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Prevalence of hepatitis B and C surface antigens among students in Jos, Nigeria

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ABSTRACT

Background: Globally, hepatitis B and C viral infections have been identified as some of the most common infectious diseases comprising major public health problems. This study aimed to assess the prevalence of hepatitis B virus (HBV) and hepatitis C virus (HCV) antigens among tertiary institution and secondary school students. **Methods:** Two hundred and twenty-six (226) students were screened for HBV and HCV surface antigens using rapid immunochromatographic strip detection assay manufactured by LabACON (Hangzhou Biotest Biotech Company, Ltd., China) and questionnaires were used to assess demographic and risk factors to HBV and HCV among the students. **Results:** A total of 226 blood samples were screened for HBsAg and anti-HCV among the students, out of which 8(3.5%) were positive for HBsAg and 0(0.0%) prevalence of HCV. Of the samples screened, 113 were among students of University of Jos, where 6(5.3%) were positive for HBsAg and 0 (0.0%) for HCV infection. Similarly, 2(1.8%) and 0(0.0%) prevalence of HBsAg and HCV infection were respectively observed among students attending Government Secondary School Gwong, Jos. Students' age group 21-30 years had the highest HBV infection of 6.8%. In a sex related assessment, males had 6.3% prevalence of HBsAg compared to 0.9% in the females. Viral infection in relation to marital status, educational level and religion were also assessed, however, there was no statistical association between the variables and viral infection. There was also no correlation between the risk factors assessed and viral hepatitis infection among the study group. **Conclusion:** There is need to educate the students on the importance of Hepatitis B vaccine to reduce the incidence of hepatitis B antigen carrier rate and regular monitoring of HCV status to ensure early detection and management as it has no vaccine yet.

Introduction

Hepatitis is an inflammation of the liver. The condition can be self-limiting or can progress to fibrosis (scarring), cirrhosis or liver cancer. In 2013, viral hepatitis was the seventh highest cause of mortality and responsible for an estimated 1.4 million deaths per year globally [1]. It is estimated

that 47% of those deaths are attributable to hepatitis B virus, 48% to hepatitis C virus and the remaining to hepatitis A and E viruses [2, 3].

In Nigeria, approximately 19 million people are living with HBV infection with prevalence rate ranging from 11% to 13% [4, 5, 6, 7] and an estimated 3.2 million people living with

HCV infection with 2.1 % prevalence rate [7]. Group specific distribution of HBV and HCV vary across the states in Nigeria. In Jos Plateau state, 13.9% and 6.8% prevalence of HBV and HCV have been respectively reported in a general population study [8]. Adekeye et al. [9] in their study among blood donors also documented 20.8% and 4.9% prevalence rate of HBV and HCV respectively in Jos. Medical personnel are at the greatest risk of infection, while other health care workers, commercial sex workers as well as students are also at significant risk of infection [10].

Although viral hepatitis is a major public health problem across the globe it has not been prioritized until recently [1]. World Health Organization has identified specific actions to prevent viral hepatitis in its “2030 Agenda for Sustainable Development Goals” to include implementation of prevention and control strategies for viral hepatitis such as raising awareness through public education, vaccination, blood transfusion safety strategies, and early diagnosis [6]. However, these are still far from achievable in Nigeria especially among students of tertiary institutions and secondary schools.

In a quasi-experimental study carried to investigate the barriers to access HBV testing among secondary school students in Jos, Plateau state, [11] observed that lack of awareness was the major barrier to access HBV test. There are other challenges for the attainment of the 2030 agenda for SDGs such as, unavailability of the HBV tests and lack of freedom of health decisions especially among secondary school students [11]. Looking at the importance of students in the chain of sexually transmitted infections, there is a need to conduct a survey on the prevalence of HBV and HCV among tertiary and secondary school students in Jos, Nigeria.

Materials and methods

Study area

The study was conducted at the University of Jos Health Services Centre located within the university's permanent site and Government Senior Secondary School Gwong in Jos North Plateau State, Nigeria. Jos North is the main commercial city of Plateau state harboring people of diverse religious and ethnic backgrounds. As a result, [12] reported Jos to have the highest prevalence of sexually transmitted disease. There are also reports on the

increasing number of intravenous drug users (IDUS) particularly among students of secondary and tertiary institutions within this region [13]. The city is located in an area covering about 9400 km of the crystalline complex in North Central Nigeria with an average elevation of about 1250 m above mean sea level and an average annual rainfall of about 1100 mm [14].

