THE PREVALENCE OF HUMAN CYTOMEGALOVIRUS SEROPOSITIVITY AMONG BLOOD DONORS AT THE UNIT OF BLOOD TRANSFUSION MEDICINE, HOSPITAL UNIVERSITI SAINS MALAYSIA

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Abstract. Human cytomegalovirus (HCMV) is a species-specific DNA virus of the Herpetoviridae family. After a primary infection, HCMV persists in a latent form most probably in bone marrow progenitor cells or in peripheral blood monocytes. The virus can reactivate to result in shedding of the virus leading to virus dissemination and new infections. Immunocompromized patients are the ones most vulnerable to serious diseases occasionally acquired in blood transfusions. In a human population, HCMV seropositivity increases steadily with age to become approximately 100% in adults. This study was performed to detect seropositivity among regular blood donors in The Hospital of the Universiti Sains Malaysia, in the state of Kelantan. Using an enzyme immunoassay, it was found that 97.6% of blood donors were HCMV-positive. HCMV is highly prevalent and may be endemic in Kelantan. Hence, long-term strategies are required for the reduction of disease dissemination, and to prevent the exposure of immunocompromized patients to the virus.

INTRODUCTION

Human cytomegalovirus (HCMV) is a herpesvirus which is present as a latent infection in a majority of the population in many countries (Hoffbrand and Lewis, 1997; Roback, 2002). It causes a potentially dangerous infection that may become devastating to immunocompromized patients. Rates of seropositivity differ in different parts of the world: in the western countries if range from 40-79% (Galea and Urbaniak, 1993; Abuharfeil and Meqdam, 2000; De Ory Manchon *et al*, 2001; Hecker *et al*, 2004; Alanen *et al*, 2005), whereas in Africa and Asia they are about 96-100% (Kositanont *et al*, 1985; Zhao and Shao, 1989; Urwijitaroon *et al*, 1993; Lu *et al*, 1999; Gargouri *et al*, 2000; Pultoo *et al*, 2001; Kothari *et al*, 2002). Since there is no effective treatment for this infection, prevention remains the most effective way to avoid HCMV infection, which is most commonly transmitted through contaminated or infected blood. Blood transfusion is a dangerous source of HCMV and screening blood donors for HCMV becomes mandatory to provide "HCMV-safe" blood and blood components for patients, especially immunocompromized ones.

In Malaysia, a percentage of human cytomegalovirus seropositivity exceeding 91% was reported among multiply transfused thalassemic patients (Jamal *et al*, 1998). The prevalence of HCMV in the general population and among blood donors in Malaysia has not been documented. This work was performed to determine the frequency of HCMV seropositivity among regular blood donors in the state of Kelantan and to utilize the data obtained to outline proper strategies for reducing new HCMV infections through blood transfusion, especially in immnocompromized patients.

PATIENTS AND METHODS

Written consents were obtained from regular blood donors at the Blood Transfusion Medicine Unit, Hospital USM. Age, gender and pe-

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riod of blood donation for each of the donors were recorded. Detection of anti-HCMV antibodies was carried out on the sera of 172 healthy blood donors. The blood was processed immediately and the sera collected and stored at -20ºC until used. Anti-HCMV IgG levels were estimated using the Abbott Axsym System in which a microparticle enzyme immunoassay (MEIA) was utilized. In brief, calibration procedures were performed and validated using positive and negative controls provided. Microplates coated with the human HCMV strain (AD 169) were incubated with the test sera. After washing in Tris buffer, anti-human IgG conjugated with alkaline phosphatase was added, washed, and reaction probed with methylumbelliferyl phosphate. Positive and negative controls were provided and utilized for system calibration. Assay results of less than 15 AU/ml were considered negative for IgG antibodies to HCMV. Samples with results ≥ 15 AU/ml were considered positive, indicating the presence of a past or a current infection.

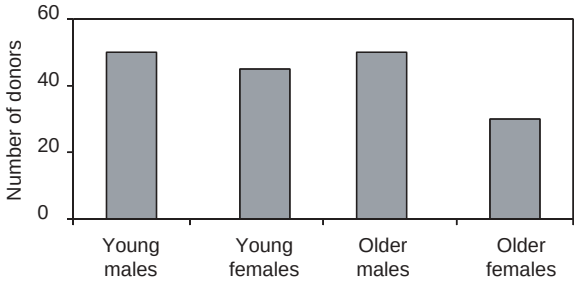

Fig 1–Distribution of donors according to age and gender. Young: 18-30 years, older adults: >31 years.

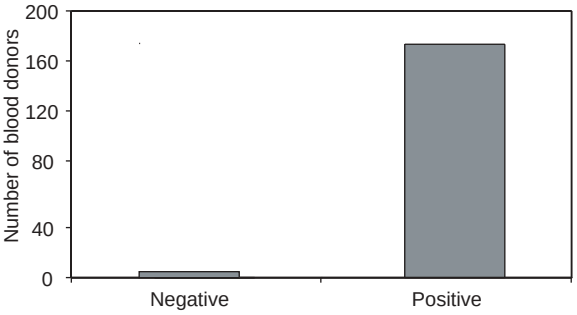

Fig 2–HCMV IgG among blood donors.

