



Seropositivity of Hepatitis B Virus Among Intending Male Blood Donors in Port Harcourt, Rivers State, Nigeria

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Abstract: The objective of this study was to determine the prevalence of HBV among intending male blood donors in some Hospitals (private and government) in Port Harcourt Town, Rivers state. A total of 182 blood sera were screened for the presence of antibodies to HBV using Monolisa HBsAg ULTRA Enzyme Immunoassay (EIA) technique. Blood donors were evaluated for the presence of Anti- HBsAg and the effect of some demographic factors on the prevalence. The overall seroprevalence of HBV was 34.6%, with a seronegativity of 65.4%. There was a significant relationship ($p < 0.05$) between the seroprevalence of the overall HBV with respect to education ($p = 0.025$). A sum of 66.7% of HBV positive was among the donors within the age group of 31-40 years old ($p = 0.176$). University graduates were the group with the highest HBV prevalence of 36.5%. A percentage of 81% HBV positive were donors with low skill occupation and a non-significant association ($p = 0.129$). Family donors had the highest prevalence of HBV (50%). No significant association found ($p = 0.943$). There was a relatively low outcome of voluntary donors (3.8%) compared to family (48.9%) and paid donor (47.3%) that were of close range. The seroprevalence of HBV in Port Harcourt, Rivers State, Nigeria was high. This shows that HBV still remains a threat to safe blood transfusion and public health in Nigeria.

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1. Introduction

Hepatitis B is caused by the Hepatitis B Virus (HBV), it is a circular, double-stranded DNA virus. HBV disease is highly persistent in neonates (becomes chronic carriers) and low persistency rate in adults (McMahon, 2009). Clinically HBV infection can be asymptomatic in the initial disease phase until it becomes symptomatic – anorexia, pain, dark urine, and yellow skin colouration, with an incubation period that lasts 30 – 180 days (W.H.O, 2017).

Transmission of HBV is most commonly through sexual route but can also be transmitted via the perinatal, or parenteral route (Fairley and Read, 2012). The parenteral route can be via needle stick injury in health care workers, household contact or through blood transfusion (Hughes, 2000). Diseases transmitted via blood transfusion is called Transfusion Transmitted Infection (TTIs) of which includes: viruses HBV, HTLV 1 & 2; parasites- malaria, babesia and Bacteria- Syphilis (Su *et al.*, 2003; Mollison *et al.*, 2005; Sheppard *et al.*, 2005; Shang *et al.*, 2007; WHO, 2011).

The epidemiology of HBV estimates 350 million world's populace are chronic HBV carriers (Locarnini

et al., 2015). Approximately 500 thousand to 1 million persons die yearly from liver diseases caused by HBV (Hou *et al.*, 2005). The prevalence of HBV in Nigeria was said to be 12.2% (Olayinka *et al.*, 2016). The HBV DNA level and HBeAg positivity is the main marker for HBV to progress into HCC (Locarnini *et al.*, 2015). The incidence of HCC was 324/100,000 persons per year for HBsAg positive and, HBeAg-negative persons, 39/100,000 persons per year of those who were HBsAg negative and 1169/100,000 person per year for HBeAg and HBsAg positive persons (Locarnini *et al.*, 2015).

About 120 million persons were HBV positive in China as at 2010 and 40 million and 12 million, in India and Indonesia respectively. About 600,000 people die annually from the disease as estimated by the World Health Organization (WHO).

The risk of transmitting this TTI can be reduced by screening donors blood and asking important questions about their lifestyle and general health preceding the donation process.

2. Materials And Methods

As this study involves humans, ethical approval was sort from both hospitals (Meridian Hospital and Rivers State University Teaching Hospital) and the Research and Ethics committee of the University of Port Harcourt, Rivers State. A sum of 182 males who intend to donate blood at these Hospitals was enrolled in this survey. For the design of this study, these Hospitals were labelled Hospital 1 and Hospital 2 respectively. Females were excluded from this study. Patients having this infection were advised not to donate blood and get the necessary treatment.

Data were analysed using Microsoft Excel spreadsheet (Microsoft Corporation). The seroprevalence was calculated. Pearson's Chi-square test was used to establish relationships between demographic factors and seropositivity of syphilis and HBV. The level of significance was set at $P \leq 0.05$.

