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Predonation testing of potential blood donors for hepatitis B virus infection: approach to blood safety in Cape Coast, Ghana

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ABSTRACT

Blood transfusions carry risks of untoward reactions, including the transmission of infections, such as hepatitis B. But about 50% of these blood donors and blood recipients have had natural exposure to hepatitis B virus (HBV) and therefore perceived to have natural immunity against HBV. In view of this, the need for hepatitis B surface antigen (HBsAg) testing of blood donors before donation has often been overlooked. This has resulted in about 50% of blood donors not going through screening for HBsAg in sub-Saharan Africa. This study examined the potential risk of acquiring transfusion-transmitted hepatitis B infection in the Cape Coast, Ghana. A total of three hundred and thirty nine potential blood donors were screened for HBsAg using a rapid test (1–2 IU ml⁻¹ sensitivity) (Determine, Abbott Laboratories). A total of 33 of the subjects were reactive, representing a prevalence of 9.7%. Prevalence among males and females were 10.5% and 8.9% respectively. Subjects who were between the ages of 22 and 25 years recorded the highest reactive cases of 48%. Prevalence of 7.7%, 20.6% and 3.7% were recorded for students, Artisans and Teachers respectively. The prevalence of prospective donors who were reactive to HBsAg was high and consistent with other similar studies reported in literature. Hence, screening for HBsAg should be performed on prospective blood donors before donation in the Cape Coast metropolis in Ghana and all other places with high prevalence.

INTRODUCTION

Blood transfusions carry risks of untoward reactions, including the transmission of infections, such as hepatitis B. Adequate laboratory screening for infectious markers reduce the risk of transfusion-transmitted infections [1,2,4]. The prevalence of hepatitis B virus (HBV) chronic carriage in sub-Saharan Africa ranges between 3% and 22% in blood donors. About 50% of these blood donors and blood recipients have had natural exposure to HBV, therefore the need for hepatitis B surface antigen (HBsAg) testing of blood donations has often been neglected in view of the perception that many donors are not infectious and many recipients are not susceptible [2]. This has precipitated in about 50% of blood donors not going through screening for HBsAg in sub-Saharan Africa according to the World Health Organization (WHO) [3]. It has been reported by Jean-Pierre *et al.* [2] that some regions within the sub-Saharan Africa may present high-prevalence for hepatitis B taking into consideration the prevalence range of 3% to 22% of the sub-Saharan Africa. Again since most of the recipients of these donated blood samples are pregnant women and children who are mostly immunocompromised [5]. Therefore, it is imperative to study populations likely to have high prevalence of hepatitis B in blood donors, in order to make informed decisions toward blood safety in blood banks [7]. In this contribution, the potential risks of acquiring transfusion-transmitted infections by hepatitis B in the Cape Coast metropolis have been evaluated.

MATERIALS AND METHODS

Study subjects

This cross-sectional study was carried out at the University of Cape Coast Campus, Ghana on October, 2010. Subjects were potential blood donors who volunteered to donate blood to support the blood bank in the Cape Coast Metropolis, Ghana. A total of three hundred and thirty nine (339) potential blood donors were recruited for the study after taken them through few questions about their health status. All the subjects for this research passed the fitness criteria used for the study. The data obtained in this study form part of Ministry of Health (Ghana) routine blood collection from volunteers (Donors). Therefore no particular identifiable group of patients were involved and their individual identities cannot be traced.

Screening for HBV (HBsAg)

Potential donors were informed that HBsAg screening would be done before blood collection. Predonation venous blood sample was taken from each donor using a disposable syringe (4ml). This was done by trained Clinical Laboratory Technologist for accuracy. The blood was then transferred to a glass tube and allowed to clot. It was then centrifuged twice for 3 minutes at 1500 rpm (table centrifuge). HBsAg was screened using a rapid test (1–2 IU ml⁻¹sensitivity) (Determine, Abbott Laboratories). During the session, volunteer donors identified as HBsAg reactive were personally notified that their blood could not be collected and were asked to attend the blood bank laboratory at Central Regional Hospital, Cape Coast, Ghana for confirmation of the test result.

