

HEPATITIS B SURFACE ANTIGEN AMONG NIGERIAN STUDENTS: A MULTI-CAMPUS STUDY

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ABSTRACT

The study aimed to evaluate the incidence, screening, and risk factors of HepB virus infection among students in two tertiary educational institutions in Kwara State, Nigeria. The multi-campus study was conducted among 354 students of the two institutions (177 per institution). A rapid diagnostic test kit was used in screening HepB surface antigen among the respondents. Data were analyzed with the use of descriptive and inferential statistics. The majority of the respondents on HepB virus infection testing in Al-Hikmah University, Ilorin (152, 85.9 %), and College of Education (Technical), Lafiagi (158, 89.3 %), were within the age range of 21-25 years. Age has been identified as a stronger influence of HepB infection on the respondents in Al-Hikmah University, Ilorin, and no such association was observed in the College of Education, (Technical), Lafiagi. In College of Education, (Technical), Lafiagi, there were significant associations between HepB virus infection and infected patients who drank alcohol, wore body tattoo, had pierced ear or body, involved in drug abuse, had blood transfusion history, multiple sex partners, shared toothbrushes, used utensils and shared sharp objects, while at Al-Hikmah University, there was no statistical association between social and medical variables and HepB infection. There was an HepB infection incidence rate of 0.6 % in Al-Hikmah University, Ilorin, and 1.7% in the College of Education, (Technical), Lafiagi.

The incidence rates of HepB burden in both institutions were low. Significant correlates were associated with HepB infection.

Keywords: Educational institutions, HepB infection, incidence, screening, risk factors

INTRODUCTION

Hepatitis B (HepB) virus infection is an asymptomatic liver infectious disease that affects billions of the populace worldwide (1, 2). The major transmission of hepatitis B is through bodily fluids while others can be through semen, urine, at birth, or from mother to child. At the acute HepB stage, the symptoms include clay-colored stools,

vomiting, dark urine, nausea, joint pain, jaundice, and abdominal pain as well as a loss of appetite, fatigue, and fever (2). A blood test is required for diagnosis while vaccinations are

necessary for protection against the risk of the burden. At a certain stage of the disease progression, treatment of the disease is ensured to lessen the virus level in the blood, and subsequent risk of causing liver disease (3). About 25 % of HepB positive adults infected from infant can develop liver cancer or cirrhosis caused by the acute infection, if not appropriately treated (1). There is, therefore, a need for people to know the importance of HepB infection through awareness from various media outlets and campaigns. These would increase the level of diagnosis, testing, vaccination, and therapy accordingly (4). According to the WHO global seroprevalence estimate in 2015, around 257 million persons had chronic HepB infection with 887,000 yearly deaths usually from hepatocellular carcinoma and cirrhosis. In 2016, up to 27 million persons (10.5 %) that contacted hepatitis B know their infection status, while approximately 4.5 million (16.7 %) persons diagnosed were receiving treatment (2).

Among the sub-Saharan African countries, Nigeria is hyper-endemic for HepB infection and around 12 % of the population were chronic carriers despite the availability of safe and effective vaccines (5). An incidence rate of 3.3 % was reported in Abakaliki (6), 18.4 % in Kaduna State (7), 4.7 % in Uyo (8), 12.5 % in Zaria (9), 4.5 % in Maiduguri (10) and 11.0 % in Makurdi (11). Furthermore, seroprevalences of 8.0 % and 5.5 % HepB infections were reported in Ilorin, (12,13). Studies on acute HepB infection are not regularly conducted in Nigeria and the disease is underreported especially among students of tertiary institution in Kwara State. However, due to the asymptomatic nature of the HepB infection, the infected students may not know their status. There is the need therefore, to conduct a multi-campus study on the HepB surface antigen among the students. The study aimed to ascertain the incidence and risk factors of HepB virus infection among students in two tertiary educational institutions in Kwara State, Nigeria

with the view of creating awareness to flatten the line of the spread of the disease.

METHODS

Setting

The studies were conducted between 6th March and 28th June 2019 among students at two tertiary educational institutions in Kwara State Nigeria, namely; Al-Hikmah University, Ilorin in Kwara Central, and College of Education (Technical), Lafiagi in the Kwara North. Kwara State is located within the North Central geopolitical zone of Nigeria with its capital in Ilorin. The State was created on 27th May 1967 with a population of 2.37 million (14). The State has a Federal University, the University of Ilorin, a State University, Kwara State University, and three Colleges of Education (the College of Education, Ilorin, College of Education, Oro, and College of Education (Technical), Lafiagi). The State also has four Private Universities namely; Landmark University, Omu-Aran, Crown Hill University, Eiyen N'korin, Al-Hikmah University, Ilorin, and Summit University, Offa (15).

