



SEROPREVALENCE OF CYTOMEGALOVIRUS INFECTION IN PRE-MARITAL WOMEN IN SOME BAGHDAD HOSPITALS

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Abstract

One hundred and sixty one serum samples collected from pre-marital women in Baghdad province, without any clinical evidence of cytomegalovirus (CMV) infection, were screened for the presence of IgG and IgM antibodies against CMV by ELISA test. The IgG antibodies were detected in 58 which gave prevalence rate of 36%, while the IgM antibodies were detected in 16 (9.9%). The number of both IgG and IgM sero positive was 50 (31.1%) and the number of both IgG and IgM sero negative (control) was 37 (23%). rising in seropositivity was observed with young women, reaching to maximum of 46.6% in age group 15-19 years. While the lower percentage 9(5.6%) showed in the age group of (30-35) years. Seroprevalence rate was also found to be more in women from urban area than those from rural area, and the difference was statistically highly significant ($p > 0.01$).

الانتشار المصلي لفيروس التضعم الخلوي في النساء ما قبل الزواج في بعض مستشفيات بغداد

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الخلاصة

تم جمع ١٦١ (مئة وواحد وستون) عينة مصل من النساء المقبلات على الزواج في محافظة بغداد، واللاتي لا يبدن أي علامات سريرية على أصابتهن بفيروس التضعم الخلوي (Cytomegalovirus) قد تم الكشف عن وجود أضداد IgG و IgM في أمصال هؤلاء النساء ضد فايروس التضعم الخلوي باستخدام تقنية الاليزا. أظهرت النتائج بأن ٥٨ (ثمانية وخمسون) امرأة قد سجلت وجود أضداد IgG بنسبة ٣٦%، في حين ان أضداد IgM قد وجدت في ١٦ امرأة (٩.٩%) . ٥٠ امرأة أظهرت وجود أضداد IgG و IgM معا وبنسبة ٣١.١% و ٣٧ امرأة (٢٣%) لم يظهرن وجود أي نوع من أنواع الاضداد وأستخدمن كسيطرة. كما وأظهرت النتائج بأن أعلى نسبة أصابة كانت بين النساء الصغيرات في العمر ووصلت أعلاها (٤٦.٦%) في الفئة العمرية ما بين ١٥-١٩ سنة. في حين أقل نسبة قد ظهرت في الفئة العمرية بين ٣٠-٣٥ سنة. كذلك بينت النتائج بأن النساء في المناطق المدنية هي أكثر أصابة من المناطق الريفية والفروقات كانت معنوية عالية.

Introduction:

Human Cytomegalovirus (HCMV) is a member of the beta-herpes virinae, a subfamily of the herpesviridae which also includes Herpes simplex virus type 1 and 2 (HSV1) and (HSV2), Varicella-Zoster virus (VZV) , Epstein barr virus (EBV) human herpes viruses 6 and 7 (HHV6) and (HHV7), and Kaposi's sarcoma

associated herpes virus [1,2].The beta herpes viruses tend to have a relatively restricted host range, long growth cycle, and slow spread in cell culture. HCMV infected cells may become enlarged (cytomegalial), showing intranuclear or intracytoplasmic inclusion bodies, the former often referred to as the "owl eye" [3]. HCMV is a common congenital viral infection in humans

due to the high prevalence of the virus in the general population. Infected infants may be asymptomatic at birth, but can develop neurological problems later in life [4]. CMV is an important cause of abortion and stillbirth after primary infection in pregnant woman. Also Cytomegalovirus, an ubiquitous agent, is one of the important causes of intrauterine infections. The infection is usually asymptomatic in adults but its significance is many times increased when it occurs during pregnancy [5]. It is endemic throughout the world affecting most of the population where the seroprevalence of CMV IgG antibodies varies greatly with a variety of epidemiological factors such as age, geographical distribution, socioeconomic status, marital status and parity. [6,7,8,9,10].

The aim of this study:

The present study was therefore undertaken to determine the prevalence of CMV IgG and IgM antibodies and the various factors affecting it in the premarital women in Baghdad province.

Methodology:

Subjects:

From the January 2009 to August 2009, 161 blood samples were collected from apparently healthy non-married women (Pre-marital women), with age from (15) to (35) years. The samples were collected from different hospitals in Baghdad, Al-Yarmouk Teaching hospital, Al-Nuaman hospital, and Teaching Laboratories of Medical City. Before blood sampling, some information from all females were collected according to a questionnaire sheet prepared previously.