Data analysis

The data from this study were subjected to statistical analysis using SPSS (Version 16) software [9, 10]. The differences among subjects groups (age, status and gender) were examined using Chi-Square method (non-parametric) as used by [11].

RESULTS

Demographic Data of Donors

A total of three and thirty nine (339) subjects were recruited for the study. One hundred and seventy (170) were males representing 59.1% whereas 169 were females representing 49.9%. The age range was between 14 and 67 years with mean age of 40.5. The distribution of the age of subjects is presented on Figure 1. Majority of the subjects were students (234) representing 69.0%, followed by Artisans (20.1%), Teachers (8.0%) and Lecturers (2.9%) (Table 1).

Table 1. Distribution of status of studied subjects

Status	Frequency	%
Student	234	69
Lecturer	10	2.9
Teacher	27	8
Artisans	68	19.8
Total	339	100

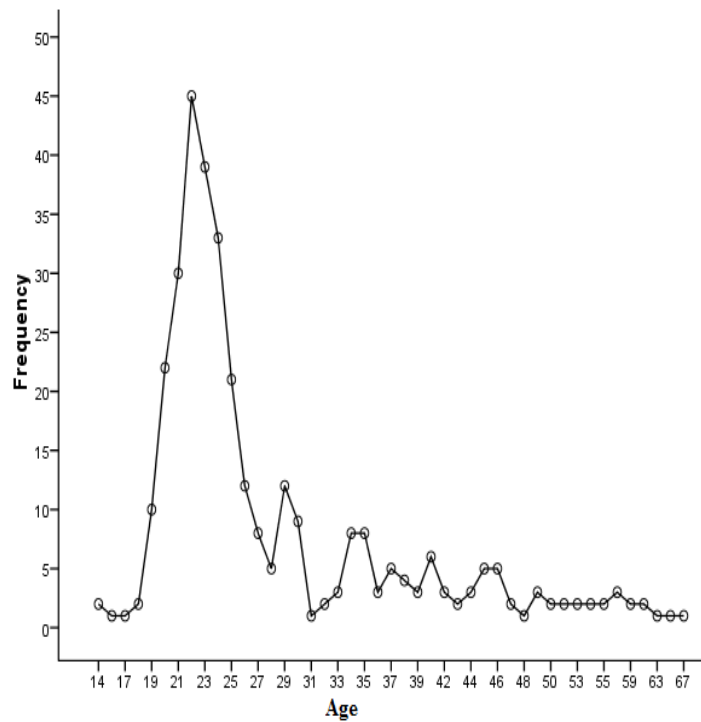


Figure 1. Age variations of subjects

HBsAg Screen

A total of 33 of the subjects were reactive, representing 9.7%. Eighteen (18) males were reactive representing 54.5% whereas females were 15 representing 45.5%. Prevalence in terms of gender was males (10.5%) and females (8.9%). Age group 22 to 25 years recorded the highest reactive cases of 48%. Students who were reactive were 18 representing 54.6%, Artisans (42.4%), Teachers (3.0%) and in the case of Lecturers, none was reactive. Prevalence of 7.7% was recorded for students who reacted. Artisans recorded prevalence of 20.6% whereas Teachers registered prevalence of 3.7% (Figure 4).