Study population

The study population involved both male and female students of Al-Hikmah University, Ilorin, and College of Education (Technical), Lafiagi in Kwara State, Nigeria.

Sample size determination

The least sample size was calculated by applying the formula described by Fisher (16).

$$N = \frac{Z^2 pq}{d^2}$$

Where N = least sample size of the study,
Z = Standard normal deviation at 1.96 (this relates to 95% confidence interval),
d = degree of accuracy with the precision expected of 0.05.

p = proportion of the target population of the previous studies (incidence of HepB infection was 13.6%).

q = 1-p. (complement of p),

$$n = \frac{1.96^2(0.136)(0.864)}{0.05^2}$$

n = 177

Therefore, 177 students were recruited for the study of HepB infection in the College of Education (Technical), Lafiagi, and (177) from Al-Hikmah University, Ilorin.

Inclusion and exclusion criteria

The students that met the inclusion criteria for the study were enrolled after a notified permission was obtained from them. They were male and female students of age greater than 21 years. However, students that declined the consent, those on hospital admission, and pregnant students were excluded from the study. The major outcome measures of this research were the detection of Hepatitis B surface antigen (HBsAg) in the blood of the subjects and correlations between HBsAg statuses and identified predisposing factors such as clinical and demographic variables for HepB infection.

Study design

The research was a cross-sectional multi-campus study involving volunteered students of two tertiary educational institutions who were unaware of their HepB virus statuses. The total number of students enrolled for HepB testing at the two institutions was 354 by simple random sampling using computer-generated random numbers.

Data instrument

A self-completed questionnaire was developed after an extensive literature review. The

questionnaires were firstly pre-tested on students in a tertiary institution in Kwara South for reliability and validity. Some minor corrections were subsequently effected before the questionnaires were administered to the enrolled students.

Data collection

A descriptive letter promising secrecy was attached to the questionnaires. The questionnaire showed no information confirming the identity of the respondents. The privacy of information was stated at the beginning of the questionnaire. The subjects were required to fill out the questionnaires based on some information such as demographics, risk factors, and screening for the HepB virus. The risk factors evaluated were social and medical information of respondents screened for the HepB infection. These include cigarette smoking, drinking of alcohol, body tattoo, ear or body piercing, injectable drug abuse, history of blood transfusion, multiple sexual partners, sharing of toothbrushes, use of utensil, sharing of sharp objects, receipt of organ transplant, history of working in the medical field and history of having a blood exposure. However, at the face-to-face interview, the subjects were asked about the history of exposure to risky procedures or behaviors. Prior knowledge questions on HepB virus infection were also asked from the respondents to assess their levels of awareness of the infection.

Laboratory assay

Collection of samples

After the personal interview of the respondents, Micropoint Rapid Diagnostic test was used to identify the occurrence of HepB antigens (HBsAg) in blood samples at the respective Laboratories of the institutional healthcare centers. Methylated spirit was initially employed to disinfect the fingerstick by swabbing before the collection of the blood. Lancets were thereafter applied to puncture the

fingerstick to obtain 60 µl of whole blood specimens.

Screening for Hepatitis B surface antigen

Hepatitis B virus screening was conducted using the Hepatitis B surface Antigen Rapid diagnostic test strip (Micropoint Laboratory, Nantong, China). It is a rapid visual immunoassay for the qualitative detection of Hepatitis B surface Antigen (HBsAg) in a whole blood specimen. A 60 µl volume of a finger prick whole blood was dropped on the test strip and one drop of phosphate-buffered saline was added to the blood on the strip immediately and allowed for 15 minutes. During the experiment, the kits were pre-coated with anti-HepB antibodies on the test line area and a reaction of the coated particle with anti-HepB antibodies and whole blood occurred. The blended multiclinal anti-HepBs (conjugated) coated wells moved through capillary action onto membrane chromatographically and produced a colored line when reacting with anti-HBs antibodies. After 15 minutes, noticeable red lines showed at the control area (C) and test area (T). Negative results showed a single line (control line) while two red lines were visible for positive samples (control and test lines) as previously described (17). The Medical Laboratory Technologist also assisted in reading the results on the test strips. Two concurrent positive test results indicated positive. Whenever a test result was positive and the other negative, a third strip was utilized as a tie-breaker for sorting out this difference using Acon Hepatitis B Ultra-Fast Diagnostic Kits (Acon Biotech Diagnostic Systems, United States of America). The strips results were highlighted as follows: Firstly, if the first and second strips were negative, the result is negative. Secondly, if the first and second strips were positive, the result is positive. Thirdly, when the first strip is positive and the second strip negative, a third test strip (tie-breaker) was conducted, and if negative, the result is negative but if positive, the result is positive.