Study population

The study was carried among students of secondary and tertiary institution in Jos as the target population. Both males and females students between the ages of 10-50 years formed the study population.

Ethical approval and consent

The protocol for this study was approved by the Ethical and Research Committee of Plateau State Specialist Hospital Board. Permission was also obtained from the state Ministry of Education, and consent of the students who were minors was sorted from their parents/guardians.

Sample and data collection

Five milliliters of venous blood was collected with sterile syringes and needles from each consenting student into plain sample bottle. Each sample was properly labeled with the number corresponding to number assigned to consenting participant. Collected samples were centrifuged for 5 min at 3000 rpm to obtain the serum. Serum was stored at -20 °C until required for examination. Information on socio-demographic variables and risk factors were obtained using questionnaire.

Laboratory screening of HBV and HCV

Samples were screened for HBsAg and Anti-HCV antibodies using enzyme-linked immunosorbent assay (ELISA) kits manufactured by LabACON (Hangzhou Biotest Biotech Company, Ltd., China) with a specificity of 99.0% and a sensitivity of 99.9%. The test and interpretation of the results were carried out following the manufacturer's instructions.

Data analysis

Data were analyzed using SPSS version 29.0 (SPSS Inc., Chicago, IL, USA). Comparison of categorical data was done using the Chi-square test. P-value of 0.05 or less was considered statistically significant.

Results

A total of 226 blood samples were screened for HBsAg and anti-HCV among students of University of Jos and GSSS Gwong, Jos. Overall, 8 (3.5%) were positive for HBsAg and 0 (0.0%) prevalence of HCV infection among the study population (**Figure 1**). Of the 113 samples analyzed among students of University of Jos, 6 (5.3%) were positive for HBsAg and 0 (0.0%) for HCV infection. Similarly, 2(1.8%) and 0(0.0%) prevalence of HBsAg and HCV infection were respectively observed among students attending Government Secondary School Gwong, Jos (**Figure 2**).

Association between hepatitis B virus infection and socio-demographic variables were assessed and presented in **Table (1)**. The age distribution of HBV infection among study participants shows age group 21-30 years had the

highest prevalence of 6.8% and 0.0% prevalence for HCV infection. The difference in the distribution of infections by age groups was not significant ($p>0.05$). In relation to gender, the prevalence of HBV was higher in male (6.3%) than in female (0.9%) with both male and female having 0% prevalence of hepatitis C virus infection. On assessment of HBV infection in association with marital status, educational level and religion, HBV infection was higher among those who are singles (3.8%), with tertiary education (5.3%) and practice Islam (5.0%) respectively.

Seroprevalence of HBsAg in relation to risk factors was also assessed. Hepatitis B virus infection was the highest among those who consumed alcoholic beverages (4.5%), had 2 sexual partners (14.3%), transfused blood (6.5%) and had a family history of HBV infection (4.5%) (**Table 2**).

Table 1. Seroprevalence of hepatitis B surface antigen and associated socio-demographic variables among students of University of Jos and Government Senior Secondary School, Gwong, Jos Nigeria

Variables	No. of samples	(%) Positive for HBV	p-value
Age group (Years)			
10 – 20	126	2(1.6)	4.617
21 – 30	88	6(6.8)	
31 – 40	10	0(0.0)	
41 – 50	2	0(0.0)	
Sex			
Male	111	7(6.3)	4.889
Female	115	1(0.9)	
Marital Status			
Single	210	8(3.8)	0.632
Married	14	0(0.0)	
Divorce	1	0(0.0)	
Widowed	1	0(0.0)	
Educational level			
Secondary	113	2(1.8)	2.073
Tertiary	113	6(5.3)	
Religion			
Christianity	186	6(3.2)	6(3.2)
Islam	40	2(5.0)	
Others	0	0(0.0)	
Total	226	8(3.5)	

Table 2. Seroprevalence of hepatitis B surface antigen in relation to risk factors among students of University of Jos and Government Senior Secondary School Gwong, Jos, Nigeria

Variables	No. of samples	HBV No. positive (%)	p-value
Alcoholic Beverages Consumption			
Yes	22	1(4.5)	0.072
No	204	7(3.4)	
No. of sexual partners			
1	31	3(9.7)	0.844
2	7	1(14.3)	