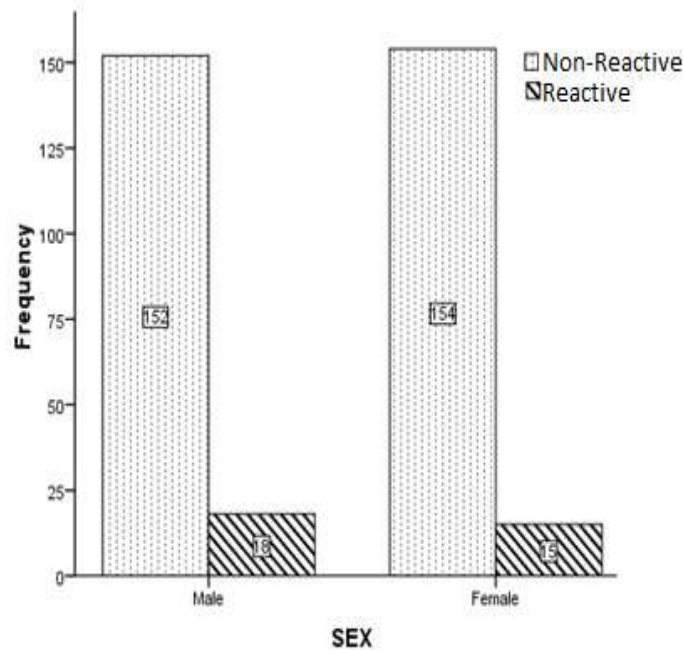


Figure 2. Frequency distribution of HBsAg reactive and non-reactive among Male and female

