SEROPREVALENCE OF CYTOMEGALOVIRUS ANTIBODIES POSITIVITY AMONG VOLUNTARY BLOOD DONORS IN THE DELTA STATE UNIVERSITY TEACHING HOSPITAL (DELSUTH), OGHARA, AND ITS ENVIRONS IN DELTA STATE- NIGERIA.

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ABSTRACT

Background: *Cytomegalovirus (CMV) is widely distributed globally and it is found in different geographical and socioeconomic groups. It can be transmitted from person to person via blood transfusion or tissue/organ transplantation and if the receipt is immune-compromised, then a severe infection and mortality can occur.*

Study Objective: *The purpose of this study is to determine the seroprevalence and risk factors for Human Cytomegalovirus (HCMV) among blood donors in DELSUTH and its environs.*

Materials and Methods: *This is a randomized cross-sectional study of voluntary blood donors for the purpose of replenishing stock in the blood bank system of the Delta State University Teaching Hospital, Oghara-Delta State, Nigeria and also from outreach blood donation centres around DELSUTH during blood donation campaigns. Five millilitres of venous blood was taken from each voluntary blood donor and assayed for CMV IgG and IgM using enzyme linked immunosorbent assay.*

Results: *A total of 185 voluntary donors were recruited for this study comprising of 162 males and 23 females. The age of the donors ranges from 23 to 62years. Human CMV IgG seroprevalence rate for males is 93% and for the females 91%. Therefore the overall CMV IgG seroprevalence rate is 92%. The CMV IgM seroprevalence rate is zero percent. There is no significant difference between the seroprevalence rates in respect of their gender, age, occupation, level of education and previous history of blood transfusion. ($p>0.5$)*

Conclusion: *The rate of seroprevalence of CMV is high among the studied population and this call for screening of voluntary-donor's blood before transfusion especially to those that are immunocompromised.*

Keywords: *Cytomegalovirus, Seroprevalence, Voluntary blood donors.*

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INTRODUCTION

Cytomegalovirus has a worldwide distribution and infects humans of all ages, with no seasonal or epidemic patterns of transmission. The seroprevalence of cytomegalovirus increases with age in all population and ranges from 40-100%.[1] The virus is acquired earlier in life and the prevalence is highest among lower socioeconomic groups in crowded living conditions.[1] Cytomegalovirus can be transmitted vertically and horizontally and infections are classified as being acquired before birth (congenital), at the time of delivery (perinatal), or later (postnatal). Most infections are acquired by direct close personal contact with individuals who are shedding the virus. Since cytomegalovirus has been detected in many body fluids, including saliva, urine, breast-milk, tears, stool, cervical secretions, blood and semen, it is clear that transmission can occur in variety of ways.[2] Prolonged shedding of virus after congenital or acquired cytomegalovirus infection contributes to the ease of virus spread; virus may be excreted for weeks, months, or even years following a primary infection.[1,2]

Transplacental infection of the foetus can occur following primary or recurrent infection of a pregnant woman, but the risk of cytomegalovirus transmission to the foetus and the rate of symptomatic foetal infection are much higher with primary maternal

infection. Newborns can also acquire infection at the time of delivery by contact with virus in the birth canal. Nearly 10%of women shed CMV in the genital tract at or near the time of delivery, and virus is transmitted to approximately 50% of the newborns.[3,4,5] Such infants begin to excrete virus at to 12 weeks of age but usually remain asymptomatic. Mother-to-infant transmission of CMV through breast milk is very common;[5] low-birth-weight premature infants are at greatest risk for developing disease. Of children who attend day-care centres and enter as toddlers, 20 to 70% experience CMV infection over a 1-to 2-year period. [2] Infection is usually asymptomatic, but the children may transmit CMV to their parents and other care-givers, posing risk to an unborn foetus if a woman is pregnant at the time. In adolescents and adults, sexual transmission of CMV may occur and is an important route of CMV spread.[1,6,7]

Similar to infections with other herpesviruses, primary infection with CMV results in the establishment of a persistent of latent infection. The sites of latent infection are thought to include various tissues, endothelial cells, and leukocytes. Therefore, CMV can be transmitted by blood transfusion and organ transplantation. Reactivation of the virus can occur in response to stimuli, particularly immunosuppression.[8,9,10,11,12]

MATERIALS AND METHODS

This is a randomized cross-sectional study of voluntary blood donors for the purpose of replenishing stock in the blood bank system of the Delta State University Teaching Hospital, Oghara-Delta State, Nigeria and also from outreach blood donation centres around DELSUTH during blood donation campaigns between January and June 2017. Five millilitres of venous blood was taken from each voluntary blood donor and assayed for CMV IgG and IgM using enzyme linked immunosorbent assay kit (Rapid Labs Ltd-Lot No. 1412008, Colchester Essex, Co 7 8SD UK).

