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PREVALENCE OF HEPATITIS B SURFACE ANTIGEN SERO-POSITIVITY AND HEPATITIS C VIRUS AMONG VOLUNTARY BLOOD DONORS IN ABIA STATE UNIVERSITY TEACHING HOSPITAL ABA, NIGERIA.

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ABSTRACT

Hepatitis B and C viruses are among the common infectious diseases of the world and constitute a major global health burden. Consequent upon their mode of transmission, thorough screening of blood has become absolutely necessary, making quick provision of safe blood rather difficult. This study aims at determining the sero-prevalence of hepatitis B and C viruses among voluntary blood donors in our centre. This was a hospital-based cross sectional study and was carried out at the blood bank of the teaching hospital, Aba, from June 2013 and December 2014. Five hundred and thirty consecutively recruited voluntary blood donors were screened for hepatitis B and hepatitis C virus infections. Hepatitis B virus infection was screened using hepatitis B surface antigen by ELISA, while hepatitis C virus infection was screened using anti-HCV antibodies by ELISA. The biodata of the donors were obtained. The prevalence of hepatitis infection among the blood donors was 51 (9.6%). HBsAg and ant-HCV were reactive in 7.26% and 1.5% of the study population respectively while co-infection was recorded in 0.74% of the donors. In conclusion, this study confirmed the presence of viral hepatitides among voluntary blood donors and these infections can be transmitted through blood in Aba, Nigeria.

Key words: Hepatitis B, Hepatitis C, blood donors, Aba, Nigeria.

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INTRODUCTION

Hepatitis B and C viral infections are among common infectious diseases of the world and constitute a major health burden (Eke *et al,* 2011). Globally, over 2 billion people are infected with the HB virus and over 400 million have chronic infection (Olokoba *et al,* 2009; Eke *et al*, 2011). Individuals with chronic infection have a high risk of liver cirrhosis and hepato cellular carcinoma which accounts for more than 1 million deaths worldwide (Onwuakor *et al,* 2014; Blattacharyd *et al,* 2007). The prevalence of chronic hepatitis B infection varies greatly around the world and is relatively high in Africa, which has the second highest number of chronically HBV – infected individuals (Mbaawuaga *et al,* 2008). Hepatitis C virus Infection (HCV) is also common with estimated 3.9 million persons infected with the virus globally (Shittu *et al*, 2014). HCV has its highest prevalence rate in Africa where it is the leading cause of liver cirrhosis and liver cell carcinoma (Olokoba *et al,* 2009; Elsheikh *et al,* 2007; Kleinman *et al,* 2003).

Diagnosis of HBV infection is through serological and virological markers. Hepatitis B surface antigen (HBsAg) is the hallmark of HBV infection and is the first serological marker to appear in acute HBV infection; and persistence of HBsAg for more than 6 months suggests chronic HBV infection (Kao, 2008; Ejele and Ojule, 2003; Onwuakor *et al,* 2014). The transmission of HBV infection Nigeria is on the increase (Shittu *et al,* 2014). Common routes of transmission of HBV and HCV include unsafe blood

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transfusion, unprotected sexual contact, intravenous drug abuse, and unsafe injections (Adekanle *et al,* 2010; Olokoba *et al*, 2008; Shittu *et al,* 2014).

In blood banks, the screening for HBsAg is carried out routinely to detect HBV infection (Blattacharya *et al,* 2007), while antibodies to hepatitis C virus (anti-HCV) are used to detect HCV infection (Olokoba *et al,* 2008).

Unfortunately, Nigeria is classified among the group of countries endemic for HBV infection with a current infected population of 18 million (Onwuakor *et al*., 2014; Ojo and Anibijuwon, 2009). Despite the existence of a safe and effective vaccine, Nigeria has remained a hyperendemic area for HBV infection, with an estimated 12% of the population being chronic carriers (Jatau and Yabaya, 2009; Ejele and Ojule, 2003). Acute symptoms of Hepatitis B virus infections have no specific treatments but supportive measures include proper bed rest, prevention of dehydration, maintenance of balanced diet, avoidance of alcoholic beverages and analgesics. (Savel and Andelman, 2005; Shittu *et al*., 2014). HBV infection can however be prevented by avoiding any contact with infected blood and body fluids including semen and vaginal secretions of infected individuals (Lindsley *et al.,* 1990).

