

Prevalence of Cytomegalovirus Antibodies among blood donors in Mosul Central Blood Bank/Iraq

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Abstract:

Cytomegalovirus infection is a matter of concern for blood bank professionals and blood transfusion recipients, especially in case of transfusion to neonates and immunocompromised patients, seroprevalence study was conducted on 100 blood samples from donors that were used in serological screening and confirm by real time PCR. All analysis were conducted using the Elisa technique (Biocheck, Inc, USA) and Real Time Polymerase Chain Reaction technique (Sacace, Italy). Interpretation results accordance with the manufacturer's instructions. from beginning May to the end October 2011, a total of 100 blood samples were collected from voluntary blood donors, the samples against anti-CMV IgM and IgG using Elisa technique and determination CMV DNA viral load by Real Time PCR, the results showed seroprevalence of anti-CMV IgG in samples studied was 64% and that of anti-CMV IgM 3%, while the CMV DNA was 2%. The viral load more than 80000 copy/ml.

Keyword: CMV, DNA, PCR.

Introduction

Cytomegalovirus (CMV) infection is a matter for concern among blood bank professionals and blood transfusion recipient, especially in cases of transfusions to neonates and immunocompromised patients ⁽¹⁾. Transmission of CMV via blood transfusion and blood products is related to it is latency in Leukocytes and consequent contamination of red blood cells and platelet components, transfusion transmitted CMV (TT-CMV) can lead to primary infection in CMV-seronegative recipient or reinfection (superinfection) by new strain in CMV seropositive recipient who receives blood products from CMV positive donor ^(2,3). Humans being are believed to be the only reservoir for human CMV (HCMV), and natural transmission occurs by direct or indirect person-to-person contact. Sources of virus include or pharyngeal secretion, urine, cervical and vaginal secretions, semen, breast milk, tears, faeces, besides contact with seropositive mothers (Passage through genital tract, breast milk, etc.). blood transfusion is the most important mode of perinatal/postnatal spread of CMV to neonates ^(4,5). Acute primary infection in the immunocompetent children and adults is self-limiting, followed by virus latency in CD 34 haemopoietic progenitor cell in bone marrow and CD13, CD14 peripheral blood monocytes ⁽⁶⁾. The aim of the study is to estimate of the seroprevalence of CMV among blood donors may be help to decide whether screening for CMV would eliminate transmission of infection to high-risk groups. Such feasibility studies have been very few in Iraq. The current study was undertaken in an attempt to address this aspect.

Patients and Methods:

One hundred blood samples were collected from blood donors attended the Central Mosul Blood bank for blood donation.

The standard blood bank questionnaires, medical examination and laboratory screening for transfusion safety were undertaken for current national blood policy on all subjects. All enrolled subjects were medically fit and negative for routinely screened

infection markers in transfusion safety. Their serum specimen was collected and stored at -20°C until testing.

All subjects were tested by commercially available anti-CMV IgM, IgG (Biocheck, Inc., USA) EIA, and CMV DNA (Sacace, Italy) Real Time PCR, tests were carried as per manufacturer instructions.

Results:

Out of 100 blood donors (100%) were males. The mean age (27.5±6.3) years. 3 subject (3%) have a positive result for CMV IgM antibody. However, 64 out of 100 (64%) were seropositive for CMV IgG antibodies, 2 out of 100 (2%) were positive for CMV DNA (the mean viral load were 80000 copy/ml. were shown in table (1). Table (2) shows the distribution of anti-CMV IgG results according to age, there were no statistically significant association ($P \leq 0.05$).

Table (1) Seroprevalence of anti-CMV IgM, IgG and CMV DNA among blood donors in central Mosul Blood Bank

Marker	Positive	Negative	Total
	n(%)	n(%)	
Anti-CMV IgM	3 (3%)	97 (97%)	100
Anti-CMV IgG	64 (64%)	36 (36%)	100
CMV DNA	2 (2%)	98 (98%)	100

Table (2) Distribution of anti-CMV IgG according age groups

Age (years)	Anti-CMV seropositive
≤20	4 (6.25%)
21-30	35 (54.68%)
31-40	15 (23.43%)
41-50	10 (15.62%)

6.25% of the blood donors aged ≤ years were seropositive for anti-CMV IgG against 54.68% in 21-30 year, and 15.62% in 41-50 year. There were no

statistically significant difference in the CMV IgG status in different age groups. (table 2).

