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Cytomegalovirus Seroprevalenceat Blood Bank of Zliten Teaching Hospital in Zliten, Libya

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ABSTRACT

Human cytomegalovirus (CMV) is a ubiquitous β-herpesvirus, also known as Human Herpes Virus 5 (HHV5). It is the largest of the human herpesviruses with a 230 kb genome encoding 165 genes. CMV is widely recognized as an opportunistic pathogen, and has a high profile as an agent of disease in immunocompromised patients; much of the recent research literature addresses infection in those undergoing solid organ and bone marrow transplantation. The virus is known to be a significant cause of morbidity and mortality following blood transfusion in children and immunocompromised adults. CMV is found throughout the world among all socio-economic groups and infects between 50% and 85% of adults by the age of 40 years. CMV infection is more widespread in developing countries and in areas of low socio-economic conditions up to 100%. The propose of this study was to estimate CMV seroprevalence among voluntary blood donors at blood bank of Zliten teaching hospital in the city of Zliten, Libya. A serological study was conducted on 150 blood samples from individuals (males and females). According to analyses, 94% and 4% of the specimens were found to be positive for anti-CMV IgG and IgM antibodies, respectively. This study showed that there were no statistically significant associations between the presence of antibodies and the socioeconomic factor and medical history of all participants. The findings of the study indicated that the prevalence of cytomegalovirus among blood donors in Zliten, Libya was very high, 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; Blood donors; Libya*

INTRODUCTION

Cytomegalovirus (CMV) is a ubiquitous agent that commonly infects individuals from diverse geographical and socio-economic backgrounds. Although most CMV infections are asymptomatic, certain patient groups are at risk of developing serious illness and long-term sequelae from CMV infection. The virus develops a lifelong latent infection among 40 to 90% of adults. It remains the leading cause of congenital viral infection and a significant cause of transfusion-acquired infections in the immunocompromised indiviuals.[1]

Transfusion- transmission of the virus infection is associated with considerable morbidity and mortality in at-risk populations such as AIDS patients, CMV- seronegative neonates and organ transplant recipients.[2]

The virus is excreted through body fluids, and the most common modes of transmission are via the oropharyngeal and genital tract, although transmission can also occur through breast milk, organ transplant or blood transfusions where CMV can easily (30-60% incidence) be transmitted by fresh whole blood to seronegative recipients.[3,4]

CMV causes infection in immunocompromised, transplant recipients and those patients who are in need of frequent blood transfusion. Risk factors for primary CMV infection include blood transfusion (treatment for clotting factors), infected transplants, hemodialysis, and the frequency of dialysis in a week. The virus can cause serious morbidity and a high mortality rate and infection may results in hepatitis, retinitis or blindness, graft rejection and multisystem failure.[5-7]

CMV seroprevalence has been shown to be the highest in South America, Africa, and Asia, while it is the lowest in Western European countries and the United States. Different results published in respect with anti-CMV immunoglobulin G (IgG) and immunoglobulin M (IgM) seropositivity around the world varies from 93-100%.[8,9]

This study was carried out to investigate the seroprevalence of CMV infection among blood donors using ELISA laboratory diagnostic techniques of anti-CMV Immunoglobulin M (IgM) and anti-CMV Immunoglobulin G (IgG).

MATERIALS AND METHODS

Study population

A serological study was conducted on 150 blood samples from Individuals who were invited to participate in the study at blood bank of Zliten Teaching Hospital, Libya. The study was conducted at Zliten Teaching Hospital,

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during the period from October 2015 to January 2016.

A consent had obtained from all participant after explaining the purpose of the study, were asked and helped to fill the structured questionnaires which comprised demographic information, history of previous exposure to blood transfusion and donation. The exclusion criteria: any history of chronic illness (e.g. hypertension etc), ages below 18 years or above 59 years which is the required age for blood donation.

Sample collection and analysis

A blood sample of 5ml was collected into a sterile plain tube and centrifuged at 2,000 r.p.m 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 the detection of anti-CMV IgG and the other one for anti-CMV IgM. A qualitative detection of CMV IgG and IgM in this study was done by using a commercially ELISA testing kits of BioChek 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

Blood samples were obtained from 150 blood donors (75 males and 75 females), 141 blood donors were found to be positive for anti-CMV IgG antibodies while only 6 blood donors were positive for anti-CMV IgM antibodies. Figure (1) summarizes the prevalence of anti-CMV IgG and IgM among all participants, giving a CMV prevalence rate of 94% for anti-CMV IgG antibodies and 4% for anti-CMV IgM antibodies.