3	8	0(0.0)	
Above	5	0(0.0)	
None	176	4(2.3)	
Injection Drug Use			
Yes	5	0(0.0)	0.188
No	221	8(3.6)	
Surgery/Tattooing			
Yes	23	0(0.0)	0.894
No	203	8(3.9)	
Blood Transfusion			
Yes	31	2(6.5)	0.892
No	195	6(3.1)	
Sharing of toothbrush			
Yes	4	0(0.0)	0.149
No	222	8(3.6)	
Family History of HBV Infection			
Yes	22	1(4.5)	0.072
No	204	7(3.4)	
Total	226	8(3.5)	

Figure 1: Overall prevalence of HBsAg and anti-HCV among students among university and secondary school students in Jos North, Nigeria

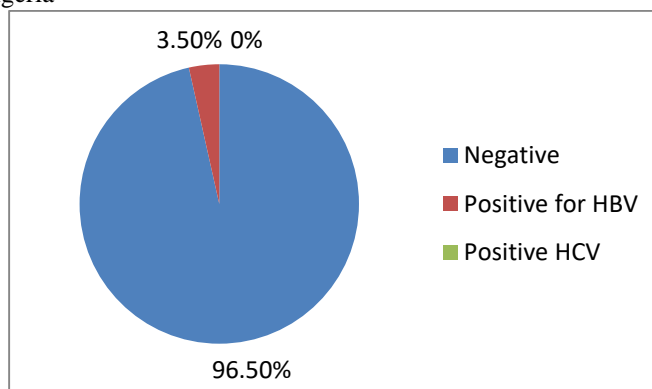
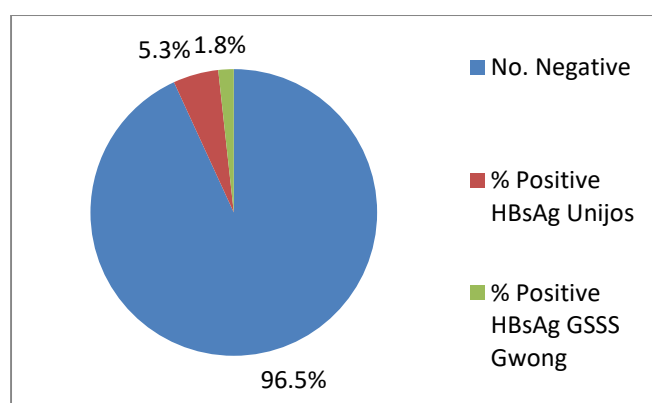


Figure 2. Prevalence of HBsAg and anti-HCV among Students of University of Jos and GSSS Gwong, Jos North, Nigeria



Discussion

Surveillance of asymptomatic students is crucial in disease detection, prompt diagnosis and intervention in silent killer diseases such as HBV and HCV. This study aimed to assess the prevalence

of hepatitis B virus (HBV) and Hepatitis C Virus (HCV) antigens among tertiary institution and secondary school students in Jos, Nigeria. A total of 226 students were screened for HBsAg and anti-HCV infections, out of which, 8 (3.5%) were positive for HBsAg and 0% prevalence of HCV was

recorded. Comparatively, the prevalence of HBsAg recorded in our study was higher than the 1.5% reported in Southwestern Nigeria by **Enitan, et al.** [15] and lower than the 16.67% and 13.3% reported by **Ekuma, et al.** [14] and **Pennap et al.** [16] respectively, in North central Nigeria. The observed differences in prevalence might not be unconnected with the study group, sample size, and the recent introduction of HBV vaccines as a part of the routine national vaccination program which many universities' clinics have made it mandatory for newly admitted students to be vaccinated at entry.

The anti-HCV antibody prevalence of 0% in this study showed a decline in the transmission of HCV as compared with the 5.2% and 11.02% reported in Jos and Kaduna by **Strickland** and 4.3% among low risk group in Jos [18].

HBV infection by gender distribution in this study showed that males had (6.3%) prevalence higher than their female counterparts with 0.9%. This agrees with the results of previous studies which clearly indicated that HBV is more prevalent among male subject than their female counterparts. In a study conducted among staff and students of the University of Jos, [19] reported a prevalence rate of 9.9% among males and 3.7% among females. Also, [20] who worked on similar subjects reported a prevalence of 43% among male students of Federal Polytechnic, Mubi Adamawa State Nigeria and a prevalence of 27% among their female counterparts. Meanwhile, a study carried out among students of Federal University Wukari, Taraba State Nigeria, **Imarenezor et al.** [21] reported a prevalence rate of 6% among male participants and zero (0.0%) prevalence among female participants. Higher prevalence of Hepatitis B infection among male individuals has been linked to some risk factors such as tattooing, intravenous drug use, multiple sexual partners and blood transfusion among others.