Study Design: This is a randomized cross sectional study.

Data Management

Data was entered and analysed using SPSS 20 software. Statistical test result was considered significant whenever *P* value was <0.05.

Results

A total of 185 voluntary donors were recruited for this study comprising of 162 males and 23 females. The age of the donors ranges from 23 to 62years. The volunteers were recruited mainly from Oghara community (101), Sapele town (54) and Eku community (30). These communities are about 20 to 30 kilometres apart, all within delta state, Nigeria. The purpose of recruiting volunteers from different communities is for us to meet up with large sample size within the time frame of this study and not for the purpose of comparison of seroprevalence rates of cytomegalovirus. Human CMV IgG seroprevalence rate for males is 93% and for the females 91%. Therefore the overall CMV IgG seroprevalence rate is 92%. The CMV IgM seroprevalence rate is zero percent. See table 1. There is no significant difference between the seroprevalence rates in respect of their gender, age, occupation, level of education and previous history of blood transfusion. ($p>0.5$)

DISCUSSION

This study revealed a high CMV IgG seroprevalence rate of 92% among adult voluntary blood donors that were recruited into this study. Blood transfusion is necessary in many circumstances in terms of saving life and this demand the transfusion of safe blood, which include pathogen-free blood[13]. Blood that is devoid of CMV antibody is recommended for transfusion for CMV antibody negative AIDS patients. The significant of this finding is that caution need to be taken when transfusing blood to patients that are immunocompromised so that dormant CMV is not activated to cause disease. Similarly in other parts of Nigeria seroprevalence rate of CMV IgG is high, ranging from 90-98%.[14,15] Additionally,

Krech[16] in Ibadan recorded 100% CMV IgG seropositivity among blood donors and Akinbami et al,[12] in Lagos had 96%. Turkey in the middle-east also recorded high seroprevalence of CMV IgG rate of 92.7%[17]. In India (southeast asia) the finding is to what is recorded for most parts Nigeria and other part of the world. Kothari, et al[18] found seroprevalence of CMV IgM to be zero percent and IgG 95%. There was no significant association between level of education, gender, age, previous history of blood transfusion on one hand and CMV IgG seroprevalence on the other. Hence, previous blood transfusion is not a risk factor in this study though only 6 out of a total of 185 volunteers for this study have previous history of blood transfusion. This is at variance with the finding of Tolpin et al[19] in 1985. They provided molecular and biochemical evidence for transfusion associated cytomegalovirus infection. Although, CMV IgM seroprevalence was zero percent in this study, reports from other studies have shown a positive correlation between post-transfusion CMV infection and the receipt of blood from IgM anti-CMV antibody positive donors.[13,20]

Only few studies have been conducted in Nigeria to estimate the seroprevalence of cytomegalovirus among blood donors. Although cytomegalovirus infection significantly causes morbidity and mortality following blood transfusion in the immunocompromised and children, screening of blood for cytomegalovirus before transfusion is not routinely done in Nigeria.

CONCLUSION

This study shows high rate of CMV seroprevalence in the Delta State University Teaching Hospital and its environs, in the Delta State of Nigeria. Therefore, potential voluntary blood or tissue/organ donors should be screen for the presence of CMV antibodies or at least seropositve donated blood should be subjected to irradiation,

TABLE1. SEROPREVALENCE OF HUMAN CYTOMEGALOVIRUS IN RELATIONSHIP WITH VARIOUS RISK FACTORS.

Risk factor	Total No.	No. of positive anti-CMV IgG volunteers	No. of positive anti-CMV IgM volunteers	p-value
Sex				?0.05
Male:	162	150(93%)	0(%)	
Female:	23	21(91%)	0(%)	
Age(yrs)				?0.05
20-29	57	53(92%)	0(%)	
30-39	53	47(88%)	0(%)	
40-49	44	42(95%)	0(%)	
50-59	30	29(96%)	0(%)	
=60	1	1(100%)	0(%)	
Occupation				?0.05
Traders	112	101(90%)	0(%)	
Artisans	26	24(92%)	0(%)	
Civil Servants	17	15(88%)	0(%)	
Farmers	25	23(92%)	0(%)	
Unemployed	5	5(100%)	0(%)	
History of previous Blood transfusion				?0.05
Yes	6	5(83%)	0(%)	
No	179	166(93%)	0(%)	
Level of education				?0.05
Tertiary	24	21(88%)	0(%)	
Secondary	118	113(95%)	0(%)	
Primary	42	39(93%)	0(%)	
Illiterate	1	1(100%)	0(%)	

leukoreduction filtration or saline-washed red blood cells in order to prevent transmission of CMV infection to immunodeficient recipients.

Limitation of the study

For reasons not quite clear most of the volunteers are males and this may have led to gender bias in the study.

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