Seroprevalence of Cytomegalovirus among Population in Zliten, Libya

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ABSTRACT

s (CMV) is widely recognized as an opportunistic pathogen associated with considerable morbidity and mortality in at high risk populations such as immunocompromised individuals and pregnant women. Seroprevalence of CMV has been reported to be highest in countries with low socioeconomic states such as South America, Africa, and Asia, and lowest in Western Europe and United States. The aim of this study was to assess the prevalence of CMV infection and to estimate socioeconomic disparities effect in infection rates among population in the city of Zliten, Libya. Aseroepidemiological study was conducted on 250 blood samples from individuals (males and females). According to analyses, 94% and 6% of the specimens were found to be positive for anti-CMV IgG and IgM antibodies, respectively. This study showed there were no statistically significant associations between the presence of antibodies and the socioeconomic factor of all participants. The findings of the study indicating there is a very high prevalence of cytomegalovirus among population in Zliten, which reflecting an alarming picture of infection especially in high risk groups and the detection of this virus it could be very helpful to reduce hazard of the virus.

Keywords- Cytomegalovirus; Seroprevalence; IgG; IgM; Socioeconomic; Population.

INTRODUCTION

Cytomegalovirus (CMV) is a member of human Herpesviridae family. It is known as the human herpes virus 5 (HHV-5) which belongs to Beta herpes virinae sub family. CMV is an enveloped double stranded DNA genome. Genomes are linear and non-segmented, around 230 kilobase pairs long encoding 165 genes making it the largest member of the herpesvirus family. The virus establishes a lifelong latency following primary infection with some cells being latently infected.[1]

This virus is widely recognized as an opportunistic pathogen associated with considerable morbidity and mortality in at high risk populations such as immunocompromised individuals and pregnant women. In immunocompromised individuals, especially in connection with transplants, hemodialysis, cancer, immunosuppressive medication and infection with human immunodeficiency virus (HIV). Transmission of the virus can occur via sexual contact and in congenital infection (neonate transplacentally) by passage through a contaminated birth canal, or by ingestion of infected breast milk. Also the transmission can occur via organ transplantation and blood transfusion which transmitted by infected organ or fresh whole blood to seronegative recipients.[2]

Primary CMV infection occurs mostly in childhood and adolescence, but also is observed in adults as primary or reactivated infection.[3] In healthy subjects, infection with the CMV virus is often subclinical but may occasionally manifest as mononucleosis like syndrome or with a mild self-limited disease.[4]

In susceptible patients who include HIV/ AIDS patients, patients on myelosuppressive cancer therapy and recipients of organ, CMV infections is associated with serious morbidity and a high mortality rate. Infection may result in hepatitis, retinitis or blindness, graft rejection and multisystem failure.[5,6]

Transplacental transmission of primary infection in the first 16 weeks of pregnancy is associated with high rates of damage in fetal development. Approximately 10% to 15% of infants with congenital CMV infection are symptomatic at birth, with manifestations including growth retardation, hepatosplenomegaly and retinitis. The risk of long-term neurodevelopmental disabilities is high in these children and include microcephaly, hearing loss, motor deficits, cerebral palsy, mental retardation, seizures, ocular abnormalities and learning disabilities.[7,8]

Cytomegalovirus (CMV) is a common virus with no known seasonal predominance and with a prevalence that ranges between 50% and 85% of adults in the United States. The epidemiology of CMV varies in different regions of the world and in different socioeconomic and age groups.[9-12]

In general presence of anti-CMV (IgG) which representing past infection, are found in approximately 60% of adults in developed countries and 100% in developing countries. CMV seroprevalence has been shown to be highest in South America,

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Africa, and Asia, while it is lowest in Western European countries and the United States.[13]

MATERIALS AND METHODS

Study population

A seroepidemiological study was conducted on 250 blood samples from individuals were invited to participate in the study in Zliten city population, Libya. The study was conducted in the at Zliten Teaching Hospital, during the period from October 2015 to March 2016.

A consent was obtained from all participant after explaining the purpose of the study. They were asked to and helped to fill the structured questionnaires which comprised factors such as: age, sex, social, educational level and other medical history which were examining disparities in infection rates between participants.

Sample collection and analysis

A blood sample of 5ml was collected into a sterile plain tube and centrifuged at 2,000 rpm for 5 minutes. Sera were separated and divided into two parts and each part was transferred to a plastic separated tube. Each tube was labeled with the data of participant and stored at -20°C and kept for further serological study. One tube was used for detection of anti-CMV IgG and another one for anti-CMV IgM. A qualitative detection of CMV IgG and IgM in this study by using commercial ELISA testing kits of Bio Check Company,

USA. The collected data was analyzed by SPSS software version 13 and the statistical analysis was performed using Chi-square and student's test. Logistic regression models were used to assess the relationship between variables. Results were considered significant when $P < 0.05$.

RESULTS

From 250 people who undertook the study, with different ages (125 males and 125 females).

Figure (1) summarises the prevalence of anti-CMV IgG and IgM among all 250 participants. As shown in the figure, the percentage of anti-CMV IgG was quite high among 94% (235 out of 250 persons) while was 6% to anti-CMV IgM (15 out of 250 persons). All positive cases were distributed between the both genders males and females.