Fourthly, when the first strip is negative and the second strip is positive, a third test strip (tie-breaker) that shows negative is a negative result while that of positive indicates a positive result

Ethical clearance

The research was conducted after approvals were sought from the Ethics and Research Committees of the two institutions. The Al-Hikmah University, Ilorin, Kwara State, Nigeria had Ethical Clearance Reference Number: HUI/EST/1.2 and dated February 4, 2019. The Kwara State College of Education (Technical), Lafiagi, Kwara State, Nigeria also possessed Ethical Clearance Reference Number: REG/COETL/641/1/14 with a date of January 22, 2019. Similarly, written and oral consent of the students was obtained before recruitment into the study.

Statistical analysis

The data were evaluated for normality by exploring box plots. Stata statistical software (StataCorp. 2013, Release 13, College Station, TX: StataCorp LP) of version 11.0 was applied to analyze the results with the use of descriptive and inferential statistics to assess the statistical differences between variables. Logistic regression was exploited for multivariate analysis to assess the predictors. The level of statistical significance was set at a p-value of < 0.05 with a 95% confidence interval.

RESULTS

The majority of the respondents on HepB virus infection testing in Al-Hikmah University, Ilorin (152, 85.9 %), and College of Education, (Technical), Lafiagi (158, 89.3 %), were within the age range of 21-25 years (Table 1). Most of the students were males: 101 or 57.1 % in Al-Hikmah University, Ilorin and 96, (54.2 %) in College of Education (Technical), Lafiagi. In both institutions, the majority of students attending the health services were single (Al-Hikmah University, Ilorin (161, 91.0 %) and College of Education, (Technical), Lafiagi

(158, 89.3 %). Yoruba language is the major language spoken by the students (Al-Hikmah University, Ilorin (102, 57.6 %) and College of Education (Technical), Lafiagi (107, 60.5 %) and Islam is their main religion (130, 73.4 %) and (149, 84.2 %) respectively.

The incidence rate of HepB infection among students attending health services at Al-Hikmah University, Ilorin was 0.6 % while in College of Education (Technical), Lafiagi three students were infected with an incidence rate of 1.7 % (Table 2).

Exposure of students to potential risk factors

In both institutions, few of the respondents were cigarette smokers and alcohol drinkers. Those involved in smoking in the institutions were: Al-Hikmah University, Ilorin - 31 (17.5 %), and College of Education (Technical), Lafiagi - 11 (6.2 %) (Table 3). Thirty-eight (21.5 %) respondents were given to alcohol in Al-Hikmah University, Ilorin, and 7 (4.0 %) in the College of Education, (Technical), Lafiagi. Also, the number of respondents who had a tattoo on their body at Al-Hikmah University, Ilorin was (15, 8.5 %) in comparison with the College of Education, (Technical), Lafiagi of (6, 3.4 %). Ear or body was pierced by a minority of the respondents in the two institutions studied, Al-Hikmah University, Ilorin had (64, 36.2 %) while College of Education, (Technical), Lafiagi recorded (17, 9.6 %). Only (29, 16.4 %) of the respondents in Al-Hikmah University, Ilorin had multiple sexual partners, whereas only (9, 5.1 %) were obtained in College of Education (Technical), Lafiagi. Seventeen (9.6 %) shared toothbrushes, (91, 51.4 %) shared utensils among themselves and limited respondents (23, 13 %) shared sharp objects in Al-Hikmah University, Ilorin and (6, 3.4 %), (18, 10.2 %) and (6, 3.4 %) in College of Education (Technical), Lafiagi respectively. These results

showed that most of the students recruited in both institutions did not indulge in risk behaviors that could expose them to contract HepB infection. However, those cigarette smokers, alcohol drinkers, had body tattoo, pierced their bodies, shared brushes, utensils, sharp objects, and had multiple sexual partners were higher in Al-Hikmah University, Ilorin as compared with College of Education (Technical), Lafiagi (Table 3).