Collection of blood samples:

Five (5) ml of venous blood was drawn from each woman aseptically. The sera were collected and dispensed in to Eppendorf- tubes and stored at -20°C till analysis.

Cytomegalovirus (CMV) detection:

IgG- anti CMV and IgM anti- CMV in sera were detected, and they were measured by means of enzyme linked immunosorbant assay by using (ELISA) kit (Bioactive Diagnostica) as recommended by the manufacture. The results were interpreted as seropositive if the antibody titer was more than 11NTU and seronegative if less than 9 NTU. Samples with titer between 9-11 NTU were considered as equivocal and should be retested after 2-weeks.

Statistical analysis:

The Chi-square (χ^2) test for significance was adopted for the comparison and calculation of association in quantitative data according to contingency tables method within the SAS (2001) program [11].

Results and Discussion:

The blood samples were collected from apparently healthy pre-marital females referred to the laboratory units of Al-Yarmouk Teaching hospital, Al-Nuaman hospital, and Teaching Laboratories of Medical City for marriage testing profile, also these Hospitals are considered as a reference hospital for distance areas of rural and urban quarters. The total number of apparently healthy females included in this study was 161. The number of IgG seropositive with CMV was 58 (36%) in Baghdad province, while the number of IgM seropositive was 16 samples (9.9%). The number of both IgG and IgM seropositive was 50 (31.1%) and the number of both IgG and IgM seronegative (control) was 37 (23%) (Table 1). The statistical analysis showed that there was a significance differences ($p > 0.05$) (in Laboratories Teaching of Medical City and Al-Yarmouk Teaching hospital) between the controls and the positive results of CMV infection in pre-marital females in Baghdad. However, no significant differences in Al-Nuaman hospital; there was a highly significant difference between the controls and the positive sera in total in Baghdad. We try to make these serological tests (IgM, IgG) mandatory in primarily test before marriage.

Other local studies on pregnant women showed that the percentage of IgM only was (7.7%) and the IgG percentage was (71.8%). In negative result of both IgG and IgM the percentage was (20.5%) [12]. Other studies showed that the percentage of CMV IgG seropositive in unmarried women was (86.7%) and the marital status did not show much difference from that of married women (87.4%) [10]. The study of Fowler *et al.*, 2006 [13] showed that the percentage of unmarried women was 130 (86.7%) out of 150.

Other universal result of the CMV-IgM antibody assay for detection of primary infection, sera from 300 women known to be seropositive for at least 1 year were tested. IgM antibody to CMV was found in 2/300 (1.5%). Among 43 women who seroconverted from CMV-IgG negative to positive, 36 (83.7%) had CMV-IgM in their first positive serum. The mean interval between the last CMV IgG negative serum and the first

positive serum was 30 weeks. When the interval between negative and positive sera was <15 weeks, 12/13 (92.3%) of sera were CMV-IgM positive [14].

Age is one of the factors affecting the prevalence of CMV seropositive in a community. In this study stepwise rise in seropositivity was observed with young women, reaching to maximum of 46.6% in age group 15-19 years. The percentage distribution of CMV in

females according to the age groups by ELISA was showed in (Table 2). While the lower percentage 9(5.6%) showed in the age group of (30-35) years, and the results showed that there were a highly significant differences ($p < 0.01$) between each age groups.

Table 1: The percentage distribution of apparently healthy females in Baghdad province by ELISA test (ELISA).

Test Result		ELISA					X ² Value
		IgG +ve IgM -ve	IgG +ve IgM +ve	IgG -ve IgM +ve	IgG -ve IgM -ve (control)	Total	
Teaching Laboratories of Medical City	No	22	24	7	12	65	4.003*
	%	37.9	48	43.75	32.5	40.4	
Al-Yarmouk Teaching hospital	No	24	14	5	15	58	3.604*
	%	41.4	28	31.25	40.5	36	
Al-Nuaman hospital,	No	12	12	4	10	38	1.545ns
	%	20.7	24	25	27	23.6	
Total in Baghdad	No	58	50	16	37	161	6.816**
	%	36	31.1	9.9	23	100	

* (P < 0.05) ** (P < 0.01) ns: non- significant

Table 2: The percentage distribution of CMV in females according to the age groups in Baghdad province by ELISA.

