Cytomegalovirus seropositivity among Voluntary blood donors in Koya

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ABSTRACT

Background: Cytomegalovirus (CMV) infects most cell types, the virus establishes lifelong latency in its host. Latent CMV is mainly associated with white blood cells, which are responsible for CMV transmission by blood transfusion. In healthy immunocompetent individuals, primary CMV infection usually is asymptomatic, while in immunocompromised individuals and low birth weight (LBW) neonates can cause severe illness with substantial morbidity and mortality rates.

Objective: The aim of this study was to determine CMV seropositivity among blood donors in Koya.

Methods: Serum samples were taken from (370) voluntary blood donors in Shahid Doctor Khalid Hospital in Koya, to detect anti-CMV IgM and IgG antibodies by Enzyme-linked immunosorbent assay (ELISA) technique.

Results: Out of 370 blood donors, were 14 (3.8%) positive for anti-CMV IgM, while 352 (95.1%) were positive for anti-CMV IgG antibodies. Statistically significant differences were seen among age groups regarding anti-CMV IgG ($p \leq 0.05$).

Conclusion: The seropositivity of CMV IgM and IgG among blood donors in Koya city was quite high, which suggests blood screening before transfusion to reduce transfusion-transmitted CMV (TTCMV).

Key Words: Cytomegalovirus, Seropositivity, Anti-CMV antibodies.

Introduction:

Transmitted infectious diseases via blood transfusion are one of the difficult tasks to the transfusion services around the world. The presence of viruses in blood components among carrier donors is the major causative infectious agents through blood transfusion. Hepatitis viruses, retroviruses, and cytomegalovirus (CMV) are main viruses that participated with transfusion-related infections (Herve, 2000; Kuhn, 2000, as cited by Adjel *et al.,* 2006).

The safety assessment of the blood supply, the quality of screening procedures, and the risk of transfusion-transmitted infectious diseases in any country can be estimated by review and analysis of the records of blood donors, screening procedures, and the prevalence of serological markers of infectious diseases (Morini *et al*., 2004). CMV is a large, enveloped virus with linear double-stranded DNA, a member of Herpesviridae family which, share a characteristic ability to remain latent within the body over long periods (Zuckerman *et al*., 2004).

Seropositivity of CMV can be found throughout the world among all socio-economic groups as well as it can be found among 50% - 85% of adults within the age of 40 years, and 100% within the age 60 and more (Ocak *et al.,* 2006). Possibly rout of transmission could be through breastfeeding, sexual contact, spread from children and through blood transfusion or blood components (Munro *et al*., 2005).

Transfusion transmitted CMV (TTCMV) can lead to serious disease among immunocompromised patients, mainly via reactivation of the dormant virus, and is a major

cause of including organ transplant recipients, patients undergoing haemodialysis, cancer patients, patients receiving immunosuppressive drugs, and HIV-infected patients (Kothari *et al*., 2002; Gao and Zheng, 2004; Ocak *et al*., 2006). .

Materials and Methods:

This study was carried out between January and May 2014 among blood donors in the Shahid Doctor Khalid Hospital in Koya city. Total of (370) voluntary male blood donors were included in this study. Their age between (19-52) years and the mean age (34.17± 7.1) (mean± SD). Sera specimens were collected and stored below -20 °C before testing.

The sera were screened for the presence of anti-CMV IgM (Biochek, Inc, BC-1091, USA), anti-CMV and anti-CMV IgG (Biochek, Inc, BC-1089, USA), according to the manufacturer's instructions by using Enzyme-linked immunosorbent assay (ELISA)

The statistical analysis was performed using Chi-square test by Statistical Package for the Social Sciences (SPSS) software version 11.5. P values less than 0.05 were considered statistically significant.

Results:

From the current study and out of 370 male voluntary blood donors. The results were 14 (3.8%) were positive while the test for anti-CMV IgM, whereas 352 (95.1%) were positive for anti-CMV IgG, (Figure 1).

Statistical analysis showed that there were no significant differences among anti-CMV IgM positive individuals to their age groups (p= 0.14) (Table 1).

Moreover, it was shown that the seropositive results for anti-CMV IgG was 94 (88.7%), 188 (97.4%) and 70 (98.6%) among blood donors with age group of (19-29), (30-39) and >40 years respectively, which was statistically differences (p= 0.001), (Table 2).