Medical information of respondents screened for viral HepB infection in the two institutions showed that in Al-Hikmah University, Ilorin, 23 (13.0 %) were injecting drugs of abuse, 17 (9.6 %) had undergone a blood transfusion, 18 (10.2 %) had a blood exposure and 85 (48 %) were aware of HepB infection, while 25 (14.1 %), 11 (6.2 %), 4 (2.3 %), 7 (4.0 %) and 64 (36.2 %), respectively, represented the figures in College of Education, (Technical), Lafiagi. More respondents were involved in blood transfusion, had blood exposure and knowledge of HepB infection in Al-Hikmah University, Ilorin compared with respondents in the College of Education (Technical), Lafiagi. However, the respondents who injected drugs of abuse were higher in the College of Education (Technical), Lafiagi than Al-Hikmah University, Ilorin (Table 4).

The findings in Al-Hikmah University, Ilorin, and College of Education, (Technical), Lafiagi on incidence rate, and risk factors for HepB infection among the respondents were represented in Table 5. Age was identified as a strong influence on HepB infection ($p < 0.05$) on the respondents in Al-Hikmah University, Ilorin, but no such association was observed in College of Education, (Technical), Lafiagi.

Infected patients at Al-Hikmah University, Ilorin showed no statistical association between social and medical variables and HepB

Table 1: Demographic information of students in two Kwara State tertiary educational institutions on HepB virus testing

Variables	Hep B Virus Testing	
	Al-Hikmah University, Ilorin n =177 (%)	College of Education (Technical), Lafiagi n =177 (%)
Age (Years)		
21-25	152 (85.9)	158 (89.3)
26-30	8 (4.5)	11 (6.2)
31-35	7 (4.0)	8 (4.5)
36-40	5 (2.8)	0 (0)
41-45	5 (2.8)	0 (0)
Gender		
Male	101(57.1)	96 (54.2)
Female	76 (42.9)	81 (45.8)
Marital Status		
Unmarried	161 (91.0)	158 (89.3)
Married	16 (9.0)	19 (10.7)
Tribe		
Yoruba	102 (57.6)	107 (60.5)
Igbo	19 (10.7)	6 (3.4)
Hausa	55 (31.1)	30 (16.9)
Nupe	0 (0)	32 (18.1)
Others	1 (0.6)	2 (1.1)
Religion		
Islam	130 (73.4)	149 (84.2)
Christianity	44 (24.9)	21 (11.9)
Others	3 (1.7)	7 (3.9)

Table 2: Incidence rates of viral HepB infection among students attending two Kwara State tertiary educational institutions

Testing of HepB Infection	Al-Hikmah University, Ilorin n=177 (%)	College of Education (Technical), Lafiagi n=177 (%)
Students infected with HepB (Positive)	1 (0.6)	3 (1.7)
Those not infected with HepB (Negative)	176 (99.4)	174 (98.3)
The incidence rate of HepB infection	0.6	1.7

Table 3: Social information of students screened for Viral HepB infection in two Kwara State tertiary educational institutions

Variables		Al-Hikmah University, Ilorin (HepB testing) n =177 (%)	College of Education (Technical), Lafiagi (HepB testing) n =177 (%)
Cigarette smoker	Yes	31 (17.5)	11 (6.2)
	No	146 (82.5)	166 (93.8)
Drinking alcohol	Yes	38 (21.5)	7 (4.0)
	No	139 (78.5)	170 (96.0)
Body tattoo	Yes	15 (8.5)	6 (3.4)
	No	162 (91.5)	171 (96.6)
Ear or body piercing	Yes	64 (36.2)	17 (9.6)
	No	113 (63.8)	160 (90.4)
Multiple sexual partners	Yes	29 (16.4)	9 (5.1)
	No	148 (83.6)	168 (94.9)
Sharing of Toothbrushes	Yes	17 (9.6)	6 (3.4)
	No	160 (90.4)	171 (96.6)
Use of Utensil	Yes	91 (51.4)	18 (10.2)
	No	86 (48.6)	159 (89.8)
Sharing of sharp objects	Yes	23 (13.0)	6 (3.4)
	No	154 (87.0)	171 (96.6)

Table 4: Medical information of students screened for Viral HepB infection in two Kwara State tertiary educational institutions

Variables		Al-Hikmah University, Ilorin n =177 (%)	College of Education (Technical), Lafiagi n =177 (%)
Injectable drug abuse	Yes	23 (13.0)	25 (14.1)
	No	154 (87.0)	152 (85.9)
History of blood transfusion	Yes	17 (9.6)	11 (6.2)
	No	160 (90.4)	166 (93.8)
Ever worked in the medical field and have a blood exposure	Yes	18 (10.2)	7 (4.0)
	No	159 (89.8)	170 (96.0)
Awareness of HepB virus infection	Yes	85 (48.0)	64 (36.2)
	No	92 (52.0)	113 (63.8)

