The results obtained in tables (21 & 22), illustrate the relation between seropositivity for CMV(IgG) and CMV(IgM) (ELISA test) among the studied pregnant women and their pregnancy outcome concerning congenitally defected infants. The results showed that women with high percentage of seropositivity (IgG) 82.35% delivered infants suffering from congenital malformation; compared with
lower percentage of seropositivity(IgG) 73% for women delivered infants without any congenital malformation. The same finding was noticed clearly on testing the seropositivity for (IgM) antibodies. Women delivered infants suffering from congenital malformation showed high seropositivity (CMV IgM) 64.7% compared with those delivered infants without congenital malformation (22.4%).

Table (21) Number and percentage of seropositive cases for CMV(IgG) (ELISA test) among pregnant women according to having sons with congenital problems.

Sons with congenital problem	Seropositive		Seronegative		Total
	No	%	No	%	
Cases have sons with congenital problems	14	82.35	3	17.65	17
Cases have sons without congenital problems	196	73	72	27	268

***% were correlated to the total number of pregnant women in each group**.

Table (22) Number and percentage of seropositive cases for CMV(IgM) (ELISA test) among pregnant women according to having sons with congenital problems.

Sons with congenital problem	Seropositive		Seronegative		Total
	No	%	No	%	
Cases have sons with congenital problems	11	64.7	6	35.3	17
Cases have sons without congenital problems	60	22.4	208	77.6	268

***% were correlated to the total number of pregnant women in each group**.

Comparative Study

Positive CMV IgM results indicate a recent infection (primary, reactivation, or reinfection).

In this part of the study we compare ELISA test system and CMV-IgM IFA rapid test system for detection of IgM antibodies to CMV in the serum of pregnant women; in order to decide which of the two methods are more sensitive for detection of IgM antibodies to CMV.

Serum samples from pregnant women previously diagnosed as seropositive for CMV-IgM antibodies using ELISA test system procedure were subjected to test for detection of IgM antibodies to CMV, using CMV-IgM IFA rapid test system . The results of this were presented in tables (23 & 24).

The results indicated that; out of 285 pregnant women only 71 (24.9%) were seropositive for CMV-IgM antibodies using ELISA test system procedure. However, out of 285 pregnant women only 55(17.5%) were seropositive for CMV-IgM antibodies using Rapid-test system procedure.

Table (23):Seropositivity for CMV-IgM antibodies in pregnant women using ELISA and Rapid test.

Item	IgM-ELISA		IgM-Rapid test	
	No.	%	No.	%
Seropositive	71	24.9	50	17.5
Seronegative	214	75.1	235	82.5
Total	285	100	285	100

***% were correlated to the total number of pregnant women**.

Discussion

Cytomegalovirus establishes a lifelong latent infection following primary infection that can periodically reactivate with shedding of infectious virus. Primary infection, reactivation and reinfection during pregnancy can all lead to *in utero* transmission to the developing fetus. Congenital CMV infections are a major cause of permanent hearing loss and neurological impairment**(11).**

It have been reported that, Africa continent have one of the highest prevalence of CMV e.g. in neighboring Egypt, CMV seroprevalence among pregnant women was 96% **(11)**.

A major contribution to the current chaotic situation is the increasing tendency of many obstetricians to perform routine serologic screening for CMV immunoglobulin G and M antibodies in women in the first trimester of pregnancy. A woman with CMV IgM antibodies, regardless of her current or previous IgG status, is then summoned for evaluation. Repeated tests are performed, including a repeat IgM test (typically by several methods such as enzyme-linked immunosorbent assay and fluorescent antibody staining), and IgG avidity assay**(12)**.

A test result of positive CMV-IgG indicates that the subject has previously been infected. After CMV infection, IgG remains in the body forever and protects considerably against the next infections. In other words, a negative result of CMV-IgG test means that the subject has not been infected with CMV. Considering the high frequency of positive CMV-IgG **(13).** This assay has a little value for diagnosis of the current CMV infection. However, it may be helpful to diagnose negative CMV-IgG cases.

Knowledge of the prevalence of seropositivity in pregnant women and the incidence of congenital infection in the various populations is useful in order to evaluate the socieconomic costs of this infection and to decide whether or not a screening program is necessary to identify it.

In the current study the overall prevalence of anti-CMV IgG antibodies in our pregnant women was 75.1%; meanwhile the overall prevalence of anti-CMV IgM antibodies in our pregnant women was 24.6% without any

statistically significant differences between age classes. Seropositivity to CMV; appeared to be independent of age, suggesting that risk of infection during pregnancy is fairly constant during these ages, and that interventions to prevent congenital CMV must target all women of childbearing age. In other similar studies no relationship was also found between age and CMV infection in pregnant women [14 & 15].

