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### Seroprevalence of hepatitis b surface antigen (HBsAg) among the medical students of Usmanu Danfodiyo University, Sokoto, Sokoto State, Nigeria

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#### ABSTRACT

Hepatitis B virus infection is a salient occupational hazard for health workers. It has been estimated that about two billion people worldwide have been infected with the virus. It is the 10<sup>th</sup> leading cause of death worldwide and results in 500,000 to 1.2million deaths per year due to cirrhosis and hepatocellular carcinoma. The presence of HBsAg in serum or plasma is an indication of active Hepatitis B infection, either acute or chronic. Healthcare workers, of which medical students are a part of, are at high risk of encountering accidental needle prick injuries, blood and body fluid exposure and hence acquiring blood borne infections, especially Hepatitis B and C, which may be followed by serious long term sequelae in a significant number of cases. The aim of this study was to determine the seroprevalence rate of Hepatitis B surface antigen (HBsAg) among the medical students of Usmanu Danfodiyo University, attending Usmanu Danfodiyo University Teaching Hospital (UDUTH), Sokoto. 245 medical students participated in this study, qualitative detection of HBsAg was done using one step HBsAg rapid test strips (DiaSpot Diagnostics, USA) and (Clinotech Diagnostics, Richmond, Canada). Results were correlated and reported as positive or negative. Among the 245 samples analyzed, 38samples were positive for HBsAg accounting for a prevalence rate of 15.5%. This prevalence was however statistically non – significant ( $p>0.05$ ). The major risk factors of hepatitis B transmission among medical students include unprotected exposure body fluids, blood and blood products as well as lack of vaccination.

**Keywords:** hepatitis B virus, seroprevalence, HBsAg, medical students, health workers.

#### INTRODUCTION

Hepatitis B is a salient occupational hazard for health workers. It is a viral infection that attacks the liver and can cause both acute and chronic disease. It has been estimated that about two billion people worldwide have been infected with the virus, 350million people worldwide are chronic Hepatitis B virus (HBV) carriers, and about 600,000people die every year as a result of the consequences of Hepatitis B [1],[2].

Hepatitis B virus is the 10<sup>th</sup> leading cause of death worldwide and results in 500,000 to 1.2million deaths per year due to cirrhosis and hepatocellular carcinoma [3]. HBV is transmitted through contact with the blood or other body fluids of an infected person. The route of HBV transmission is similar to that of HIV transmission. However, HBV

is 50 to 100 times more infectious than HIV and 10 times more than Hepatitis C virus [2],[4]. Many of the patients infected with HBV are asymptomatic and as such help in the spread of the disease in the community and particularly to health workers [5]. HBV also has a perinatal route of transmission (from mother to child at birth) this route is a common source of transmission in Asia and Africa [6],[7].

The presence of HBsAg in serum or plasma is an indication of active Hepatitis B infection, either acute or chronic. HBV is the most common significant chronic viral infection worldwide. The endemicity of HBV infection varies greatly worldwide. The prevalence of chronic HBV infection varies from  $\geq 8\%$  in Africa, Asia, and Western Pacific to  $< 2\%$  in Western Europe, North America and Australia [7]. In Nigeria where HBV infection is considered endemic, different prevalence rates have been reported. The several reports have established the endemic nature of HBV by the presence of HBsAg in different population groups from different parts of the country.

A HBsAg seroprevalence rate of 14.3% was reported in Jos, Nigeria [9], 4.3% prevalence rate was reported in pregnant women in Port Harcourt, Nigeria [10]. Among blood donors in Benin City, a prevalence of 5.4% was reported [11], while a prevalence rate of 25.0% was reported among HIV infected individuals in Jos, Nigeria [9].

The incubation period of HBV as defined by the duration between exposure and appearance of clinical jaundice is between 30 and 130 days. The serologic incubation period, the duration between exposure and appearance of Hepatitis B surface antigen in the plasma or serum as detected by radioimmunoassay is as early as 6days and rarely persists for more than 4months [12],[13]. The HBsAg one step Hepatitis B surface antigen test strip (serum/plasma) is a rapid test to qualitatively detect the presence of HBsAg in serum or plasma sample. The test employs a combination of monoclonal and polyclonal antibodies to selectively detect elevated levels of HBsAg in serum or plasma.

Health care workers (HCWs) are those persons such as employees, students, contractors, attending clinicians, public safety workers or volunteers whose activities involve contact with patients or with blood or other body fluids from patients in a healthcare laboratory or public setting. HCWs are at high risk of encountering accidental needle prick injuries, blood and body fluid exposure and hence acquiring blood borne infections, especially Hepatitis B and C, which may be followed by serious long term sequelae in a significant number of cases [14],[15].