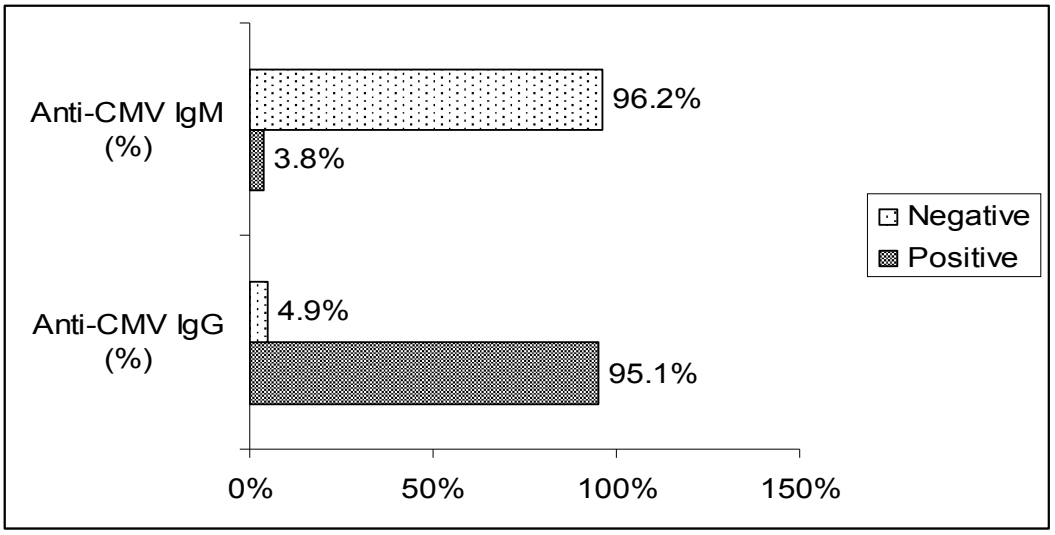

Figure 1: Percentage of prevalence of Anti-CMV IgM/IgG among Blood Donors

Table 1: Anti-CMV IgM seropositivity among different age groups

Age group year	Total	Anti-CMV IgM (%) Positive	Anti-CMV IgM (%) Negative	P value
19-29	106	6 (5.7%)	100 (94.7%)	0.14
30-39	193	8 (4.1%)	185 (95.9%)	
>40	71	0 (0%)	71 (100 %)	

Table 2: Anti-CMV IgG seropositivity among different age groups

Age group year	Total	Anti-CMV IgG (%) Positive	Anti-CMV IgG (%) Negative	P value
19-29	106	94 (88.7%)	12 (11.3%)	0.001
30-39	193	188 (97.4%)	5 (2.6%)	
>40	71	70 (98.6%)	1 (1.4%)	

Discussion:

The existence of CMV antibodies (IgM and IgG) among blood donors can be potentially infectious (Chaudhari and Bindra, 2009). In the present study, (3.8%) of blood donors showed seropositive for anti-CMV antibody (Figure 1). The seroprevalence of anti-CMV IgM among blood donors in Iran close to our finding ranged was (2.3-2.8%) (Morini *et al*., 2004; Hejazi *et al.*, 2007), and less incidence in India which was reported 0.071% and 1.6% Delhi in Pune respectively (Kumar, *et al*., 2008; Chaudhari and Bindra, 2009). Whereas in Nigeria seropositive of anti-CMV was high among blood donors (19.5%), reported by Akinbami and co-workers (2009). This variation in prevalence rates may refer to assay methods, sample size, socio-economic, environmental and climatic factors (Barbi *et al*., 2006; Tamer *et al*., 2009).

The highest rates of seropositive result for anti-CMV IgM antibodies were found among the age 19-29 years which was (5.7%), while the rate decreased among the age group (>40 years) (Table 1), this may be due to the small sample size of blood donors.

A decreased percentage rates of seropositivity of TTCMV infections were found among organ transplanted blood components who were negative for anti-CMV IgM antibody (Ganepola *et al*., 2007). Low birth weight (LBW) neonates in the risk case following blood transfusion which positive to anti-CMV IgM antibodies. (Akinbami *et al*., 2009). CMV infections are found throughout the world with prevalence rate between 40%-100% (Zuckerman *et al.*, 2004), the results of the current study was agreement with this range (95.1%).

Seroprevalence rates of CMV infections vary geographically and also affected by socio-economic status. Our finding supported by other studies, in Ghana seropositivity of anti-CMV IgG was 93.2% among blood donors (Adjei *et al*., 2006), while in Malaysia the ratio

was found to be 97.6% positive for CMV (Ahmed *et al.*, 2006). In another study carried out in Nigeria it was 96% (Akinbami *et al*., 2009). The prevalence rate of anti-CMV IgG in Urmia, Iran reached 100% among blood donors (Hejazi *et al*., 2007), while studies among pregnant women in Turkey and Australia reported CMV seropositive rates of 96.4% and 56.8% respectively (Munro *et al*., 2005 and Tamer *et al*., 2009). The high prevalence of seropositivity may indicate the endemicity of CMV infection (Roback, 2002).

From the current study, it was concluded that seropositivity of anti-CMV IgG among blood donors was varied with the age, significantly, (Table 2). The rates of seropositive results of anti-CMV IgG was increased with the age, which was agreed with the results reported by Galea G. and Urbanak in 1993 in Scotland among blood donors.

