PREVALENCE OF CYTOMEGALOVIRUS IN BLOOD DONORS AT BLOOD BANK OF INMOL, PAKISTAN. (A CASE STUDY)

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ABSTRACT: Cytomegalovirus is a pathogen, belongs to subfamily herpesviridae, causes congenital infections and severe complications in immunocompromised people which is a matter of concern for blood bank professionals and blood transfusion recipients. In Pakistan, it is not mandatory to screen CMV in donated blood from donors at blood banks. The present study was aimed to determine prevalence of CMV IgM in donated blood samples. For this purpose, thirty-five blood samples were collected from Institute of Nuclear Medicine and Oncology Lahore (INMOL), Pakistan and tested by Enzyme-Linked Immunosorbent Assay (ELISA) after serum extraction for detection of CMV IgM. Present study showed that seroprevalence of CMV IgM is 8.57% in Lahore, Pakistan. It is recommended that screening of blood, for CMV IgM must be carried out before acceptance of blood at blood banks in order to avoid long term consequences in recipients. Other strategies such as leucoreduction, filtration, saline washed RBCs, frozen deglycerolized RBCs, may also be used to minimize the transmission of CMV through transfusion.

Key Words: Cytomegalovirus, ELISA, Blood donors.

INTRODUCTION

Human cytomegalovirus (HCMV) belongs to subfamily herpesviridae, found everywhere and affects children at early childhood stage or people having destabilized immune system [1]. In young women having unsafe sex practice with multiple sex partners were reported to more victim of CMV [2]. In nature CMV is transmitted through direct or indirect contact, pharyngeal secretions, semen, breast milk, cervical, vaginal excretions and urine [3]. CMV is also transmitted through blood transfusion or blood products, as it relates to its latency in leukocytes and consequent contamination of red blood cells and platelet components, and the subclinical character of the infection in immunocompetent individuals [4]. In 0.5-4% pregnant females there is a chance of developing primary CMV infection after delivery. HCMV infection when occurs in first or second trimester, it causes complex post-encephalitic impairment of the infant brain, leading to motor and mental retardation, cerebral palsy, epilepsy, retinal defects, and progressive hearing loss [5]. Studies also showed that HCMV may involve in proliferation of breast cancer cells and antiviral treatment may be harmonious to chemotherapy [6].

Prevalence of HMCV in different parts of the world were studied and it was found that the prevalence of HMCV was 95 % in blood donors of Dehli, India [7], 60.60 % in blood donors of Newzaeland [8], 97.6 % in blood donors of Malaysia [9] and 76.6 % in blood donors of Japan [10]. In Pakistan the seroprevalence of CMV in general population and among blood donors has not yet been documented. Therefore, our basic aim is to determine the prevalence of CMV in blood donors by detecting the presence of CMV specific IgM antibodies with the purpose of determining whether routine CMV screening for donors is justified or not. This study will helpful in developing proper strategies for reducing CMV infection through blood transfusion.

MATERIALS AND METHODS

Population under study consisted of 35 voluntary blood donors attended over a three month period from December to February at Institute of Nuclear Medicine and Oncology Lahore (INMOL), Pakistan. Blood samples of all 35 blood donors were collected and sera were separated and stored at -40 ºC. CMV specific IgM was detected by using Enzyme Immunoassay for the Detection of IgM Antibodies (ELISA). For this purpose, commercially available CMV Ig M kit, Biocheck Inc., USA (Cat log No. BC-1091) was used. Purified CMV antigen was coated on surface of micro wells and diluted serum was added to them. If CMV IgM specific antibody was present, it would bind to antigen and all unbound materials were washed away with wash buffer. Later on, HPR-conjugate was added, which binds to antigen-antibody complex whereas excess HPR-conjugate was washed off and later a solution of TMB reagent was added. The enzyme conjugate catalytic reaction was stopped at specific time. The intensity of the color generated is proportional to amount of IgM specific antibody in sample. The tests were performed and results were read by micro wells reader. The CMV IgM index of donor samples were used to interpret the results. The donor samples have IgM index 1.0 or greater were positive for IgM antibody to CMV, while donor samples have CMV IgM index less than 0.90 were negative. The donor samples of CMV IgM index between 0.91-0.99 were equivocal [11-13].