2.1 Sample Collection

Intravenous blood samples were obtained aseptically using a 5-ml syringe and allowed to clot at room temperature in plain tubes. Serum specimens were separated by centrifugation at 3000rpm

(resolution per minute) for 5 min. The Sera were stored at -20°C and used for the serological analyses.

2.2. Hepatitis B surface antigenemia analysis

HBV was detected using Monolisa HBsAg ULTRA (BIO-RAD, 3, Boulevard Raymond Poincare 92430 Marnes-la-Coquette France) for detecting hepatitis B surface antigen (HBsAg) in human serum by Enzyme Immunoassay Technique, following the instructions of the manufacturer.

3. Results

3.1 demographic factors of the male blood donors in both Hospitals.

The total of 182 intending males blood donors was screened for HBV. The demographic factors obtained from the donors from both Hospitals and the Overall are shown in Table 1.

The relationship of the demographic factors with the screening results are shown in Table 2 with a significant relationship between HBV and Education $p=0.025$ ($p < 0.05$).

Fig 1-3 shows prevalence of from both hospitals $n=63$ (34.6%), Hospital 1 $n= 27$ (27%) and Hospital 2 $n= 36$ (43.9%).

Table 1: The demographic information of the male blood donors in two Hospitals in Port Harcourt

Demographic factors	Groups	Hospital 1	Hospital 2	Overall
GENDER	Males	100 (100%)	82 (100%)	182 (100%)
EDUCATIONAL LEVEL	Primary School	26 (26%)	14 (17.1%)	40 (22%)
	Secondary School	29 (29%)	20 (24.4%)	49 (26.9%)
	Diploma	19 (19%)	23 (28%)	42 (23.1%)
	Undergraduate	7 (7%)	1 (1.2%)	8 (4.4%)
	Graduate	19 (19%)	24 (29.3%)	43 (23.6%)
OCCUPATIONAL SKILLS	Unemployed	18 (18%)	7 (8.5%)	25 (13.7%)
	Low Skill	74 (74%)	73 (89%)	147 (80.8%)
	High Skill	8 (8%)	2 (2.4%)	10 (5.5%)
DONOR TYPES	Family Donor	62 (62%)	26 (31.7%)	89 (48.9%)
	Voluntary Donor	3 (3%)	4 (4.9%)	7 (3.8%)
	Paid Donor	35 (35%)	52 (63.4%)	86 (47.3%)
AGE GROUP	21-30 years	35 (35%)	15 (18.3%)	50 (27.5%)
	31-40 years	52 (52%)	56 (68.3%)	108 (59.3%)
	41-50 years	13 (13%)	11 (13.4%)	24 (13.2%)
	Total	100	82	182

Table 2: Summary of the relationship between the overall HBV prevalence with respect to the demographic factors of the intending male blood donors of both Hospitals.

Blood donors (n= 82)	Demographic factors	categories	no tested	HBV pos	Statistics (p Value)
Age		21 – 30	50	12 (19%)	p = 0.178
		31 – 40	108	42 (66.7%)	
		41 – 50	24	9 (14.3%)	
Educational level		Primary	40	12 (19.0%)	p = 0.025
		Secondary	49	12 (19.0%)	
		Diploma	42	15 (23.8%)	
		Undergraduates	8	1 (1.6%)	
		Graduates	43	23 (36.5%)	
Occupational risk		Unemployed	25	6 (9.5%)	p = 0.129
		Low risk	147	51 (81.0%)	
		High risk	10	6 (9.5%)	
Donor types		Paid	86	30 (47.6%)	p = 0.943
		Family	89	31 (49.2%)	
		Voluntary	7	2 (3.2%)	
total			182	63 (34.6%)	

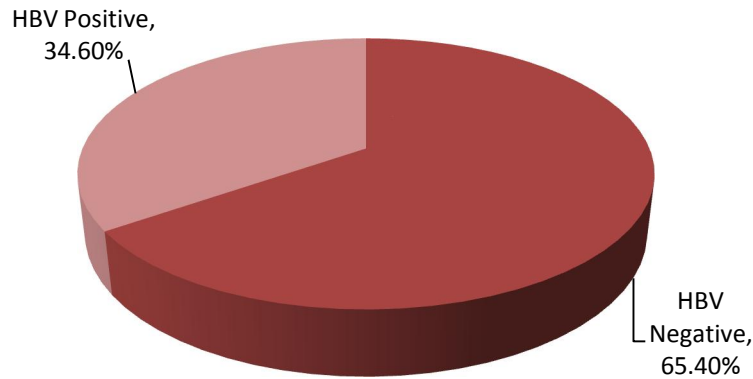


Fig. 1: Overall seroprevalence of HBV from intending male blood donors from two Hospitals in Port Harcourt Town, Rivers State

