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ORIGINAL ARTICLE

Seroprevalence of hepatitis B surface antigenaemia among healthcare workers in a private Nigerian tertiary health institution

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Abstract

Hepatitis B virus (HBV) has long been recognized as an occupational risk for healthcare workers (HCWs) as a result of regular and routine exposure to blood and other body fluids in the course of their duties. The risk of occupational exposure to such infection has been the concerns of HCWs for years. This cross-sectional study aimed to determine the seroprevalence of Hepatitis B surface antigenaemia among HCWs, from various occupation categories, in Babcock University Teaching Hospital, Ilisan, Nigeria, between May and June 2015. A structured questionnaire was used to collect demographics and clinical data. Sample analytical process was carried out using the HBsAg commercially available kits (Genedia, Green Cross, Korea).

Of the 100 HCWs enrolled in the study, HBsAg was detected in 7%. The positivity of HBsAg, in this study, was more among males and all were from staff younger than 50 years old. The occupational risk of HBV infection among the HCWs in this study was highest among the cleaning staff followed by nurses and doctors. None was documented among the medical laboratory technologists. Regular Infection prevention and control training is required and HBV vaccine should be more readily available for HCWs by coordinated institutional vaccination programs.

Keywords: Seroprevalence, Hepatitis B infection, hepatitis B surface antigen, Healthcare workers, Nigeria

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Introduction

Hepatitis B virus (HBV) infection is a global health problem; approximately 2 billion people in the world have been infected by HBV, and more than 400 million worldwide are chronic carriers of the virus.[1,2] HBV infection accounts annually for 1 million deaths worldwide from cirrhosis, liver failure, and hepatocellular carcinoma.[1] It is hyperendemic (more 8% of the population infected) in Sub-Sahara Africa and a major cause of chronic liver disease.[3,4,5] Transmission of hepatitis B virus results from exposure to infectious blood or body fluids containing blood. Possible forms of transmission include (but are not limited to) unprotected sexual contact, blood transfusions, re-use of contaminated needles and syringes, and vertical transmission from mother to child during childbirth.[5] A recombinant DNA vaccine for hepatitis B has been available in Nigeria for about two decades. Unfortunately, vaccination programs in Nigeria have not received adequate attention or funding by the government. Further, community misconceptions have hindered increasing coverage rates.[6,7] The United Nations Children's Fund (UNICEF) and the World Health Organization (WHO) estimated that only 41% of Nigerians were vaccinated against HBV in 2013.[8]

As reviewed by Musa *et al.*,[9] the risk of contracting HBV in Nigeria is substantial, given a low vaccination rates coupled with the fact that as many as 75% of the population will be exposed.[10] There are reports of varying national and risk group-specific estimates. Prior reports suggest a prevalence of 10-15% in the average risk Nigerian population.[11] In Nigeria, investigators have found high HBV prevalence among surgeons (25.7%),[12] voluntary blood donors (23.4%),[13] and infants (16.3%).[14] A 2012 study in Kano Nigeria found that among 440 HIV positive patients, 12.3% were co-positive for HBV.[15] Although, pregnant women are generally considered low risk for HBV infection, rates as high as 11% have been reported in Nigeria.[16] Hepatitis B is the commonest cause of chronic liver disease in Nigeria. In southern parts of the country, up to 58.1% of patients with chronic liver disease were found HBsAg positive.[17]

Healthcare workers (HCWs) are at risk of infections with blood-borne viruses including HIV, HBV and hepatitis C virus (HCV). Among these, HBV is the most common and the only one of the three serious viral infections for which an immunization exists.[4] Hepatitis HBV has long been recognized as an occupational risk for HCWs as a result of regular and routine exposure to blood and other body fluids in the course of healthcare services.[18,19] The risk of infection for health workers depends on the prevalence of disease in the patient population and the nature and frequency of exposures. The prevalence of HBV infection in the general population varies by country and region; in the European Union and the United States it is about 0.1-0.2% (low prevalence), 0.4-0.8% in Germany, 0.5-5.6% in Italy, 3% in Mediterranean countries (medium prevalence), high prevalence of 10-15% in Asia and Africa.[20]

