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Prevalence of Hepatitis B virus infection among blood donors at the Yaounde Military Hospital, Cameroon

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ABSTRACT

Blood transfusion can provide life-saving therapeutic benefits to patients. However, many infectious agents including Hepatitis B virus (HBV) can be acquired from infected transfused blood. HBV infection is a serious public health problem facing the world today. The aim of this study was to determine the seroprevalence of Hepatitis B virus infection among voluntary blood donors at the Yaounde Military Hospital, Cameroon. A cross sectional study was conducted on blood donors from August 2013 to August 2014, to assess the prevalence of Hepatitis B virus infection. A total of 313 study subjects were recruited and tested for Hepatitis B surface antigen using the rapid chromatographic immunoassay and ELISA. The results showed that, of the 313 blood samples tested, 277 were negative and 35 were positive for HBsAg; giving an overall Hepatitis B prevalence of 11.2%. The blood donors were comprised of 275 males and 38 females. The prevalence of HBV infection could be high among voluntary blood donors in Cameroon; hence it demands more vigilance in routine screening of donated blood prior to transfusion.

Keywords: Prevalence, Hepatitis B virus, voluntary blood donors, screening.

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INTRODUCTION

Blood transfusion is a common emergency decision for management of severe anemia due to various medical, surgical or obstetric conditions. Where there are clear transfusion guidelines and practices, it can have a life-prolonging effect in the recipients. Several infectious agents including Hepatitis B virus (HBV) can be acquired from infected transfused blood. This infection is the leading cause of morbidity and mortality not only because of the acute illness but also due to its chronic sequel, like chronic hepatitis, cirrhosis and hepatocellular carcinoma.

HBV infection is a serious public health problem facing the world today. Hepatitis B is responsible for approximately 1 to 2 million deaths per year worldwide (WHO, 2013; Karki et al., 2008) and it is estimated that there are about 300 million carriers of Hepatitis B virus in the world (Gulia et al., 2010).

Countries are classified on the basis of endemicity of HBV infection into high (8%; like equatorial Africa, South East Asia, China, parts of South America), intermediate (2 to 7%; like Eastern Europe, Middle East, South Asia) or low (<2%; developed countries as North America and Australia) incidence countries (WHO, 2013). According to WHO, the prevalence of HBV among blood donors in 2015 was estimated at 0.02, 0.64 and 3.59% for high, middle and low-income countries, respectively (WHO, 2015). In 2003, the prevalence of HBsAg among blood donors was established at 10.7% in Cameroon (Mbanya et al., 2003). Recent studies among blood donors in Cameroon have revealed HBsAg prevalence rates of 10.8% (2011) (Noah, 2011) and 12.14% (2012) (Ymele et

al., 2012).

Information on the prevalence of HBV infection in a cosmopolitan city like Yaounde can help public health bodies to better check further spread within the general population. Also, such data underlie the necessity of early diagnosis and treatment in order to prevent the health complications among patients. Our study could further serve as a monitoring indicator for the persistent rise of the disease prevalence as documented by previous studies (Mbanya et al., 2003; Noah, 2011; Ymele et al., 2012; Ndumbe and Skalsky, 1993). Therefore, this study was carried out to examine the prevalence of HBV infection among blood donors at the Yaounde Military Hospital (YMH), Cameroon.

MATERIALS AND METHODS

Subjects, study area and sample collection

In this cross-sectional study, a total of 313 samples from blood donors were screened over a period of 1 year (August 2013 to August 2014), at YMH. Blood donors were selected for this study after satisfactorily answering the donors' questionnaire and passing the physical examination conducted by the study team.

Generally, the inclusion criteria were: Accept and voluntarily consent to take part in this study; consent to donate blood and for the first time at YMH; Accept pre-donation counseling; Age: 18 to 55 years; Donor appearance and inspection: generally well, not febrile, breathless or suffering from persistent cough; Minor illnesses: no general malaise, pain, fever, headache, cough or diarrhea (individuals with a history of recent infection: defer for 14 days following full recovery and cessation of any therapy, including antibiotics); Weight: more than or equal to 55 kg; Vital signs: A normal pulse rate of 60 - 100 per min, A normal body temperature of 37.0°C, A normal blood pressure of 120 - 129 mmHg (systolic) and 80 to 89 mmHg (diastolic); Donor Iron Status: Minimum Hemoglobin level of 12.5 g/dl (females) and 13.5 g/dl (Males), Minimum interval of between donations of whole blood of 12 weeks (males) and 16 weeks (females); Gender: Females not pregnant, lactating or menstruating; Donor medical history: no communicable, cardiovascular, respiratory or endocrine diseases; and must not have been transfused within the past 12 months. Donors who did not meet these criteria were not included in this study. Explanations regarding the nature and aim of the study were provided. Participation on this study was voluntary and subjects were assured of anonymity for their laboratory testing.