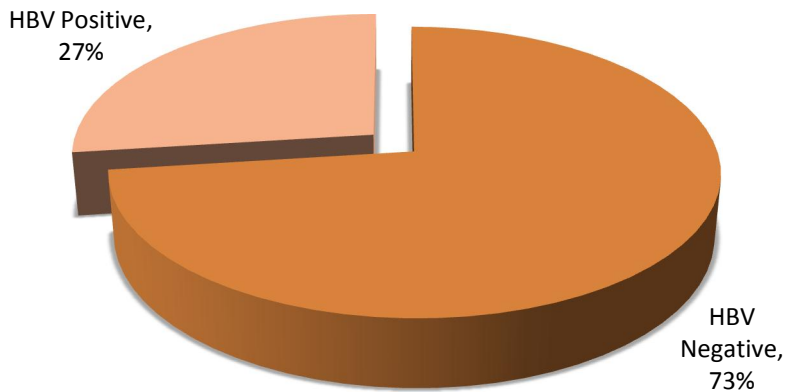


Fig 2: Seroprevalence of HBV in Hospital 1 in Port Harcourt Town, Rivers State

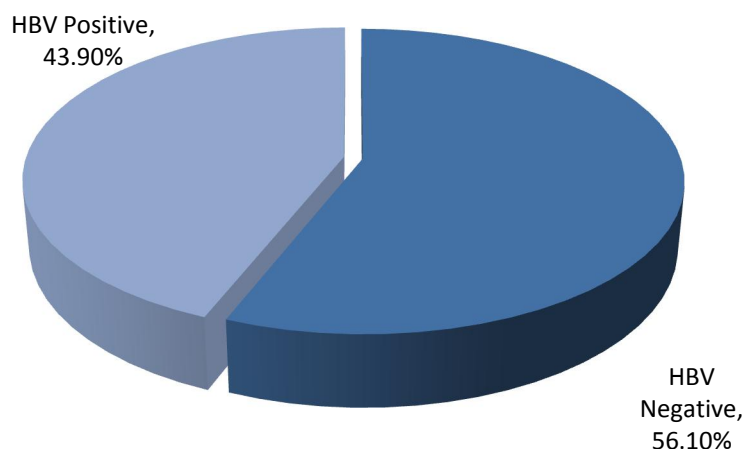


Fig 3: Seroprevalence of HBV in hospital 2 in Port Harcourt, Rivers State

4. Discussion

Post-transfusion TTI is the main factor that affects the availability of safe blood for transfusion (Fashola and Otegbayo, 2002). Periodic assessment of TTIs among supposedly healthy donors is an important public health intervention measure for safe blood units and its product in hospital settings (Mohammed *et al.*, 2017).

This study surveyed the prevalence of HBV among intending male donors in two hospitals in Port Harcourt. In this study, a total of 182 donors were screened within study duration. The overall prevalence of HBV was 34.6% which is above the prevalence of 14.52% among 182 male donors reported by Ogbolu *et al.* (2016). In addition, the prevalence was also greater than 4.1 %, 20.3% and 7.5% reported in studies conducted in Calabar (Okoroiwu *et al.*, 2018), Ibadan (Otegbayo *et al.*, 2003) and both Kano and Jos (Ja and Ao 2015; Nwankwo *et al.*, 2012). However, a lower value (1.67%) has been reported in Port Harcourt (Ejele and Ojule, 2004).

Furthermore, from other African countries, lower rates were recorded in Ghana, (15.9%), (Williams *et al.*, 2014), 2.0% in Eritrea (Siraj *et al.*, 2017) and Ethiopia 10.9% (Yusuf and Alemayehu, 2016). Prevalence of HBV observed in this study could be ranked high when compared with other Sub-Sahara African countries and regions in Nigeria. The alarming prevalence within Port Harcourt points to a high transmission rate within the city.