RESULTS

A total of 35 blood donors were screened for anti CMV IgM. Their age ranged from 18-49 years. All subjects were healthy male voluntary blood donors with mean age of 25 ± 0.97. Among all blood donors 31.42 % had blood group A,

Table 1: Seroprevalence of CMV-specific IgM antibodies among blood donors.

Status	Anti CMV- IgM screened	%age
Positive	3	8.57%
Negative	32	91.42%
Total	35	100%

31.42 % had blood group B, 34.27 % had blood group O and 2.85 % had blood group AB. 94.26 % of blood donors were Rh positive while 5.7 % were Rh negative. CMV IgM was positive in 3 blood samples while 32 blood samples were negative for CMV specific IgM antibodies (Table 1). Hence the seroprevalence of CMV IgM among blood donors was 8.57 %.

DISCUSSION

The blood donors used in our research contains individuals that belong to different socioeconomic status, living under various hygienic circumstances. Our study is a representation of the present CMV seroprevalence in Lahore, Pakistan. A total of 35 healthy blood donors were screened for anti CMV IgM. CMV IgM was positive in 3 blood samples while 32 blood samples were negative for CMV-specific IgM antibodies. Hence the seroprevalence of CMV IgM among blood donors was 8.57%.

The CMV IgM seroprevalence among blood donors in our study is comparable with some previous studies. These studies showed that the prevalence of HMCV was 9.52 % in Bankok, Thailand [14], 7 % in Denmark population [15], 3.6 % in blood donors of Nairobi [16], 2.3 % in Brazil [17] and 2 % in Bangladesh [18]. However, some reports showed high prevalence of HMCV in blood donors which is 95 % in India [7], 97.6 % in blood donors of Malaysia [9] and 76.6 % in blood donors of Japan [10].

The possible explanation for this distribution could be related to socioeconomic, environmental and climatic factors [19]. Previous studies have shown that CMV prevalence and infection rates are higher among ethnic minorities and persons with low socioeconomic status. House hold transmission and sexual practice appears to be an important route of CMV transmission [20]. Some studies showed that anti CMV IgM was more predominant among individuals with higher education, which differs from previous studies that highlighted association between seropositivity and low level of education [21]. CMV infection via transfusion of seropositive blood donor is also a major problem for seronegative patients and the knowledge about the level of antibodies in blood is necessary to prevent further complications in recipients [22].

There are different strategies to reduce the risk of CMV via blood transfusion. Leucoreduction reduces the risk of CMV and latently infected white blood cells by this process. However, it has been reported that low but definite risk of transmitting CMV infection still occur despite of CMV seronegative or leucoreduction units. Data also suggested that plasma viremia in seronegative donor may be important reason for reduced risk of CMV transmission by CMV seronegative or leucoreduced blood. Studies for the methods of pathogen inactivation of blood components are under progress that may mitigate the limitations of current approach of present CMV infection [23].

The limitations of this study are small sample size (due to financial problem in purchasing enough test kits) and no female volunteer presenting at blood bank. Despite these limitations, the present study shows the seroprevalence of anti-CMV IgM among blood donors. Among immunocompromised patients, CMV infection can cause severe illness and even death. Therefore, the spread of CMV through blood products should be prevented.

Therefore, it is suggested that the future strategies may be adopted for prevention and reduction of post-transfusion CMV infection in susceptible recipients. It should include the screening of blood donors for CMV positivity and transfusion of CMV seronegative blood to recipients. It is also suggested that if seronegative blood is not available then other strategies such as leucoreduction, filtration, saline washed RBCs, frozen deglycerolized RBCs may be used to minimize the transmission of CMV through transfusion.

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