The results of the present study showed that there were no significant differences concerning seropositivity for anti-CMV(IgG) and (IgM) according to age, gender, marital status, occupations, previous medical history and educational level of all included individuals. Statistical analysis for socio-economic factors which shown the distribution of anti-CMV (IgG) and (IgM) results according to socioeconomic characteristics, five factors were analyzed and the results revealed that all factors were not significant when $P > 0.05$ (Tables 1, 2).

Table 1: Socio-economic-associated factors for CMV (IgG) in study population.

| Variable | HCMV IgG | | | | OR (95% CI) | P-value |
| | Positive | | Negative | | | |
	Number	%	Number	%		
Marital status *Married* *Single*	130 105	52 42	5 10	2 4	*0.19* *(0.11-13.95)*	*0.48**
Gender *Male* *Female*	115 120	46 48	10 5	4 2	*1.17* *(0.43-1.56)*	*0.44**
Age *≤ 20* *21-40* *≥ 41*	70 85 80	28 34 32	0 15 0	0 6 0	*1.22* *(1.15-6.05)*	*0.55**
Educational level *Illiterate* *High school* *Graduated* *Post graduated*	0 85 130 20	0 34 52 8	0 5 10 0	0 2 4 0	*0.32* *(0.85-3.95)*	*0.48**
Occupation *Unemployed* *Student* *Administration* *Housewife*	0 50 150 35	0 20 60 14	0 0 15 0	0 0 6 0	*0.98* *(0.86-6.36)*	*0.49**

*Fisher exact.

Table 2: Socio-economic-associated factors for CMV (IgM) in study population.

Variable	HCMV IgM				OR (95%CI)	P-value
	Positive		Negative			
	Number	%	Number	%		
Marital status						
Married	4.0	10	180	72.0	2.10	0.59*
Single	2.0	5	55	22.0	(0.58-48.25)	
Gender						
Male	2.0	5	120	48.0	1.77	0.56*
Female	4.0	10	115	46.0	(0.28-3.29)	
Age						
≤ 20	2.0	5	40	16.0	0.98	0.52*
21-40	4.0	10	125	50.0	(0.36-2.85)	
≥ 41	0.0	0.0	70	28.0		
Educational level						
Illiterate	2.0	5	85	34	0.85	0.51*
High school	4.0	10	110	44	(0.03-11.18)	
Graduated	0.0	0.0	40	16		
Post graduated	0.0	0.0	0	0		
Occupation						
Unemployed	2.0	5	0.0	0.0	0.81 (0.56-6.16)	0.58*
Student	2.0	5	70	28.0		
Administration	0.0	0	80	32.0		
Housewife	2.0	5	85	34.0		

*Fisher exact.

DISCUSSION

In the present study, the seroprevalence of anti-CMV IgG was 94%, which indicates a high rate of prior exposure to the virus while 6% in seropositivity of anti-CMV IgM which indicates the infection was from first exposure to the virus.

Seroepidemiologic studies showed that CMV is universally distributed among human populations. It is endemic in all parts of the world; epidemics are unknown. It presents throughout the year, with no seasonal variation seen in infection rates. In general, prevalence of infection is great and varies with socioeconomic status, living conditions, and hygienic practices which is acquired earlier in life in developing countries. The seroprevalence of CMV ranges from 40% to 60% in the northern hemisphere among developed countries and from 80% to 100% in Africa, Latin America and Asia especially in developing countries.[14,15]

The prevalence of CMV infection in the general population of African countries reportedly high.It has been reported to be 100% in Egypt, 90% in Eritrea and 97.14% in Tunisia.[16-18]

Also this study in agreement with other study in Nigeria by Akinbami et al., among blood donors which estimated 96% of CMV infection.[19]

In India and Pakistan were reported a high prevalence of CMV infection as well 95%, 97.8% by Kothari et al and Rizvi et al., respectively.[14,20] These high percentages in different developing counties of CMV infection, it were in contrast with the percentage reported in western literature, in the United States, the seroprevalence was 58.9% of CMV infection, in Portugal 77% and estimated
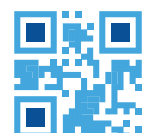
for Finland as 56.3%.[20-23]

In the study, the results indicated that there was no statistically significant difference between different ages, gender, marital status, different occupations, educational levels and previous medical history in the prevalence of CMV-IgG and IgM antibodies. Similar study in southern, Brazil by Souza et al., that found CMV-IgG antibody seroprevalence in the studied samples was (96.4%). There were no statistically significant associations between the presence of antibodies and the socioeconomic characteristics of donors.[24]

The variation of Seroprevalence of CMV-lgG antibodies between different countries may be due to the differences is socioeconomic levels in the study areas. Weber and Doerrin1994 mentioned that people who come from lower socioeconomic areas show a higher CMV-lgG seroprevalence than do people from an upper or middle income levels.[25]

The socioeconomic factor has a great effect in the infection rate between countries, but Colugnati et al., reported there is a significant difference in socioeconomic factors among population in USA, the possible explanation of this difference in socioeconomic factors which has no effect in Libya and other developing countries in comparing to USA (which reported a significant difference), could be linked to homogenous society, especially in Libya which has the same race, hygiene practices, living conditions, life style and economic state in general. That was completely different in USA, which has a huge number of races with living conditions which reflect disparities in infection rate among population.

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