Globally, needle stick injuries (NSIs) are the most common source of occupational exposures to blood and the primary cause of blood-borne infections of HCWs.[21,22] Approximately 2 million NSIs per year are incurred by Healthcare workers that result in infections with hepatitis B and C and HIV.[23] WHO data from injection safety surveys show on average: four NSIs per worker per year in the African, Eastern Mediterranean, and Asian populations.[24] In Vietnam, 38% of physicians and 66% of nurses reported sustaining a sharp injury in the previous nine months.[25] In South Africa, 91% of junior doctors reported sustaining a needle stick injury in the previous 12 months.[26]

The two most common causes of NSIs are two handed recapping and the unsafe collection and disposal of sharps waste. This placed cleaners and waste collectors also at risk.[22] Determinants of NSIs includes: Overuse of injections and unnecessary sharps; Lack of supplies: disposable syringes, safer needle devices, and sharps-disposal containers; Lack of access to and failure to use sharps containers immediately after injection; Inadequate or short staffing; Recapping of needles after use; Lack of engineering controls such as safer needle devices; Passing instruments from hand to hand in the operating suite; Lack of awareness of hazard and lack of training.[22,27]

The HBV remains infectious for a prolonged period on environmental surfaces and is transmissible in the absence of visible blood.[18] HCWs do not recognize all exposures to potentially infectious blood or body fluids[19] and, even when exposures are recognized, often do not seek post-exposure prophylactic management.[28] In serologic studies conducted in the United States during the 1970s, HCWs had a prevalence of HBV infection approximately 10 times greater than the general population.[18] However, there have been a significant drop since the implementation of the "standard precautions" which are devised to be used for the care of all patients in hospitals regardless of their diagnosis or presumed infection status.[29]

Since inception of Babcock University Teaching Hospital (BUTH) in 2012 and the establishment of Infection Control Committee a year after there has been no data on HBsAg status of HCWs till date. As a dynamic healthcare institution, BUTH is concerned about the welfare of its staff and students. Hence, the aim of this study was to determine the seroprevalence of HBsAg among HCWs in BUTH so as to provide data that might help to improve preventive measures and established a hospital-wide surveillance.

Methods

Study design and location

This cross-sectional study among HCWs was conducted at Babcock University Teaching Hospital (BUTH) between May and June 2015. BUTH is a tertiary care hospital located in Ilisan-Remo in the south-western part of Nigeria. It is one of the private mission hospitals in the country with a bed capacity of 240 and has more than 350 HCWs. The hospital also serves as a teaching hospital for Ben Carson School of Medicine, Babcock University Ilisan-Remo, Ogun State Nigeria. BUTH is a tertiary health institution which provides healthcare services to the people of Ogun state and neighboring Lagos and Ondo states in South West Nigeria.

Study population

Target population includes resident doctors, sanitary staff, medical students, staff nurses and medical laboratory scientists/technicians. Due to the limited time required by the medical students to conclude the study a convenient sample size of 100 HCWs across the various occupational categories was taken.

Exclusion criteria

Participants with known HBsAg, history of unsafe blood transfusion, spouse of hepatitis B patients, or staff not interested in the study were excluded from the study.

Ethics approval and data collection

This study was approved by Babcock University Health Research Ethics Committee (BUHREC) and an informed consent was obtained from each participant before collecting the demographic and clinical data. A questionnaire was administered to obtain socio-demographic information, such as gender, age, education, economic status, and residency, occupation, parenteral exposures, sexual partners, vaccination status, and duration of employment, medication and history suggestive of any systemic illness.

Assays

Three-mL blood samples were obtained by venipuncture for serological analyses. Samples were centrifuged and sera were separated immediately. Sera were stored at -20°C, and tested for the presence of HBsAg by HBsAg test kits manufactured by Genedia, Green Cross, Korea, following the manufacturer's instruction. The presence of HBsAg was considered as the evidence for prior exposure to HBV (recent infection or chronic carrier).