Safe blood transfusion is inevitable in the prevention of HBV and HCV transmission. Studies have shown that international modes and standards for organizing blood banks and blood donations are not affordable in Sub-Saharan Africa and might not even be sustained where they exist (Shittu *et al,* 2014). It has been revealed that the low implementation of national policies for transfusion, organizational dysfunctions, inadequate financing and the lack of adequate blood screening equipment are among the several problems undermining the blood safety in Sub-Sahara Africa (Florent *et al,* 2012).

Getting safe blood is becoming increasingly difficult because of these blood borne viral hepatitides (Olokoba *et al,* 2009). Various studies have been carried out on the prevalence of hepatitis B surface antigen and HCV among blood donors in various parts of Nigeria (Umolu *et al*, 2005; Uneka *et al,* 2005; Lawal *et al*, 2009; Ado *et al,* 2010) but none have been reported in Aba, Abia State. Nigeria. This study was therefore carried out to determine the prevalence of hepatitis B and C virus infections among apparently healthy intending blood donors at Abia State University Teaching Hospital (ABSUTH), Aba, Nigeria.

MATERIALS AND METHODS

Study Area/Setting: Study was carried out at the haematology department of Abia State University Teaching Hospital between June 2013 and December 2014.

Ethical Consideration: Ethical approval was obtained from ethical committee of Abia State University Teaching Hospital Aba.

Sampling technique and Sample Size: A total of five hundred and thirty (530) blood donors were randomly selected for the study.

Inclusion and Exclusion Criteria: The blood used for this research included voluntary and commercial donors aged between 18 and 65 years.

Sample Collection and Sample Analysis: Blood samples were collected and screened for HBsAg and HCV. About 3.0mls of venous blood was obtained from each donor aseptically into plain bottles. The samples were allowed to clot and retract after which serum was isolated by centrifugation for about 5 minutes. The serum samples were then screened for HBV using rapid test ELISA kits (Acon Laboratories, USA) to detect hepatitis B surface antigen (HBsAg). Also the serum samples were screened for HCV using rapid test ELISA kits (Acon Laboratories, USA) to detect antibodies to hepatitis C virus (anti-HCV).

Statistical analysis: Data analysis was done using statistical package for social sciences (SPSS, version 100). Comparison of means was done using the student – t test. The level of statistical significance was taken as $p < 0.05$.

RESULTS

A total of five hundred and thirty (530) blood donors were screened for hepatitis B and C virus infections. The age of the donors ranged from 18-65 years with a mean of 34.6±5.7 years. Majority of the donors were in the age group 30-39 years (Table 1).

Of the 530 blood donors, 509 (96.0%) were males and 21 (3.96%) were females, giving a male to female ratio of 24.24:1 (Table 2).

The prevalence of Hepatitis infections among the blood donors was 51 (9.6%). HBV infection was higher among males (6.70%) than females (0.56%). Similarly, the prevalence of HCV infection was higher among males 6 (1.13%) than the females 2 (0.37%).

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Co-infection with HBV and HCV were more prevalent in the males 3 (0.56%) than in females 1 (0.18%). HBs Ag and anti-HCV were reactive in 7.26% and 1.50% of the study population respectively while co-infection was recorded in 0.74% of the intending donors (Table 3). However, there was no significant relationship between them ($P > 0.05$).

The subjects within ages 20-29 years and 30 – 39 years had the highest prevalence of HBV infection (2.23%) and (2.79%) respectively. The prevalence of HCV was 0.37% between ages 20-29 years and 0.56% for ages 30-39 years. Subjects within ages 30-39 years had the highest prevalence of co-infection while ages 40-69 had no co-infection. The frequency of co-infection is therefore very low (Table 4).

Table1: Age and gender distribution of Blood donors.

Age groups (years)	Male	Females	Frequency (n) %
< 20	11	0	11 (2.07)
20- 29	191	8	199 (37.54)
30-39	233	12	245 (46.22)
40-49	50	1	51 (9.62)
50-59	19	0	19 (3.58)
60-69	5	0	5 (0.94)
Total	509	21	530 (100%)

Table 2: Sex distribution of donors.