There were no statistically significant differences in seropositivity and detection of IgG and IgM antibodies for CMV when the participants included in the present study were grouped by job type. The incidence of seropositivity for CMV among different occupational groups was similar to the rate expected for the general population. Similar findings were obtained by other authors[16].

Cytomegalovirus (CMV) is a ubiquitous organism, found universally in all geographic locations and socioeconomic groups. However, infection with CMV is more common in developing nations and the people belonging to the lower socioeconomic section of the society.

The effect of residence on seropositivity and detection of IgG and IgM antibodies for CMV was evaluated in our study and the results proved that there was no statistically significant difference between different groups according to their residence. This may be explained by the fact that most peoples in our country, whatever they live in urban or rural areas are usually relevant to each other and most peoples usually live even for some time in both rural and urban areas. This results disagree with that obtained in study performed in US population; where lifelong exposure to persistent infections such as CMV may be one way in which lower social status in rural areas contributes to poorer health outcome[17].

CMV is known to be a significant cause of morbidity and mortality following blood transfusions, especially in children and immunocompromised patients[18].

Cytomegalovirus (CMV) is a virus that many people acquire during childhood or adolescence. One way of transmission of this virus is through blood transfusion or surgical operations and in the current research, the effect of number of times of blood transfusion and surgical operations on seropositivity and detection of IgG and IgM antibodies for CMV was determined. No statistical differences on seropositivity to CMV between those did not received blood transfusion and those received blood transfusion for one or more times. Also this was noticed for surgical operation. This means that pregnant women under investigation may got infection through other mean other than blood transfusion or surgical operation.

Studying the effect of gestational age on seropositivity and detection of IgG and IgM antibodies for CMV were evaluated. The detection rates of IgG and IgM antibodies were more or less are similar in different gestational ages (first, second or third trimesters) and there is no statistically significant differences between different gestational ages. Since IgM antibody to CMV persists from one to over 6 months after primary infection, it is possible that some of our first trimester infections occurred months prior to conception. Because of the persistence of IgM antibody for months after primary infection, IgM antibody results cannot be used to define maternal infection as second or third trimester. For example, if the first prenatal serum available is at the 28^{th} week of gestation, IgM antibody to CMV could indicate first, second or third trimester infection.

Our study showed a significant relationship between history of abortion and prevalence of CMV infection. The rate of CMV infection in pregnant women with history of multiple abortions was approximately six times as much as rate of infection among women who had no history of previous abortion. Other studies have also reported higher prevalence of CMV infection in women with spontaneous abortion [19]. Thus, it seems that CMV infection may play an important role in abortion.

The same result was also noticed in case of relationship between occurrence and prevalence of CMV infection and pregnant women delivered infants suffering from congenital malformation. Where The results showed that women with high percentage of seropositivity (IgG or IgM) delivered infants suffering from congenital malformation; compared with lower percentage of seropositivity (IgG or IgM) for women delivered infants without any congenital malformation. These results coincide with report that summarizes knowledge accumulated in a long-term study of congenital and maternal cytomegalovirus (CMV) infection in Sweden. In this report, type of maternal CMV infection was serologically determined in 62/76 cases (30 primary, 32 secondary). CNS disturbances in the infants occurred after both primary (all trimesters) and secondary maternal infections [20].

The effect of traveling abroad to another countries on seropositivity and detection of IgG and IgM antibodies for CMV was investigated in our study and the results proved that there was no statistically significant difference between different groups according to this classification. This means that infection in most cases acquired locally.

The current study does not demonstrate any significant influence of educational levels on the prevalence of anti-CMV antibodies. Our results are in agreement with that observed in Turkey and in other developing countries[21].

Conclusion

The results obtained in this study reported that:

1. The findings of our study indicated high prevalence of CMV seropositivity in Alkhoms among most cases of pregnant women.
2. We did not find any relationship between age, personal status occupational activities, residence, gestation age, educational level, traveling to another countries, blood transfusion, surgical operation and CMV infection.
3. Our study showed a significant relationship between history of abortion in pregnant women investigated and prevalence of CMV infection.
4. Also the results indicated that a significant relationship between prevalence of CMV infection as monitored by detection of CMV-IgM antibodies and women delivered infants suffering from congenital malformation.
5. The results proved that rapid test is less sensitive for detection of CMV-IgM antibodies compared with ELISA system.

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