Statistical analysis

All collected data were analyzed using SPSS. Quantitative variables were compared using Fisher Exact test. P values < 0.05 were considered statistically significant.

Results

Out of the 100 HCWs 37% percent were males and 63% were females giving an M:F ratio of 1:1.5. With respect to occupation category, 54% of the study group were nurses, while cleaning staff, doctors and Medical laboratory Technologists represented 22%, 17% and 7% respectively (Table I). HBsAg was found only in 7 out of 100 HCW screened; four of which (57.1%) were cleaning staff while none of the laboratory technicians screened were positive (Table I). Fifty five percent of the participants had some form of vaccination against HBV and 57% of HCW with positive HBsAg have no This outcome may be a reflection of differences in

Table I. Demographic and clinical data

Characteristic No.		Frequency		HBsAg	
		No.	%	No.	%
Study Group		100	100	7	7
Gender					
Male		37	37	4	57.1
Female		63	63	3	42.9
Age (Years)					
<30		39	39	4	57.1
30-50		54	54	3	42.9
>50		7	7	0	
Occupational Category					
Doctors		17		1	14.3
Nurses		54		2	28.6
Med lab Scientist		7		0	0
Cleaning Staff		22		4	57.1
Risk Factors					
Awareness of Universal Precaution	**Yes**	82		4	57.1
	No	18		3	42.9
Awareness of exposure to Agents	**Yes**	79		4	57.1
	No	21		3	42.9
Protection					
Vaccination against HBV	Yes	59		4	57.1
	No	41		3	42.9

diagnostic methods and sample size employed in various studies.

Discussion

The prevalence of HBsAg in this study was more among males than females and younger staff (<50 years) than older staff but this was not statistically significant. The occupational risk of HBV infection among the HCW in this study across occupational categories was highest for cleaning staff and lowest for the laboratory technicians. This finding was statistically significant (P value <0.05). The high prevalence among the cleaning staff may be attriuted to accidental pricks and exposure to blood and other body fluid products among this group. This may be related to poor and unsafe disposal syringes and needle devices which sometimes occur in healthcare facilities in developing countries like Nigeria. This may be connected with lack of access to and failure to use sharps containers immediately after injection use.[27] Also, awareness level is low among this group of HCWs. This study did not find any positive results of HBsAg among the medical laboratory technologists and it may be due to high awareness of bio safety and good laboratory practices.

The prevalence of current hepatitis B virus infection and life time exposure to hepatitis B virus infection among health care workers was high though, the difference between those who had some form of vaccination and those who had none was not

Table II. Distribution of hepatitis B virus infection based on number of vaccines uptake by subjects screened

No. of vaccines uptake	Total No. Subjects screened (n=100)	No. Positive Cases (%)	No. Negative Cases (%)
None	45	4	41
1	13	1	12
2	16	1	15
3	26	1	25
Total	**100**	7	93

The Fisher exact test statistic value is 0.69767. The result is not significant at $p < 0.05$

statistically significant (P>0.05). Considering the risk of liver cirrhosis, hepatocellular carcinoma1 and transmission of HBV to patients, there is need to concentrate efforts on reducing transmission through improving the work environment, pre-employment screening and mandatory vaccination of HCWs. Strict infection control policy on management of sharps and health education, training and re-training should be activated.

Study Limitations

This study had some limitations that may have influenced the outcome. The relative small sample size is due to the short duration of study because the medical students involved in the study had a limited time to conclude the study. The convenience sampling prevented a broader coverage of HCWs across other occupational categories.

Conclusion

The results of this study suggest that HBsAg have high prevalence among HCWs. Previous exposure to body fluid, previous needle stick injuries might be the source of infection in these HCWs. HCWs should be immunized with the correct doses of hepatitis B virus vaccine. Routine health education should be carried out in healthcare facilities to raise the level of awareness of all healthcare service staff to HBV infection.

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