RESULTS

The ages of donors ranged from 18 to 47 years, with a mean age of 29.3 years. There were 74 female donors and 98 male donors who were divided into groups of young adult males and females (Ages 18-30 years), and older adults >30 years (Fig 1).

HCMV IgG was positive in 168 blood samples; only 4 samples were negative for HCMV IgG. Hence, the prevalence of positive HCMV IgG among the donors was 97.6%. All 4 negative donors were females with ages between 18 and 21 years (Fig 2).

DISCUSSION

In this study, 168 donors out of 172 were found to be positive for HCMV IgG (97.6%). This result indicates that the extent of exposure in the human population in the state of Kelantan to the virus is equivalent to that of the surrounding communities in Southeast Asia (Kositanont *et al*, 1985; Zhao and Shao, 1989; Urwijitaroon *et al*, 1993; Lu *et al*, 1999; Pultoo *et al*, 2001; Kothari *et al*, 2002). One reason for this distribution was the relatively low socioeconomical status and closeness of contacts within this population (De Jong *et al*, 1998).

The only 4 donors that turned out to be negative were young females. Being young was expected, since the seroconversion rate suggested that the risk of primary HCMV is a lifelong event and correlates with age and gender (Hecker *et al*, 2004). Females were generally less likely to be negative compared to males, since the number of males was higher than females in this study. This may not be a significant finding with the relatively low sample size in the study.

It can be concluded that HCMV is endemic in the population of Kelantan State. For this reason, blood recipients should be screened for HCMV, and only the negative ones should receive HCMV-free blood or blood products, especially young patients who have not been exposed previously to the virus. In addition, infection with HCMV via blood may endanger immunocompromized patients requiring trans-

fusion therapy, even if they are positive for HCMV antibodies. These findings point out the need for the availability of leukodepleted blood products and HCMV-free blood when requested.

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REFERENCES

Abuharfeil N, Meqdam MM. Seroepidemiologic study of herpes simplex virus type 2 and human cytomegalovirus among young adults in Northern Jordan. *New Microbiol* 2000; 23: 235-9.

Alanen A, Kahala K, Vahlberg T, Koskela P, Vainionpaa R. Seroprevalence, incidence of prenatal infections and reliability of maternal history of varicella zoster virus, human cytomegalovirus, herpes simplex virus and parvovirus B19 infection in South-Western Finland. *BJOG* 2005; 112: 50-6.

De Jong MD, Galasso GJ, Gazzard B, *et al.* Summary of the 2nd International Symposium on Human Cytomegalovirus. *Antiviral Res* 1998; 39: 141-62.

De Ory Manchon F, Sanz Moreno JC, Castaneda Lopez R, Ramirez Fernandez R, Leon Rega P, Pachon del Amo I. Human cytomegalovirus seroepidemiology in the community of Madrid. *Rev Esp Salud Publica* 2001; 75: 55-62.

Galea G, Urbaniak SJ. Human cytomegalovirus studies on blood donors in North-East Scotland and a review of UK data. *Vox Sang* 1993; 64: 24-30.

Gargouri J, Elleuch H, Karray H, Rekik H, Hammami A. Prevalence of anti-HCMV antibodies in blood donors in the Sfax region (value in blood transfusion) *Tunis Med* 2000; 78: 512.

Hecker M, Qui D, Marquardi K, Bein G, Hackstein H. Continuous human cytomegalovirus seroconversion in a large group of healthy blood donors. *Vox Sang* 2004; 86: 41-4.

Hoffbrand AV, Lewis SM. Postgraduate haematology. 4th ed. Butterworth: Heinemann,1997.

Jamal R, Fadzillah G, Zulkifli SZ, Yasmin M. Seroprevalence of hepatitis B, hepatitis C, HCMV and HIV in multiply transfused thalassemia patients: results from a thalassemia day care center in Malaysia. *Southeast Asian J Trop Med Public Health* 1998; 29: 792-4.

Kositanont U, Wasi C, Chandanayingyong D, Thongcharoen P. Prevalence of human cytomegalovirus antibodies in Thai blood donors. *Asian Pac J Allergy Immunol* 1985; 3: 179-82.

Kothari A, Ramachandran VG, Gupta P, Singh B, Talwar V. Seroprevalence of human cytomegalovirus among voluntary blood donors in Delhi, India. *J Health Popul Nutr* 2002; 20: 348-51.

Lu SC, Chin LT, Wu FM, *et al.* Seroprevalence of HCMV antibodies in a blood donor population and premature neonates in the south-central Taiwan. *J Med Sci* 1999; 15: 603-10.

Pultoo A, Meetoo G, Pyndiah MN, Khittoo G. Seroprevalence of human cytomegalovirus infection in Mauritian volunteer blood donors. *Indian J Med Sci* 2001 Feb; 55: 73-8.

Roback, JD. HCMV and blood transfusions. *Rev Med Virol* 2002; 12: 211-9.

Urwijitaroon Y, Teawpatanataworn S, Kitjareontarm A. Prevalence of human cytomegalovirus antibody in Thai-northeastern blood donors. *Southeast Asian J Trop Med Public Health* 1993; 24 (suppl 1): 180-2.

Zhao CQ, Shao JJ. Detection of specific antibodies to human cytomegalovirus in the blood donors in Qingdao. *Zhonghua Liu Xing Bing Xue Za Zhi* 1989; 10: 78-81.