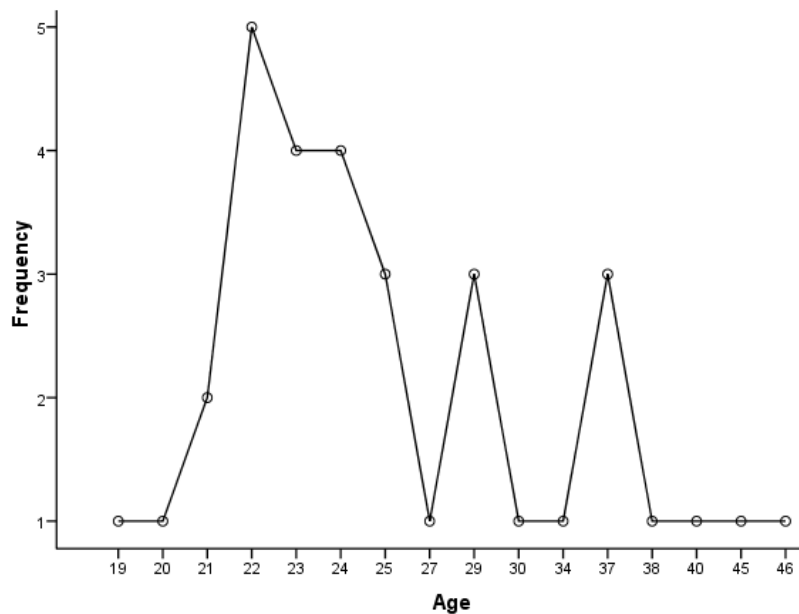


Figure 3. Variation of HBsAg reactivity among age groups

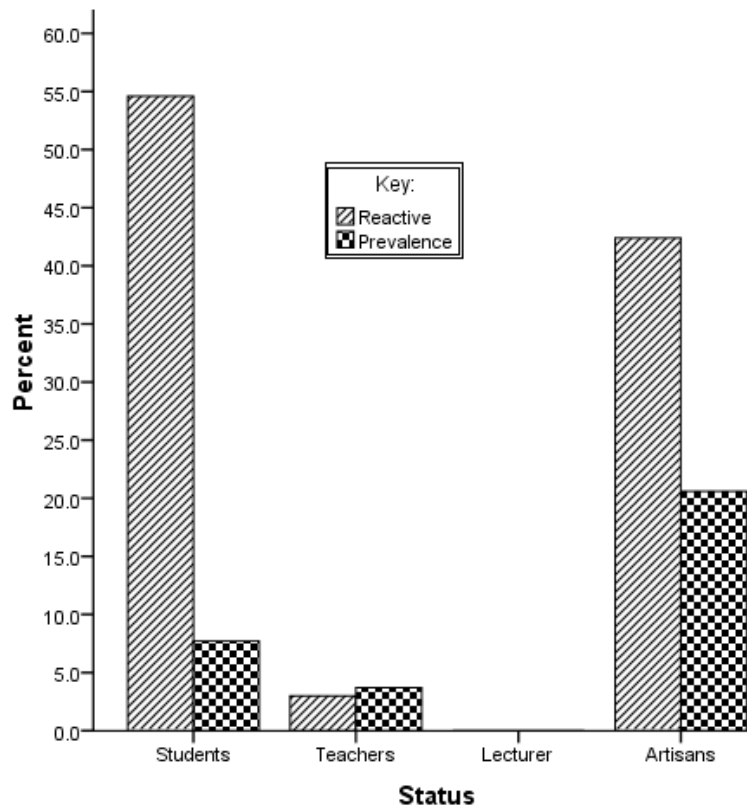


Figure 4. Comparison of HbsAg reactivity and prevalence among subjects

DISCUSSION

This study revealed that there is marginal difference in prevalence of HBsAg reactivity between males and females. Males recorded relatively high prevalence of reactivity than females but statistical analysis showed that gender was not a significant factor ($p=0.836$) when it comes to the reactivity of HBsAg test. Majority of the prospective blood donors in this study were from the age group 21 to 25 years (Figure 3) which is consistent with another study carried out at Komfo Anokye Teaching Hospital, Kumasi, Ghana [2]. This is not surprising since subjects between 21 and 25 years are considered to be fit and active due to their age so they are always the target when it comes to voluntary blood donation in Ghana. This explains why students are usually encouraged by the government of Ghana to donate blood because most of them fall within this age group [12].

It was evident from this research that subjects within the age group of 21-25 were the most reactive to the HBsAg reactivity test which concurred with the some studies in Ghana [2, 1]. This could be attributed due to the lifestyle of subjects within this age bracket which exposes them to the infection. They are very active sexually and therefore tend to have more than one partner. In addition, the high prevalence could be due to high turn out of subjects from this age group. Statistical analysis also showed that the reactivity to HBsAg is age dependent ($p=0.021$).

Majority of the prospective donors were students [12]. These mean that the Ghana government's campaign on voluntary blood donation among students is receiving the right response from the

populace. Targeting students for voluntary blood donation in Ghana is appropriate since the prevalence of hepatitis B among students recorded in this study is relatively lower than the overall prevalence of the study.

The overall prevalence of HBsAg reactivity in this study is 9.7% which is marginally lower than the prevalence recorded in Kumasi, Ghana (11.5%) [2]. The results of this study agrees with the prevalence recorded in studies conducted in some Caribbean countries [5]. Other studies in other parts of the world have corroborated this fact [6, 8]. However, the prevalence of HBsAg reactivity in this study is relatively higher than the lowest prevalence reported by WHO in the sub-Saharan Africa (3%) [3].

Among the prospective donors, Artisans recorded the highest prevalence, which is two times higher than the overall prevalence of the study. This relatively high prevalence among Artisans could be attributed to their usually carefree lifestyle which exposes them to the infection. In addition, most of them are illiterates and are found at the bottom of the economic ladder from a Ghanaian perspective and may not know a lot about HBV and how to avoid it. Organizing educational workshops on HBV infection for illiterates and less educated people as is being done for students is therefore inevitable because it is a threat to public health.

The findings of this study show that there is a relationship between income and educational levels on the reactivity of the prospective donors to the HBsAg test. None of the Lecturers who are known to be high on the economic and educational ladder was reactive to HBsAg. Teachers who are known to be at the middle of the economic ladder recorded relatively very low prevalence. Conversely, Artisans recorded very high prevalence.

CONCLUSION

Predonation HBsAg screening of blood donors will help improve the quality of blood samples that are stored in blood banks in hospitals, especially in areas with high prevalence like Ghana. This study sought to bring to the fore relevant research figures that could stimulate appropriate response from policy makers on this area of public health. Therefore, Cape Coast metropolis can be considered a high prevalence area, and hence blood donor recruitment and coverage of screening for transfusion-transmitted infections, especially HBV, should be encouraged.

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