Table 5: Demographic Correlates of students screened for HepB Infection in two Kwara State tertiary educational institutions

Variables		Al-Hikmah University, Ilorin (HepB Positive student) n= 1	p-value	College of Education (Technical), Lafiagi (HepB Positive students) n= 3	p-value
Age (Years)	21-25	1	0.001	3	0.622
	26-30	0		0	
	31-35	0		0	
	36-40	0		0	
	41-45	0		0	
Gender	Male	1	0.664	2	0.217
	Female	0		1	
Marital Status	Unmarried	1	0.992	3	0.243
	Married	0		0	
Tribe	Yoruba	1	0.313	2	0.923
	Igbo	0		0	
	Hausa	0		0	
	Nupe	0		1	
	Islam	1		2	
Religion	Christianity	0	0.852	1	0.694
	Others	0		0	

Table 6: Social and Medical information correlates of HepB virus infection among Students in two Kwara State educational institutions

Variables		Al-Hikmah University, Ilorin (HepB Positive student) n = 1	p-value	College of Education (Technical), Lafiagi (HepB Positive students) n= 3	p-value
Cigarette smoking	Yes	0	0.648	3	0.964
	No	1		2	
Drinking alcohol	Yes	0	0.572	2	0.001
	No	1		1	
Body tattoo	Yes	0	0.982	3	0.001
	No	1		0	
Ear or body piercing	Yes	0	0.748	2	0.001
	No	1			
Injecting drug abuse	Yes	0	0.111	2	0.023
	No	1		1	
History of blood transfusion	Yes	0	0.805	3	0.001
	No	0		0	

Multiple sexual partners	Yes	0	0.670	3	0.004
	No	1		3	
Sharing of toothbrushes	Yes	0	0.805	2	0.001
	No	1		1	
Use of utensils	Yes	1	0.512	3	0.492
	No	0		0	
Sharing of sharp objects	Yes	0	0.737	2	0.001
	No	1		1	
	No	1		3	
Ever worked in the medical field and have a blood exposure	Yes	0	0.387	3	0.212
	No	1		0	

infection (Table 6). However, in College of Education (Technical), Lafiagi, there were significant associations between HepB virus infection and infected patients who drank alcohol ($p = 0.001$), wear body tattoo ($p = 0.001$), had pierced ear or body ($p = 0.001$), had history of drug abuse ($p = 0.001$), had blood transfusion history ($p = 0.001$), had multiple sex partners ($p = 0.004$), shared toothbrushes ($p=0.001$), used utensils ($p = 0.001$) and shared sharp objects ($p = 0.001$).

DISCUSSION

The demographic data obtained from the study showed that most (82.7 %) of the students that participated were within the age bracket of 21 to 25 years. This is in line with a similar study in a tertiary institution in Southern Nigeria (18). Also, the majority of the students were females. This could be attributed to two factors, the first being that the population of females is higher in the location of this study, and secondly, the females were more interested in health-related activities (18).

A low incidence rate of HepB infection was recorded in the College of Education (Technical), Lafiagi (1.7 %), and Al-Hikmah University, Ilorin (0.6 %) among the respondents. The incidence rate of HepB was however, higher in the College of Education than Al-Hikmah University, Ilorin. This might be attributed to the fact that the number of respondents who injected drugs of abuse were higher in the College of Education (Technical), Lafiagi than Al-Hikmah University, Ilorin. Our finding was also similar to a study in Karachi with an incidence rate of 0.6 % (19). The lower seroprevalence of HepB infections among the students of the two institutions studied may be due to prior knowledge of the infection and its preventive and control measures which could alleviate the spread of the disease. Contrarily, prevalence rates of HepB infection were higher in most previous studies conducted in Nigeria including a study in the University of Ilorin among undergraduate students with 5.5 % (13), in Maiduguri (4.5 %) (10); Okolobiri (10.6 %) (20); Wukari (6.0 %) (21); Jos (22.5 %) (22); Jos (13.9 %) (23); Bida (11.3 %) (24) and

Ankpa (8.5 %) (25). The differences could be attributed to disparities in the knowledge of hepatitis infection and involvements in injecting drugs of abuse among the students. The likelihood is also that the majority of the students were not exposed to the risk factors of HepB infection. This connotes that proper counseling and orientation are needed for the students attending the Healthcare Services in the two institutions of study.

In the current study, age was identified as a strong influence on HepB infection among the respondents in Al-Hikmah University, Ilorin. This is similar to earlier studies (7, 25, 26) where it was observed that age was a major factor in HepB infection particularly those between 21 and 25 years. Another study (17) also pointed age as a risk factor of HepB infection, with the infection increasing with increase in age.