Sex	Frequency	Percentage
Male	509	96.04
Female	21	3.96
Total	530	100

Table 3: Gender distribution of Hepatitis infection among the subjects

Gender	Overall no screened	No positive for HBsAg (%)	No. positive for HCV (%)	No. positive for HBsAg and HCV (Co-infection) %
Male	509	36 (6.70)	6 (1.13)	3 (0.56)
Female	21	3 (0.56)	2 (0.37)	1 (0.18)
Total		39 (7.26)	8 (1.50)	4 (0.74)

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Table 4: Distribution of Hepatitis Infection in relation to the age groups of the subjects:

Age Gender	Overall no screened	No positive for HBsAg (%)	No. reactive for HCV (%)	No. reaction for both infections
< 20	11	3 (0.56)	1 (0.18)	0.(0.0)
20-29	199	12 (2.23)	2 (0.37)	1 (0.19)
30-39	245	15 (2.79)	3 (0.56)	3 (0.55)
40 - 49	51	5 (0.93)	1 (0.18)	0 (0.0)
50 – 59	19	3 (0.56)	1 (0.18)	0 (0.0)
60- 69	5	1 (0.18)	0 (0.0)	0 (0.0)
Total	530	39 (7.26)	8 (1.50)	4 (0.74)

DISCUSSION

It is well documented in medical literature that the transmission of viral hepatitides (HBV and HCV infection) can occur during blood transfusion (Ejele *et al*., 2005; Abdalla *et al.,* 2005; Elfaki *et al.,* 2008). Proper screening of every blood donor is of utmost importance in the prevention of transmission of these highly infectious diseases.

The age range of blood donors in this study was 18 to 65 years with a mean of 34.6 years. This is similar to that in the study of Olokoba *et al*. (2009) who found that their blood donors were in the range of 18 to 61 years with a mean of 31.3 years. Similarly, the study by Khan *et al.* (2002) showed blood donors in the age range of 18 to 60 years while the findings of Muktar *et al.* (2005) in Zaria, Northwestern, Nigeria revealed a mean age of 33years even though their age ranged from 19 to 42 years. However the donors in Jos, North central Nigeria were in the age range of 21-50 years (Egah *et al.,* 2004).

Most of the blood donors in this study were males (96%). This is similar to the study by Olokoba *et al.,* (2009), 96%; Egah *et al.* (2004), 95%; Muktar *et al.* (2005), 98%; while Nwokediuko *et al.* (2007) in their study in Enugu, South Eastern, Nigeria found that 91.8% of their donors were males. However, all the donors were males in the study of Elfaki *et al.* (2008) among the Sudanese, and in the study of Khan *et al.* (2002).

From this study, the overall prevalence of HBsAg among voluntary blood donors is 7.26%. This result is similar to 7.4% reported by Shittu *et al.* (2014) at Akure, Nigeria; the 8.3% in the work of Muktar *et al.* (2005); and the 8.8% found by Matee et al, (1999) in Tanzanian donors. This figure is higher than the 1.1% found by Ejele *et al.* (2005) in Niger Delta region of Nigeria; the 2.2% found by Bhatti *et al.* (2007) in Pakistani donors; the 2.4% found by Olokoba et al, (2009) among voluntary blood donors in Yola, Nigeria; the 4.0% found by Abdalla *et al.* (2005) in Kenyan donors and the 2.5% reported by Okonko *et al.* (2012) among intending blood donors in UCH, Ibadan, South Western Nigeria. The HBV infection rate in this study is however lower than the 14.5% reported by Lawal *et al.* (2009) among blood donors in Ibadan; the 20% reported by Alao *et al.* (2009) among prospective blood donors in Otukpo, Benue State; the 11.0% reported by Oronsanye and Oronsanye, (2004) among donors in UBTH, Benue City, Nigeria; the 18.6% reported by Buseri *et al.* (2009) among blood donors in Osogbo, Nigeria and the 10.0% reported by Elfaki *et al.* (2008) in Sudanese blood donors.