The aim of this study was to determine the seroprevalence rate of Hepatitis B surface antigen (HBsAg) among the medical students of Usmanu Danfodiyo University, attending Usmanu Danfodiyo University Teaching Hospital (UDUTH), Sokoto.

## MATERIALS AND METHODS

### 2.1 Ethical Consideration

Ethical clearance was sought for and obtained from the ethical committee of Usmanu Danfodiyo University Teaching Hospital (UDUTH), Sokoto. Informed consent was also obtained from all the participants.

### 2.2 Study Population

Medical students (Medical Laboratory Science, Medicine and Surgery, and Pharmacy) of Usmanu Danfodiyo University were recruited for this study. A total of two hundred and forty five (245) of the students participated. Simple random sampling technique was used in recruiting the subjects of this study.

### 2.3 Exclusion Criteria

Students who had received Hepatitis B vaccine were excluded from the study. Sociodemographic data and other relevant information of each participant were obtained with the aid of a questionnaire.

### 2.4 Specimen Collection

3ml of venous blood samples were aseptically collected from the cubital fossa of all the participants and dispensed into sterile plain containers. The samples were allowed to stand on the bench for 15 minutes for clotting and clot retraction. Subsequently, the samples were centrifuged at 4000rpm for 5minutes. The serum was separated into pre-labelled plain containers.

### 2.5 Sample Analysis

Qualitative detection of serum HBsAg was determined using commercial third generation rapid chromatographic immunoassay. Two commercial rapid diagnostic HBsAg test strips were used; DiaSpot HBsAg rapid test strip (DiaSpot Diagnostics, USA) with relative sensitivity and specificity of >99% and 97% respectively with an accuracy of 98.5% and Rapid Test Strip (Clinotech Diagnostics, Richmond, Canada) with relative sensitivity and specificity of 99% and 97% respectively and an accuracy of 98.5%. Strict adherence to manufacturers' instructions was observed.

The test and result interpretations were done according to the manufacturers' instructions. Result from both the test strips were correlated for each subject and reported as positive or negative.

### 2.6 Data Analysis

Data was analyzed using Chitest, p value of 0.05 was considered significant at 95% confidence interval. Data analysis was done with the aid of Statistical Programme for Social Sciences (SPSS) version 18.0

## RESULTS

Among the 245 subjects, 120(49%) were males while 125(51%) were females. The ratio of males to females is 1:1.04. The age of the participants range from 17 – 32years with a mean age of 21.9years (Table 1). With respect to their course of study, department of Medical Laboratory Science (BMLS) students were 100(40.8%), Medicine and Surgery (MBBS) students were 102(41.6%) and Pharmacy students were 43(17.6%).

Among the 245 samples analyzed, 38 samples were positive for HBsAg accounting for a prevalence rate of 15.5% (38 Of 245), this prevalence rate is however statistically non –significant ( $p>0.05$ ). Among the positive cases, it was observed that the infection was higher in males with a prevalence of 25% (30 Of 120) when the overall population was considered and relatively much lower in females with an overall prevalence rate of 6.4% (8 of 125), (Table 2).

The distribution of HBsAg among the departments was observed as follows: 7.3% (n=18) for MBBS, 6.5% (n=6) for BMLS and 1.6% (n=4) for pharmacy students.

The difference in HBsAg status among the medical students was statistically non- significant ( $p>0.05$ ).

**TABLE 1: AGE RANGE AND DISTRIBUTION OF HBsAg**

AGE RANGE	POSITIVE	NEGATIVE	N
17 - 20	5	85	90
21 - 24	25	85	110
25 - 28	8	31	39
29 - 32	0	6	6
<b>TOTAL</b>	<b>38</b>	<b>207</b>	<b>245</b>

**TABLE 2: DISTRIBUTION OF HBsAg STATUS BY SEX**

SEX	N	HBsAg POSITIVE (%)	HBsAg NEGATIVE (%)
MALES	120	30 (25%)	90 (75%)
FEMALES	125	8 (6.4%)	117(93.6%)