On the effect of demographic factors on HBV prevalence, it was observed that donors within 31 - 40

years were most affected with a high HBV prevalence of (66.7%). This might be because those in this age group are more sexually active and socially interactive by virtue of being a working-class group, where there is a high possibility for casual and paid sexual relationships. This age group is similar in range to 28-37 reported to have the highest prevalence of HBV in the study by Nwankwo *et al* (2012) in Kano and above 31.4% in the 31-40 years age group in the study by Mohammed *et al* (2017) in Bauchi.

In view of donors' educational qualifications, those with university qualification have highest HBV prevalence of 36.5%. In contrast, the least seropositivity was observed in the undergraduate group with 1.6% prevalence which was also the least observed by Ogbolu *et al* (2016) with 6.25% prevalence among undergraduates. It is possible that low seropositivity observed in the undergraduate group may be a result of recent and free vaccination scheme in a universities health facility in line with immunization drive in Nigeria.

Donors with low skill occupation were discovered to have the highest HBV prevalence 81%, similarly, they had the highest prevalence in the study by Ogbolu *et al* (2016) implying that occupational skill is a predisposing factor for acquiring hepatitis B infection.

Family replacement donors accounted for (48.9%) of donors and had the highest percentage prevalence of HBV infection (49.2%), followed by paid donors (48.6%). The lowest donor type was voluntary donors, and they had the least HBV

prevalence of 3.2%. This finding is in consonance with Okoroiwu *et al.* (2018) that reported that the amount of voluntarily donated blood has continued to fall over the years in Nigeria due to logistics and organizational problems associated with the national blood transfusion service. The World Health Organization encourages more voluntary donation because they are less likely to transmit transfusion transmissible-infection than family replacement and commercial donors (W.H.O, 2017).

The only significant link between the prevalence of HBV and demographic factors was found between HBV and educational qualifications of donors with a p value of 0.025 ($p < 0.05$), but the link between HBV and the other demographic factors were found to be insignificant.

A prevalence of 74.1% of HBV seropositivity was found in donors with low skill occupation in Hospital 1. However, they made up the largest donor populace accounting for 86.1% seropositivity of HBV in Hospital 2. Considering sweaty nature of their jobs and are usually lowly paid and hence most are paid donors, and some promiscuous (e.g., commercial drivers, farmers, artisans). The low frequency of HBV among the high skill donors might be due to enlightenment on the risk and mode of transmission of this disease, as they are mostly educated.

None of the voluntary donors had HBV but 63% of the family donors had HBV while 37% of the paid donors had HBV. Paid donors were the majority of 52 (63.4%) among the intending male donors in Hospital 2. Paid donors accounted for 52.8% of HBV seropositivity, while family donors accounted for 38.9% HBV, leaving voluntary donors accounting for 8.3% of HBV seropositivity in that order.

In Hospital 1, the demographic factors of the intending male donors had no significant association with HBV prevalence as their p value were greater than 0.05 ($p > 0.05$). However, the educational qualifications of the donors had a significant association with respect to HBV frequency ($p = 0.004$). In Hospital 2, the demographic factors of the intending male donors had no significant link with HBV frequency as their p value were greater than 0.05 ($p > 0.05$).

In conclusion, the prevalence of HBV observed in this study was higher when compared with other Sub-Sahara African countries and regions in Nigeria. A low-frequency turnout of voluntary donors as compared to family and commercial donors, as such there is a need for public sensitization on encouragement of voluntary blood donations. There were no female blood donors as at the time this study was carried out.

For as long as HBV remains a public health problem worldwide, the need to screen all blood

donors for circulating antibodies to HBV infection using not only rapid test methods but also advance methods that can detect the pathogens in the window period is necessary. The small sample size was a constraint in this study as such, larger population size should be used in further studies.

This study has contributed to the general knowledge of the relevance of screening blood donors before a blood transfusion to prevent post-transfusion infections and possible death. It has pointed to the urgent need for a voluntary donation of blood as this group of donors is proven to be the safest source of blood. It laid emphasis on the risk of untreated HBV disease to blood donors and unsuspecting recipients. The current prevalence of HBV status among male donors in a district of Port Harcourt was achieved.

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