Laboratory tests and questionnaire pre-testing

All the samples were screened for HBsAg using Hepacard (Biomed industries, India) (rapid chromatographic immunoassay) for qualitative detection in serum/plasma. All reactive samples were further confirmed by microwell ELISA. Tests were performed using adequate controls, and in accordance with the manufacturer's instructions. The questionnaire was pre-tested using ten people from the target group.

Ethical considerations

Permission for this study was obtained from the Chief Medical Officer of the Hospital. Informed consent was obtained from all study participants before they were enrolled in the study. Positive donors were counseled and referred to the appropriate specialized service of the hospital for care and treatment.

Statistical analysis

Demographic and other data were analyzed using Statistical Package for Social Sciences (SPSS version 17.0; Chicago, USA). The statistical analysis of data was done using Pearson chi-square test for trends in proportions. A p value of < 0.05 was considered statistically significant.

RESULTS

A total of 313 voluntary blood donors were screened. Table 1 shows the demographic information of the study population and associated HBV seroprevalences. The mean age of the participants was 28.7 years (range 17 to 55 years). The proportion of males and females was 87.9 and 12.1%, respectively (Table 1).

The overall prevalence of HBV infection was 11.2%. In males, the prevalence was higher (10.5%) than in females (1.0%). However, this difference is not statistically significant (P = 0.47) (Table 1). The age groups with the highest prevalence of HBV infection were 21 to 25 years (5.1%), 26 to 30 years (2.8%) and 31 to 35 years (1.6%). No HBV infection was obtained in the 46 to 50 years old age group. More demographic data on marital status shows that 83.0% of the subjects were single, 16.7% were married and 0.4% were divorced. Single subjects (10.6%) were more infected than married subjects (0.7%). No infection was obtained in divorced subjects. These differences are not statistically significant (Table 1).

The highest numbers of subjects were from the Center (50.8%), West (15.6%) and South (13.4%) regions. Similarly, the highest prevalence was obtained in donors from the Center (5.4%), West (2.2%) and South (1.3%) regions. No prevalence was obtained in the South west region. Foreigners represented 0.6% of the study population and had zero prevalence (Table 1). Occupationally, most of the blood donors were private sector workers (48.2%). The unemployed made up 21.2% of the study population, students (12.9%), civil servants (7.1%), and soldiers (10.6%). However, the highest HBV prevalence (4.7%) was obtained with those donors that had no jobs. Students had zero prevalence (Table 1). These differences in the prevalence are again not statistically significant.

DISCUSSION

In this study, the overall prevalence of HBV infection was 11.2% which is similar with other studies conducted in the same study area (Mbanya et al., 2003; Noah, 2011; Ymele et al., 2012; Ndumbe and Skalsky, 1993). According to the WHO classification, Yaounde qualifies

Table 1. Demographic characteristics of the study population and HBV infection at YMH between August 2013 and August 2014.

Characteristics	Patients (n = 313)	Positive cases	Chi square; P-value
	No. (%)	No. (%)	
Sex			
Male	275 (87.9)	33 (10.5)	$X^2 = 0.5$; p = 0.47
Female	38 (12.1)	3 (1.0)	
Age group (years)			
15 - 20	35 (11.2)	2 (0.6)	
21 - 25	107 (34.2)	16 (5.1)	
26 - 30	69 (22.0)	09 (2.8)	
31 - 35	42 (13.4)	05 (1.6)	
36 - 40	25 (8.0)	01 (0.3)	
41 - 45	19 (6.1)	01 (0.3)	
46 - 50	10 (3.2)	00 (0)	
51 - 55	05 (1.6)	01 (0.3)	
Data not available	01 (0.3)		
Marital status			
Single	234 (83.0)	30 (10.6)	
Married	47 (16.7)	02 (0.7)	$X^2 = 2.9$; p = 0.22
Divorced	01 (0.4)	00 (0)	
Data not available	31 (9.9)		
Region of Origin			
Center	159 (50.8)	17 (5.4)	
South	42 (13.4)	04 (1.3)	
East	12 (3.8)	01 (0.3)	
Littoral	11 (3.5)	03 (0.9)	
North West	12 (3.8)	01 (0.3)	$X^2 = 5.5$; p = 0.22
South West	07 (2.2)	00	
West	49 (15.6)	07 (2.2)	
Far North	14 (4.5)	02 (0.6)	
North	04 (1.3)	01 (0.3)	
Foreigner	02 (0.6)	00	
Occupation			
Civil servant	06 (7.1)	02 (2.4)	
Soldier	09 (10.6)	02 (2.4)	
Private sector worker	41 (48.2)	02 (2.4)	$X^2 = 8.8$; p = 0.06
Unemployed	18 (21.2)	04 (4.7)	
Student	11 (12.9)	00	
Data not available	228 (72.8)		