Transfusion-transmitted infectious disease can be minimized by reduction in the number of blood transfusion to and making blood transfusion as life saving procedure, because the CMV virus exist in the blood of healthy donors in a latent state within monocyte, reactivation may followed transfusion when these infected cells encounter allergenic stimuli (Zuckerman *et al*., 2004). Another way is serological screening tests which are gatekeeper of the safety of blood and blood components for transfusion (Morini *et al*., 2004).

However the majority of blood donors in developing countries are seropositive for CMV, therefore it is very useful to screen and identify the very few CMV seronegativity among blood donors, keep an inventory of them for immunosuppressed patients (Adjei *et al.*, 2006; Akinbami *et al*., 2009).

Other prevention strategy is “CMV safe” transfusion leuco-reduction blood, which decrease the risk of TTCMV infection by reducing the number of white blood cells (**Nichols *et al*., 2003)**.

Due to high CMV seropositivity rates among blood donors the current study recommend blood transfusion from seronegative CMV blood donors and the use of leucoreduced blood to reduce the risk infectious the diseases caused by TTCMV infection, especially among immunocompromised patients.

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پوختــتـه

ڤایرۆسی (CMV) لە توانایی دایەزۆربەی خانەکانی لەش توشبکات بەشێوەیەکی شاراوە و بۆ ماوەیەکی زۆربمێنێتەوە, بەتایبەتی لە ناو خانە سپی یەکانی خوێن, کە هەر ئەوەشە دەبێتە هۆی گواستنەوەی ڤایرۆسەکە لە کەسێ کەوە بۆ کەسێ ی تر لە کاتی گواستنەوە خوێن. لە کەسانی تەندروست تووش بوون بە ڤایرۆسی (CMV) بە گشتی هیچ نیشانەیکی نەخۆشی نی یە, بەڵام ئەو کەسانەی کە برگری لەشیان دابەزیووە (کپە) و وە منداڵی کێش کەمی تازە لە دایك بوو, کاتێك تووشی ئەم ڤایرۆسە دەبن ئەوا زۆر بەتوندی نەخۆشیان دەخات و لە ئەنجامدا ڕێژەی تووشبوان و مردن زیاد دەکات. مەبەستی توێژینەوەکە گەڕان و دیاریکردنی ڕێژەی دژەتەنی تایبەت بە (CMV) لە نێوان خوێن بەخشەکان لە شارۆچکەی کۆیە, کە تێدا (۳۷۰) کەس ئامادەبون لە نەخۆشخانەی شەهید دکتۆر خالید لە کۆیە بۆ خوێن بەخشین بە شێوەیەکی خۆبەخشانە. ئەنجامەکان ئەوەیان دەرخست کە (۳.۸٪) دژە ڤایرۆسی (CMV) جۆری (IgM) یان پۆزەتیف بوو. لەکاتێکدا (۹۵.۱٪) پۆزەتیف بوو بۆ جۆری (IgG), ئەوەی دواییان لەڕووی ئامارەوە ڕێژەیەکی بەرچاوە ($p\leq 0.5$).لە دەرئەنجامەکان دەرکەوت کە ڤایرۆسی (CMV) لەنێوان خوێن بەخشاندا لە کۆیە ڕێژەکەی زۆر بەرزە بە, وا باشترە کە خوێن پشکنینی بۆ بکرێت بەر لە گواستنەوەی, بۆ ئەوەی ڕێژەی تووش بوون بە (CMV) بەهۆی خوێن گواستنەوە کەم بکرێتەوە.

الخلاصـــة

(CMV) تصيب معظم انواع الخلايا وتبقى لمدة طويلة بشكل خفي خاصة داخل كريات دم البيضاء حيث تنتقل عن طريق الدم , ففي اشخاص اصحاء الذين لديهم مقاومة عالية عند اصابتهم بهذا الفايروس لا تظهر عليهم اي علامات تدل على اصاباتهم , أما اشخاص الذين لديهم مناعة متدنية واطفال هزيلي و حديثي الولادة يصيبون بهذا المرض بشكل حاد وبدوره يؤدي الى الموت . هدف من هذا الدراسة هي البحث وتحديد عن مضادات خاصة ب (CMV) بين المتبرعين بالدم في مدينة كؤية ,حيث تبرع (۳۷۰) شخص بشكل طوعي بالتبرع بالدم في مستشفى (شهيد دكتؤر خالد) في كؤية . أظهرت النتائج بأن (۳.۸ ٪) من المتبرعين كان لديهم مضادات ضد الفايروس (CMV) من نوع (IgM) اي النتيجة كانت أجابية , في حين (۹۵.۱ ٪) كانت ايجابية لنوع (IgG) ويعتبر هذه النسبة فرقاً احصائياً معنوياً بين مجاميع (IgG) حيث كان ($P \leq 0.05$) . نستنتج من هذه الدراسة بأن مضادات (CMV) من (IgG / IgM) بين المتبرعين بالدم في مدينة كؤية هي نسبة عالية جداً لذى من المستحسن ان تجرى فحص ل (CMV) للمتبرعين قبل نقله الى المرضى المحتاجين .