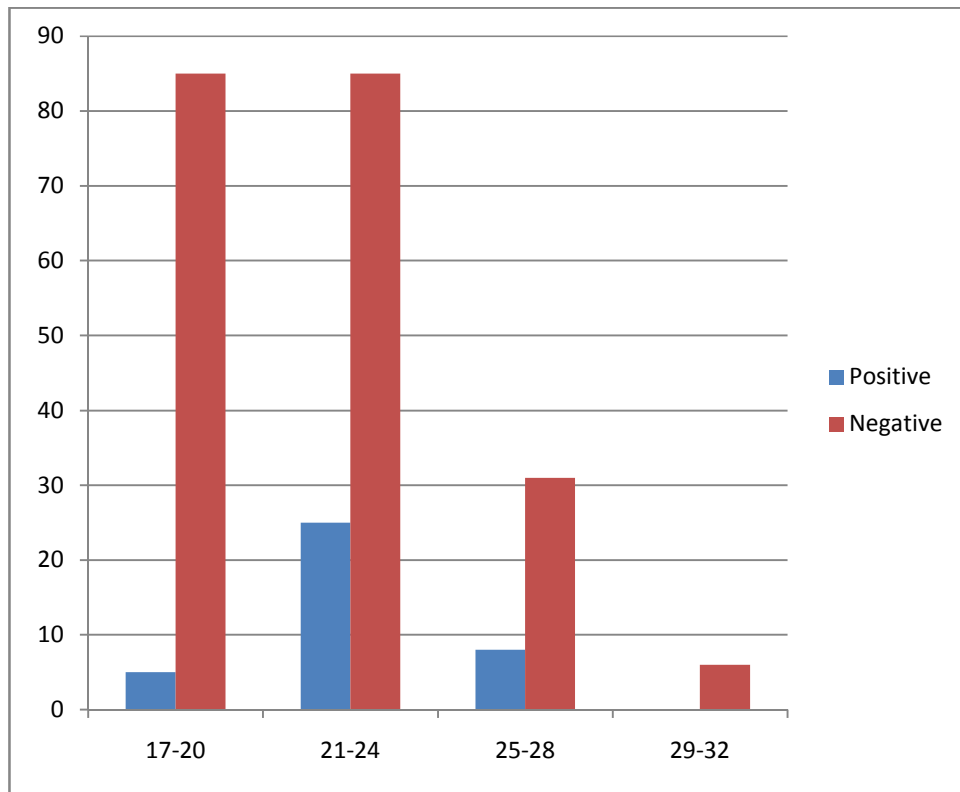


Figure 1: bar chart showing the prevalence of HBsAg among the age group of the subjects

## DISCUSSION

Hepatitis B virus (HBV) remains a public health burden in the world, mostly in developing countries including Nigeria. Occupational exposure of healthcare workers to infected blood and blood products remain a major risk factor. Medical students are at risk of acquiring HBV infection and as well transmitting it to other patients in the course of their clinical and laboratory posting.

The prevalence of HBV has been shown by previous studies to vary between developed countries where the prevalence is low (2%) and developing countries where the infection is endemic with age, sex, and socioeconomic status as important risk factors for infection [16].

This study showed HBsAg seroprevalence rate of 15.5% among medical students of Usmanu Danfodiyo University, Sokoto. This high prevalence rate is comparable to the prevalence rate of 39% reported by Olubuyida and colleagues among doctors and dentists [17], but in contrast to the prevalence rate of 3.2% reported among medical students of Lagos State University [18]; and also comparable to the national average population of 20% in Nigeria [19].

Results from other parts of Africa and the rest of the world show varying result, Pido and Kagimu reported a prevalence of 11.0% among medical students of Makerere University, Uganda [20], prevalence of 0.6% and 0.95% were reported among Gomal University medical students, Pakistan [21] and students of health colleges in Saudi Arabia [22] respectively. However, study at Kenyatta National Hospital reported a high prevalence of 18% among the medical students [23].

The prevalence rate was higher in males 25% (30 of 120) than in females 6.4% (8 of 125) this relative disparity in the prevalence rates between males and females is comparable to the study by Dutta and colleagues which reported HBsAg prevalence of 35.3% in males and 19.3% in females [24]. No scientific evidence has been given for this apparently higher seroprevalence in males than in females.

In this study, HBsAg was highest among the 21-24years age group (figure 1). This is comparable to the study by Eke and colleagues which found HBsAg to be highest among women of 20-24years age group in Nigeria [25]. In most epidemiological studies on HBsAg, there has been a link between age and acquisition of HBsAg [25]. The age of acquiring the infection is one of the determinants of the prevalence rates of HBsAg.

With respect to the departmental distribution of HBsAg, high prevalence of 7.3% and 6.5% was observed in MBBS and BMLS students respectively whereas the prevalence among Pharmacy students was 1.6%. This apparent low prevalence rate among Pharmacy students may be suggestive that other clinical students acquire the infections. This is because there is much lower contact with the patients by pharmacists and pharmacy students in contrast to other medical students who are usually in more contact with the patients, patients' body fluids, blood and blood products, which are all potential routes of transmission.

### CONCLUSION

Lack of vaccination and unprotected exposure to body fluids, blood and blood products remains the major risk of Hepatitis B transmission among medical students. The seroprevalence of HBsAg among the population studied was 15.5%.

#### Recommendation

We recommend that medical students be duly informed and vaccinated against HBV and given proper orientation on the various routes of transmission of the virus after voluntary HBsAg screening. Safety guidelines should be enforced in the hospital and those who have acquired the infection be treated to prevent horizontal transmission to their colleagues and patients.

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