Discussion:

CMV antibody positive (IgG, IgM) and CMV DNA in blood donors harbor CMV in their peripheral blood which can be potentially dangerous in the present study, the seroprevalence of anti-CMV IgG in blood donors was (64%) which indicated a high rate of prior exposure to virus. The result was lower than that found by Souza *et al*⁽⁷⁾ in Brazil where the rate (96.4%). Similar studies in India (87.9%) showed higher than seroprevalence than current study.

The seropositive of anti-CMV IgM in blood donors was (3%) which indicates acute CMV infection: the seroprevalence of anti-CMV IgM in the present study was higher than what was found by⁽⁹⁾. Where the rate was (0%). Similar studies in Brazil was (2.3%)⁽⁷⁾ and India (1.6%)⁽⁸⁾ also showed lower seroprevalence in the present study. Factors such as assay methods, sample size, geographic distribution, and socioeconomic status can explain difference in IgM incidence. High CMV seroprevalence ranging from 90-100% in blood donors was also reported from Malaysia⁽⁹⁾, Mauritius⁽¹⁰⁾, Ghana⁽¹¹⁾.

Studies from India also reported CMV infection in neonates after exchanging transfusion^(13, 14), and from other high risk groups such as bone marrow transplant patients⁽¹⁵⁾, renal transplant patients⁽¹⁶⁾ and HIV/AIDS patients⁽¹⁷⁾. CMV infection in these threatening CMV disease and CMV induced immunosuppression leading to superinfection by various other pathogens with high mortality^(18, 19). Recipient factor such as CMV status, degree of immunosuppression, increase cytokine production (e.g. patients of sepsis, burns) are associated with TT-CMV⁽²⁰⁾. Furthermore, it has been documented that blood transfusion itself lead to immunodulation with profound negative effect on the immune system

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which persists for many months⁽²¹⁾. All these indicate high risk and need for strategies in prevention of TT-CMV.

The high seroprevalence in adults of the present study indicates the endemicity of infection, this could be related to socioeconomic, environmental and climatic factors.

It is known that CMV, like other herpes viruses, can remain latent for long periods, or remain in a state of non-replication or undetectable replication levels, furthermore, there is possibility that anti-CMV IgM titer may be falsely low or negative because of competition between high antibody titers and antigens for binding sites, along with false-positive reaction resulting from rheumatoid factor, among others⁽¹²⁾.

Traditionally, preventive strategies of TT-CMV in high risk transfusion recipients are transfusion of CMV (free) (i.e. neither positive for CMV IgG or nor CMV IgM) or CMV "safe" prestorage leukodepleted blood components^(14, 22). Due to high seroprevalence of CMV in our donors it is not feasible to transfuse CMV free blood to all high risk patients. Naturally, we have to consider option of prestorage leukodepletion of blood components. Leukodepleted blood product reduces risk of CMV by reducing the number of latency infected cells of blood components in addition it reduces possibility of CMV reactivation in recipients by reducing cytokine release and other immunological trigger from donor leukocytes⁽¹⁴⁾. Presence of plasma viraemia prior to seroconversion and failure to achieve adequate removal of leukocytes have been implicated for residual risk of CMV in these blood components which is rarely encountered⁽¹⁴⁾.

Conclusions:

The blood donors in study region had high seroprevalence of anti-CMV IgG.

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انتشار الاجسام المضادة للفايروس المضخم للخلايا بين متبرعي الدم في مركز نقل

الدم الرئيس في الموصل - العراق

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الملخص

ان قضية الاصابة بالفايروس المضخم للخلايا بين المرضى الذين يتلقون دم خاصة الاطفال الخدج والمرضى المثبطين مناعيا تبقى من القضايا المهمة في بنوك الدم ، اجريت دراسة الغزيلة للتحري عن الانتشار المصلي للفايروس المضخم للخلايا بطريقة الاليزا على (100) نموذج دم من متبرعي الدم ، واكدت النتائج الموجبة بتقنية الوقت الحقيقي لتفاعل البلمرة المتسلسل. جمع (100) نموذج دم من متبرعي الدم الطوعيين للفترة من ايار 2011 لغاية تشرين الاول 2011، تم التحري عن الاجسام المضادة للفايروس من نمط IgG, IgM بتقنية الاليزا وتم التقدير الحمل الفايروسي باستخدام تقنية الوقت الحقيقي لتفاعل البلمرة المتسلسل، كان الانتشار المصلي للأجسام المضادة للفايروس من نمط IgG (64%) و IgM (3%) بينما بلغ تواجد DNA الفايروس (2%) بين العينات الموجبة للأجسام المضادة للفايروس نمط IgM وكان معدل الحمل الفايروسي اكثر من 80000 نسخة /مل.