X^2 = Pearson chi-square; p = p – value.

as a high prevalence area (greater than 8%) (WHO, 2013). Previous studies show that, the prevalence of HBV infection in Cameroon is increasing with time. Ndumbe and Skalsky (1993) found an HBV prevalence of 6.7% in 1993; while Mbanya et al. (2003) recorded a prevalence of 10.7% in Cameroon in 2001 and a more recent report in 2012 by Ymele et al. (2012) observed a prevalence rate of 12.14%. The prevalence rate (11.2%) in the present study was slightly lower than the most recently reported (12.14%) (Ymele et al., 2012). The lower rate in this recent study could be explained by the test method used for screening which has been well documented to be 93.4 to 94.12% sensitive (Kaur et al., 2000; Lau et al., 2003). Nevertheless the rate is quite

high and necessitates the need for proper screening of donated blood with more sensitive and specific test kits, in addition to the application of strict donor selection criteria.

This prevalence obtained in Yaounde (a cosmopolitan city) could be higher in low socio-economic communities of Cameroon as some reports document a low prevalence in areas with high standards of living and highest prevalence in areas with low socio-economic levels (Kuliya-Gwarzo, 2009). High rates have also been reported in other parts of Africa such as in Kano, Nigeria (Nwankwo et al., 2012). Low rates (2.48%) of HBV infection have been reported in some parts of the world such as India (Gulia et al., 2011). Majority of our study population were males (87.9%) and females representing a small proportion of 12.1%. This could be due to the fact that most females are rejected during donor examination as a result of menstruation, pregnancy or other female physiological related states. In the present study, the prevalence of HBV infection in males was higher (10.5%) than in females (1.0%). This difference was not statistically significant ($p = 0.47$) and this could be due to small sample size as other studies with higher sample sizes documented significantly higher seroprevalences in males than in female donors (Karandeep et al, 2009; Chandrasekaran et al., 2000; Karki et al., 2008; Tareen et al., 2002).

The significantly higher infection rate in males than in female donors suggest other routes of exposure other than sex. This could be attributed to the use of unsterilized barbing razors to sheave which exposes the client in case of facial bleeding (Saeed et al., 2005). The repeated use of potentially contaminated razors and other non-sterilized shaving tools most likely infect barbers and their clients with HBV infections and has been well documented (Mele et al., 1995, Saeed et al., 2005; She et al., 1998; Candan et al., 2002). Also, health education programs focusing on barbers' community may contribute to the reduction in HBV transmission in this and other similar settings.

In 2006, Rodenas and colleagues reported a higher prevalence of HBsAg in donors older than 38 years (Rodenas et al., 2006), whereas in the present study, the age groups with the highest prevalence of HBV infection was 21 to 25 years (5.1%), followed by age group 26 to 30 years (2.8%) and a low prevalence rate was observed in the age group 31 to 35 years (1.6%). Our results are similar with the findings of Karandeep et al. (2009) who observed a higher prevalence rate in donors less than 35 years of age. No HBV incidence was recorded among donors in the age group above 46 years in the present study. The age group most infected with HBV is the sexually active and newly independent adults which also happen to be the work force of the population. In our study, single participants (10.6%) were more infected than married donors (0.7%). Married couples are less likely to engage in practices that put them at risk of contracting HBV and other sexually transmitted infections.

The highest prevalences were obtained in donors who had as region of origin, the Center region (5.4%) (Yaounde). This high prevalence could be explained by the accompanying large population of the center region. This variation in the prevalence of hepatitis B infection from region to region depends upon a complex mix of behavioral, environmental and host factors. The highest HBV prevalence (4.7%) obtained in donors that had no jobs could be explained by the fact that again, the unemployed are those most likely to indulge in risky sexual relationships and hence HBV infection.

CONCLUSION AND RECOMMENDATIONS

The prevalence of HBV infection in Yaounde is high and need constant monitoring to evaluate control schemes. More studies are needed to generate data on this infection and possible sources of infection. Preventive measures are important to curb it. Safe sex practices, strict donor selection, health education, safe injection usage, proper sterilization of instruments, use of sensitive laboratory test kits and immunization of people at risk should constitute an important package of a prevention program. Accurate identification and clinical management of both the blood donors and family members would reduce the probability of infection through blood transfusion and preventing further dissemination of the infection.

Conflict of interests

The authors declare that there is no conflict of interest regarding the publication of this paper.

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