The HCV infection rate of 1.5% found in this study is similar to the 1.5% found in the work of Matee *et al.* (1999). This figure is higher than the 0.2% found in the work of Abdalla *et al.* (2005); and the 0.5% found in the work of Ejele et al, (2005). The HCV infection rate in this study is however lower than the 3.0% found by Ezeani *et al.* (2006) in South-eastern, Nigeria; the 3.7% found by Nwokediuko *et al.* (2007); the 3.9% found by Esumeh et al, (2003), the 4.2% found in the work of Bhatti *et al.* (2007) and the 6.0% found in the work of Egah *et al.* (2004). However Elfaki *et al.* (2008) found no case of HCV infection among the 260 Sudanese blood donors studied.

The wide differences in the HBV and HCV infection rate among the voluntary blood donors in the different regions within and outside Nigeria may be due to the differences in geographical locations, age range of donors, sample size, the period of time the studies were carried out, and the different socio-cultural practices such as sexual behaviour, marriage practices,

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circumcision, tattooing, scarifications etc which take place in these regions (Olokoba *et al.*, 2009; Shittu *et al.* 2014). Access to healthcare, immunization practices, and the laboratory test reagents used for the screening may also be contributory factors to the wide differences in results (Olokoba *et al.* 2009).

The highest prevalence of HBV infections was seen in donors aged 20-29 years and 30-39 years with an infection rate of 2.23% and 2.79% respectively. Previous studies by Ado *et al.* (2010); Adekeye *et al.* (2013) and Onwuakor *et al.* (2014) have also shown the highest prevalence to be among these age groups. These age groups contain the very active youths in the society, and correlates with peak age of sexual activity. The highest prevalence of HBV among these youths may therefore be attributed to some social vices associated with the youths such as unprotected sexual activities with multiple partners, tattooing and intravenous drug use (Shittu *et al*., 2014). This again explains why hepatitis infection is higher amongst the younger age groups in society than in the aged (Onwuakor *et al.,* 2014).

The gender distribution showed that the HBV infection was higher among males (6.7%) than the females (0.56%). Also the prevalence of HCV infection was higher in males (1.13%) than in females (0.37%). This is probably due to high availability of males for blood donation and lifestyle variations between the gender groups. This is similar to the findings of Adekeye *et al.,* (2013) and Uneke *et al.,* (2005) who also reported higher prevalence of these infections among males than females. However other previous studies by Otegbayo *et al.,* (2003) and Pennap *et al.,* (2010) reported higher prevalence of HVC among females (16.6%) than males (3.4%). This may probably be due to higher sample size from females than males. In this study co-infections were more prevalent in males (0.56%) than females (0.18).

Screening for HBsAg alone does not fully reflect the epidemiology of the disease as it could indicate a carrier state, viral replication or chronic hepatitis. This study therefore did not differentiate carriers of HBsAg from those with active infection since we did not screen for anti HBs antibodies and anti-HBc antibodies which are indicators of previous exposure to HBV infection. If these markers were assayed for, the actual sero-prevalence rate would most probably be much higher than the present reported figures. This study confirmed the presence of hepatitis B surface antigen and HCV among apparently healthy blood donors in our community.

The danger of viral hepatitides in voluntary blood donors is the risk of transmission of these infections to recipients of blood and blood products. It is important to take steps to improve our medical facilities and diagnosis in the hospital to enable us detects the diseases early, reduce their spread and manage infected individuals. We recommend the introduction of routine screening of blood donors for HCV in centres where this is not currently practiced. A strict selection criteria for blood donors is emphasized and blood transfusion must be highly restricted to those that actually need it.

LIMITATIONS

This study has some limitations. In laboratory analysis, serology by rapid test kit, is less sensitive than amplification assays (liquid phase hybridization, antibody capture approach, branched DNA) and DNA amplification tests based on the polymerase chain reaction (PCR) which are now considered the gold standard in the diagnosis of HBV infection. However, these tests are very expensive and are not available in most centers like ours. Nevertheless, rapid tests kits are used as a screening tool in order to identify donors that may require confirmation of their status and further management.

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AUTHORS' CONTRIBUTIONS

Ngwogu, K. O. and Ngwogu, A.C. contributed to the successful completion of this study. Their carrier background played important roles.

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