Age group (year)	Test	ELISA							
		Teaching Laboratories of Medical City		Al-Yarmouk Teaching hospital		Al-Nuaman hospital,		Total in Baghdad	
		No	%	No	%	No	%	No	%
15-19		30	46.1	27	46.6	18	47.4	75	46.6
20-24		20	30.8	22	37.9	14	36.8	56	34.8
25-29		10	15.4	7	12.1	4	10.5	21	13
30-35		5	7.7	2	3.4	2	5.3	9	5.6
Total		65	100	58	100	38	100	161	100
X ² Value		8.637**		8.975**		8.738**		8.725**	

** (P < 0.01)

Previous studies have shown that children who excrete CMV may spread infection to a parent and to other adults in the household [15]. Other studies have demonstrated that having children in child care centers with high rates of CMV infection correlates with an increased risk for CMV infection in the parents of these children [16,13]. Possibly young children in these households were acquiring CMV infection in child care centers, resulting in CMV exposure for other household members.

Although young children and sexual activity are recognized as sources of CMV infection, previous studies did not evaluate whether these exposures both singly and together contribute to increases in maternal infections that then may lead to congenital CMV infections [13].

The present study shows that CMV infection is widespread among the women of child bearing age group of Amritsar. Significant association of the various epidemiological factors (age, socioeconomic status and parity) with CMV suggests also revealed that women of child bearing age are more exposed to this infection. As no effective treatment and vaccine against the CMV is available, more emphasis should be laid upon educating women (to maintain good hygiene, limited contact with infected children and responsible sexual practices) and their prospective screening to reduce the foeti maternal transmission.

This study also found that women aged (15-19) years were more likely to have an infant with congenital CMV infection than women who were older. Young maternal age may be a marker of recent exposure to CMV, although it also may be indicative of a biological effect of age on maternal infection. Possibly the combination of an age-related factor with recent exposure to the virus in young women enhances CMV infection during pregnancy and

increases the risk for transmission to the fetus [17]. Other study [10] found that the age group of (36-42) years was the higher incidence group (98%) of infection.

In this study the percentage of women in urban community that were infected with CMV is 107(86.3%), while in the women of rural community the percentage is 17(13.7%) (Table 3). The results showed that there were a highly significant differences ($p < 0.01$) between urban and rural infected women with CMV. Also there was a highly significant ($p < 0.01$) and a significant differences ($p < 0.05$) between the positive results (IgG +ve, IgG+ve and IgM +ve, and IgM +ve).

The study of Mohammed [12] showed that the percentage in urban area was (82.9%). Rates of congenital CMV infection are higher in urban, low-income, predominantly black populations in which the CMV seroprevalence rates among women of childbearing age are high, suggesting that CMV exposures occurred frequently in these populations [13].

The prevalence of CMV antibodies during child bearing age varies greatly in different population groups. Lower prevalence rate of CMV IgG antibodies (40-80%) has been reported from developed countries, and higher rate (90 - 100%) from developing countries, depending upon the variability of accessibility of virus and its circulation rate in the community [18].

In our study, statistically significant difference in prevalence rates was observed between the lower and upper socioeconomic classes. IgG antibody levels were also found to be higher in women of urban background as compared to the women residents of rural area. Adverse observations have been reported from other studies. [12,19].

Table 3: The percentage distribution of positive CMV females in Baghdad province according to educational level by ELISA test.

Test Subject	ELISA Test								X ² Value
	IgG +ve IgM -ve		IgG +ve IgM +ve		IgG -ve IgM +ve		Total in Baghdad		
	No	%	No	%	No	%	No	%	
Urban	49	84.5	43	86	15	93.75	107	86.3	9.763**
Rural	9	15.5	7	14	1	6.25	17	13.7	3.613*
Total	58	46.8	50	40.3	16	12.9	124	100	6.743**
X ² Value	9.862**		10.041**		10.480**		9.894**		

*($P < 0.05$)

** ($P < 0.01$)

For prevention of congenital CMV infection, young women of childbearing age should be informed about CMV transmission routes [20]. Young women should be instructed to practice good hygiene (ie, hand-washing) when caring for young children. Adolescents and young women should be advised to avoid salivary and genital contact with others

However, changing behaviour through health communication is challenging. A randomized, clinical trial that provided information on CMV and the importance of hand-washing failed to show a decrease in CMV acquisition by women of childbearing age, demonstrating the difficulty in changing behaviours,[21] yet successes have been observed in lowering the risk for HIV infection in black adolescents through health education interventions [22]. Even if behavioural changes through health communication decreases some congenital CMV infections, more likely an effective vaccine that is given to children or young teens and could prevent congenital infection would be more successful in preventing congenital CMV infection in most populations.

The diagnosis test for CMV must be introduced with other tests in the marriage test profile. Also the need for further studies to follow up the infected pre-marital women after the marriage especially in those with IgM +ve and (IgG and IgM) +ve women.

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