HepB infection was higher among male respondents than females. This result is in tandem with earlier studies conducted in Ankpa, Nigeria (25), and Bahrain (27) where the occurrence of HepB surface antigen was significantly higher in males than females. This result is also supported by another study in Anhui Province of China (28) where being feminine was a risk factor for HepB infection. These findings could be attributed to males being more promiscuous than females. The males were usually exposed to different sexual partners which results to vulnerability to the viral infections. Furthermore, this study revealed that transfusion of infected blood is not significant among the respondents. This is inconsistent with some reports (29 - 31) that blood transfusion played a vital role in the transmission mechanism of HepB infection among their participants.

Generally, HepB infection rates of 1.7 % in College of Education (Technical), Lafiagi, and 0.6 % in Al-Hikmah University, Ilorin in this study were lower compared with most previous reports in Nigeria.

These include that of 3.3 % in Abakaliki (6), 4.5 % in Maiduguri (10), 11.0 % in Makurdi (11) and 18.4 % in Kaduna State (7). In Ahmadu Bello University, Zaria, and the University of Uyo, the incidence rates of 12.5 % (9) and 4.7 % (8) were reported among students, respectively. Also in the University of Ilorin, 8.0 % and 5.5 % seroprevalence were separately reported (12, 13). The higher value reported in earlier studies may be attributable to differences in sample populations and demographic factors such as age. Also, the high incidence rates recorded among the students in the previous studies could be due to reduced awareness of the epidemiology of the hepatitis disease including mode of transmission, treatment, prevention, and control among the respondents. The lower incidence rates found in our study may be a result of HepB screening programs that were incorporated into the routine medical checkups of the students in the two institutions studied. This shows that educational awareness of the infectious disease and health surveillance should be intensified in the institutions to prevent and control the human deadly diseases among students.

The present study found that there was no impact of marital status, tribe, and religion on the occurrence of HepB infection but a significant association existed between alcohol consumption, body tattooing, ear or body piercing, injectable drugs abuse, history of blood transfusion, multiple sex partners, sharing of toothbrushes and sharing of sharp objects and HepB infection. This result is also similar to a report by Sawyerr (17) who studied risk factors and rates of HepB infection. The major risk factors for HepB infections in the current study were found to be contact with blood or body fluids, sexual exposure, and piercing activities. This aligns with the study of Ndako *et al.* (7) who reported the risk factors for HepB infections among their respondents to include sharing sharp objects, blood transfusion, and sexual exposure. A study by Molla *et al.* (32) revealed factors such as unsafe injection of drugs and blood transfusion products as the

major factors for HepB infection among their respondents.

It is worth mentioning that most previous studies observed sexual exposure as a major threat in HepB infection transmission. This could be because the population under study, adolescents is known to have risky sexual exposure patterns. This present study also showed that cigarette smoking, sharing of utensils with others, working in medical fields and sharing of sharp objects were the risk factors predisposing adolescents to HepB infections. However, the work of Omeje *et al.* (33) reported no significant associations between HepB positivity and blood transfusion, history of surgery, scarification marks, sharing of sharp objects, drug injections, unprotected sex, and family history of hepatitis.

CONCLUSION

The incidence rates of HepB infection were low in both institutions studied. The majority of respondents do not involve themselves in most of the social and medical habits that may predispose to the contract of HepB infection. The most potential predictors for contracting HepB affliction were age, body tattoo, body piercing, blood transfusion, multiple sex partners, use of alcohol, injectable drug abuse, sharing of sharp objects, and sharing of toothbrushes. This present work underscores the health importance of screening students in tertiary institutions for HepB infection to further reduce the ravaging effects of the disease.