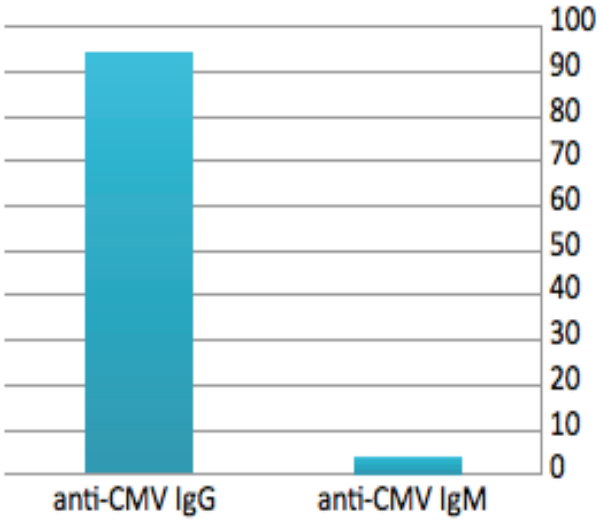

Figure 1: Seroprevalence of CMV antibodies in study cases.

The positive results were found among both gender and in different ages. The results of the present study showed that there were no significant differences concerning seropositivity for anti-CMV IgG and IgM according to demographic information, history of previous exposure to blood transfusion and donation and other medical history of all participants.

DISCUSSION

A World Health Organization (WHO)-sponsored survey of complement-fixing antibodies against CMV reported frequencies ranging from 40% in highly industrialized areas, to 100% in developing countries.[10]

The present study was undertaken to define further the epidemiology of CMV infection among a volunteer blood donor population, since volunteer donors may be expected to provide the major source of most blood transfusion requirements.

The results of the current study reported the seroprevalence of 95% for anti-CMV IgG in voluntary blood donors of which 4% were anti-CMV IgM positive. This reflects an alarming picture of the disease in the population and indicates that the seroconversion is an ongoing process.

A study of the seroprevalence of CMV among voluntary blood donors in India reported that none of the 200 donors tested positive for CMV IgM antibodies, but 95% were positive for CMV IgG antibodies.[11]

Similarly, a study conducted in similar settings at Military Hospital in Ghana, a developing country, found none of the 264 donor blood units were positive for anti-IgM CMV, but anti-IgG CMV seroprevalence was 93.2%.[12]

This study also agrees with a study that was performed on blood donors by Gargouri*et al*., in Tunisia, among 280 donors, 272 were positive for IgG to CMV (97.14%) but it was differing from a study performed in Libya, in which the percentage of blood donors with CMV (IgG) antibodies were (78.49%) and (10.75%) of blood donors were positive for CMV-IgM antibodies.[13,14]

Factors such as assay methods, sample size, geographic distribution and socioeconomic status can explain the differentiation of CMV prevalence.

The result of this Libyan study was close to Western literature, which describes the seroprevalence in voluntary blood donors ranging from 38%-75% and completely different to this study and other studies in different developed countries.[15]

The results of the present study showed that there were no significant differences concerning seropositivity for anti-CMV (IgG) and anti-CMV (IgM), whereas the infection was in both genders, and all ages in participants with different medical histories and profiles.

Screening all donated blood against certain viruses is mandatory in many countries, but determination of CMV antibodies are not a part of the routine laboratory tests in blood transfusion centers, and would just add up to screening cost.[16,17]

CONCLUSION

There is a very high prevalence of cytomegalovirus antibodies among blood donors at Zliten blood bank. Since the CMV remains latent within leucocytes after infection inspite of the prescence of antibodies in seropositive individuals, leucoreduction of blood products is recommended before transfusion to seronegative susceptible patients.

RECOMMENDATIONS

More studies must be done, on a larger scale, both in donor and patient populations in order to improve strategies for preventing and reducing the transmission of CMV through blood transfusion, especially in immunocompromised patients and other risk groups.

The limitations of this study were embodied in the small sample size at the Blood Bank of Zliten city. Despite these limitations, the present study shows that donated blood at the Blood Bank of Zliten has a high seropositivity for IgG antibodies to CMV.

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