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REFERENCES

1. Ivonie, U., Yanuar, A. and Firdayani, D (2018). Virtual screening of Indonesian herbal database

- for CP allosteric modulator of hepatitis B virus, *Int. J. App. Pharm.*,10:190-5.
2. World Health Organization (2019). Hepatitis C. Available from: <https://www.who.int/news-room/fact-sheets/detail/hepatitis-c>. Accessed on June 1, 2020.
3. Alotaibi, A. and Khan, J. (2017). Study of hepatitis B virus infection and its genotypes in tribal people, *Asian J. Pharm. Clin. Res.*,10:51-5.
4. Ganczak, M., Dmytryk-Daniłow, G., Korzeń, M., Drozd-Dąbrowska, M. and Szych, Z (2016). Incidence of HBV infection and knowledge of hepatitis B among patients attending primary care clinics in Poland, *J. Comm. Health*,41:635-44.
5. Olayinka, A.T., Oyemakinde, A., Balogun, M.S., Ajudua, A., Nguku, P., Aderinola, M., Egwuenu-Oladejo, A., Ajisegiri, S.W., Sha'aibu, S., Musa, B.O.P, Gidado, S. and Nasidi, A (2016). Seroprevalence of hepatitis B infection in Nigeria: A National Survey, *Amer Jf Trop Med Hyg*, 95(4):902. <https://doi.org/10.4269/AJTMH.15-0874>.
6. Ikobah, J., Okpara, H., Elemi, I., Ogarepe, Y., Udoh, E. and Ekanem, E. (2016). The prevalence of hepatitis B virus infection in Nigerian children prior to vaccine introduction into the national programme on immunization schedule, *Pan Afr. Med. J.*, 23:1-9.
7. Ndako, J.A., Nwankiti, O.O., Echeonwu, G.O.N., Junaid, S.A., Anaele, O. and Anthony, T.J. (2011). Studies on incidence and risk factors for hepatitis B surface antigen among secondary school students in North-Central, Nigeria, *Sierra Leone J Biomed Res*,3:163-8.
8. Mboto, C. and Edet, E. J. (2012). Incidence rate of Hepatitis. *Int. J. Modern Biol. Med.*, 2(2):101-11.
9. Aminu, M., Okachi, E. E., Abubakar, S. M. and Yahaya, A. (2013). Prevalence of hepatitis B virus surface antigen among healthy asymptomatic students in a Nigerian University, *Ann. Afr. Med.*,12:55-6.
10. Dawurung, J., Bukbuk, D.N., Ajayi, B.B. and Baba, M. (2012). Prevalence of hepatitis B and C virus co-infection among students of University of Maiduguri, Nigeria, *Arch. Appl. Sci. Res.*,4:158-4.
11. Musa, B.M., Bussell, S., Borodo, M.M., Samaila, A.A. and Femi, O. L. (2015). Incidence of HBV infection in Nigeria, 2000-2013: A systematic review and meta-analysis, *Nig J Clinl Pract*,18(2):163-72.
12. Udeze, A. O., Adeoye, P. A., Odugbes, A.E., Sule, W. F. and Okonkwo, I.O. (2015).

- Hepatitis B and C seropositivity in a cohort of positive patients in Ilorin, North-Central, Nig. *J. Microbiol.*, 28:2767–76.
13. Bello, S.I., Williams, F.E., Aliyu, F.O, Ojieabu, W. A. and Adewumi, M. A. (2019). Viral hepatitis B infection among undergraduate students accessing health services at public tertiary institutions in Kwara South, Nigeria, *J. Basic Soc. Pharm. Res.*,1:8–16.
14. National Population Commission (NPC) (2014). Nigeria demographic and health survey, Abuja, Nigeria. Available from: <https://www.google.com/search?client=firefox-bd&q=National+Population+Commission+%28NPC%29+%282014%29+Nigeria+Demographic+and+Health+Survey++%09Abuja%2C+Nigeria>. Accessed on June 15, 2020.
15. National Human Development Report (2018). Available from: https://www.ng.undp.org/content/nigeria/en/home/library/human_development/national-human-development-report-2018.html. Accessed on June 9, 2020.
16. Araoye, M. O. (2004). Sample Size Determination. In: Araoye, M.O. (Eds) Text Book of Research Methodology with Statistics for Health and Social Scientists, Nathadex, Ilorin- Nigeria, pp. 117–20.
17. Sawyerr, H.O. (2016). Risk factors and rates of Hepatitis B virus infection among municipal waste management workers and scavengers in Ilorin, Kwara State, Nigeria. *J. Health Pollut.*, 6:1–6.
18. Ogefere, H. O., Igiezeme, C. and Moses-Otutu, M. (2016). Potential risk factors and seroincidence of hepatitis C virus infection among students in a tertiary institution in Southern Nigeria, *J. Molecul. Biol. Res.*, 15(2):5–11.
19. Dinesh, R. and Ramalakshmi, S. (2017). Prevalence of hepatitis B virus and associated risk factors in Irula tribal population, *Asian J. Pharm. Clin. Res.*,10:100–2.
20. Ochei, K. C., Obeagu, E.I., Ibegi, B.T., Ugobo, E.I. and Odo, M. (2016). Prevalence of hepatitis B and C from samples received from the various wards in Niger Delta University Teaching Hospital (NDUTH), Okolobiri for haematological analyses, *Int. J. Med Res.*,1:24–7.
21. Imarenezor, E.P.K., Brown, S.T.C., Yakubu, O.E. and Soken, D.C. (2016). Survey of hepatitis B and C among students of Federal University Wukari, Taraba State, Nigeria, *Int. Res. J. Med. Med. Sci.*,4:31–7.
22. Ndako, J.A., Onwuliri, F.C., Banda, J.M., Alejlowo, O.O., Fajobi, V. and Olapade, D.O. (2016). Risk factors and prevalence of hepatitis B surface antigen (HBsAg) among apparently healthy volunteers in an urban setting, North-Central Nigeria, *Int. J. Sci.*, 5(3):9–15. <https://doi.org/10.18483/ijSci.958>.
23. Itelima, J.U. (2017). Prevalence of hepatitis B and C in Jos, Plateau State, Nigeria, *Antivir. Antiretrovir. Res. J.*, 9(3): <https://doi.org/10.4172/1948-5964-C1-036>.
24. Amiwero, C.E.1., Nelson, E.A., Yusuf, M., Olaosebikan, O. F, Adeboye, M.A.N, Adamu, U.G, Oladele, C., Busuyi, J.S., Erinle, J.S. and Babalola, A. (2017). Knowledge, awareness and prevalence of viral hepatitis among health care workers (HCWs) of the Federal Medical Centre Bida, Nigeria. *J. Med. Res.*, 3:114–120.
25. Omatola, C.A., Onoja, B.A and Agama, J. (2020). Detection of hepatitis B surface antigen among febrile patients in Ankpa, Kogi State, Nigeria, *J. Trop. Med.* <https://doi.org/10.1155/2020/5136785>.
26. Ezeilo, M.C., Engwa, G.A., Iroha, R.I. and Odimegwu, D.C. (2018). Seroincidence and associated risk factors of hepatitis B virus infection among children in Enugu metropolis, *Virol.*, 9. <https://doi.org/1178122X18792859>.
27. Al-Sadeq, D.W., Taleb, S.A, Zaied, R.E, Fahad, S.M, Smatti, M.K., Rizeq, B.R., Al Thani, A.A., Yassine, H.M. and Nasrallah, G.K. (2019). Hepatitis B virus molecular epidemiology, host-virus interaction, coinfection, and laboratory diagnosis in the MENA region: An update, *Pathog.*, 8(2):63. <https://doi.org/10.3390/pathogens8020063>.
28. Ly, K.N., Xing, J., Klevens, R. M., Jiles, R.B., Ward, J.W. and Holmberg, S.D. (2012). The increasing burden of mortality from viral hepatitis in the United States between 1999 and 2007, *Ann. Int. Med.*,156:271–8.
29. Siraj, N., Achila, O.O., Issac, J., Menghisteab, E., Hailemariam, M., Hagos, S., Gebremeskel, Y. and Tesfamichael, D. (2018), Seroprevalence of transfusion-transmissible infections among blood donors at national blood transfusion service, Eritrea: A seven-year retrospective study. *BioMedCentral Infect. Dis.*,18:264. <https://doi.org/10.1186/s12879-018-3174-x>.
30. Uche, G., Iloh, P., Amadi, A.N., Obiegbu, N.P. and Chuku, A. (2013). Risk factors for hepatitis B virus infection among adult Nigerians with clinical features of liver diseases in a resource-constrained environment of a primary care

- clinic in Eastern Nigeria, *Sci. J. Clin. Med.*,2:98-105.
31. Negash, M., Ayalew, M., Geremew, D. and Workineh, M. (2019). Seroprevalence and associated risk factors for HIV, Hepatitis B, and C among blood donors in South Gondar District Blood Bank, Northwest Ethiopia. *BMC Infect. Dis.*, 19:430. <https://doi.org/10.1186/s12879-019-4051-y>.
32. Molla, S., Munshea, A. and Nibret, E. (2015). Seroprevalence of hepatitis B surface antigen and anti-HCV antibody and its associated risk factors among pregnant women attending maternity ward of Felege Hiwot Referral Hospital, Northwest Ethiopia: A cross-sectional study, *Viol. J.*,12:20–8.
33. Omeje, K.N., Ibekwe, R.C., Ojukwu, J.O., Una, A.F. and Ibe, B.C. (2017). Risk factors for hepatitis B surface antigenaemia among secondary school students in Abakaliki, South Eastern Nigeria, *Nig. J. Paediatr.*, 44:14. <https://doi.org/10.4314/njp.v44i1.3.10.4314/njp.v44i1.3>.