On age distribution, there was a higher prevalence rate (6.8%) among students age 21-30 years. This was in agreement with previous report by **Wasa and Maigana** [22] who documented higher prevalence rate of 18.2% among students of Gombe state University within age group 16 -30 years. High sexual activity could be attributable to this observed prevalence among members of the age group [23]. [14] were able to identify some factors associated with the increased risk among the age group to include, duration of sexual activity, number of sexual partners and the clients of prostitutes.

On assessment of marital status, 210 (92.9%) of the participants were single with 3.8% prevalence of HBV. This finding agrees with [16] who also reported a higher prevalence of HBV among students who are single in Nasarawa state, Nigeria. Having multiple sexual partners and inconsistent safe sexual practices among the students who were single could be associated with this observed prevalence.

There was no significant statistical association between the factors assessed and infection with the viruses, however, the findings suggest that these factors need to be evaluated further in a larger study to verify their involvement in the transmission of HBV in a target population.

Conclusion

There is a need to educate the students about the importance of Hepatitis B vaccine to reduce the incidence of hepatitis B antigen carrier rate and regular monitoring of HCV status to ensure early detection and management as it has no vaccine yet.

Conflict of interest

The authors declare no conflict of interest.

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References

- 1- **Jefferies M, Rauff B, Rashid H, Lam T, Rafiq S.** Update on global epidemiology of viral hepatitis and preventive strategies. *World J Clin Cases* 2018; 6(13):589–599.
- 2- **World Health Organization (WHO).** Sixty Third World Health Assembly - Viral Hepatitis 2010;(WHA63.18) Available from: <http://>

- apps.who.int/gb/ebwha/pdf_files/WHA63REC1/WHA63_REC1-en.pdf.
- 3- **Wiktor SZ, Hutin YJ.** The global burden of viral hepatitis: better estimates to guide hepatitis elimination efforts. *Lancet* 2016; 388:1030–1031.
 - 4- **Olayinka AT, Oyemakinde A, Balogun MS, Ajudua A, Nguku P, Aderinola M.** Seroprevalence of hepatitis B infection in Nigeria: A National Survey. *Am. J. Trop. Med. Hyg* 2016; 95: 902-907.
 - 5- **Akindigh TM, Joseph AO, Robert CO, Okojokwu OJ, Okechalu JN, Anejo-Okopi JA.** Seroprevalence of hepatitis B virus co-infection among HIV-1-positive patients in North-Central Nigeria: The Urgent Need for Surveillance. *Afr. J. Lab. Med* 2019; 8:622.
 - 6- **World Health Organization (WHO).** Hepatitis C; (2020). Available from: <https://www.who.int/news-room/fact-sheets/detail/hepatitis-c>.
 - 7- **Odukoya OO, Odeyemi KA, Odubanjo OM, Isikekpei BC, Igwilo UU, Disu YM.** Hepatitis B and C Seroprevalence among Residents in Lagos State, Nigeria: A Population-Based Survey. *Niger. Postgrad. Med. J* 2022; 29:75-81.
 - 8- **Itelima JU.** Prevalence of hepatitis B and C in Jos, Plateau state, Nigeria. 12th World Congress on Virology. *J. Antivir. Antiretrovir* 2017; Retrieved from [https:// www.omicsonline.org/proceedings/prevalence-of-hepatitis-b-and-c-in-jos-plateau-state-nigeria-75267.html](https://www.omicsonline.org/proceedings/prevalence-of-hepatitis-b-and-c-in-jos-plateau-state-nigeria-75267.html).
 - 9- **Adekeye AM, Chukwuedo AA, Zhakom PN, Yakubu RS.** Prevalence of Hepatitis B and C among Blood Donors in Jos South LGA, Plateau State, Nigeria. *Asian J. Med.Sci* 2013; 5(5): 101-104
 - 10- **National AIDS/STIs Control Program (NASCP).** Introduction. Guidelines for the Prevention, Treatment and Care of Viral Hepatitis in Nigeria. Federal Ministry of Health 2016; 1-30.
 - 11- **Mathew M, Tinuola FR, Goel SR, Taiwo O, Philip J.** Prevalence of Hepatitis B among School Adolescents in Jos, Plateau State Nigeria. *Texila Int. J. Publ. Healt* 2018; 6(4):1-7
 - 12- **Federal Ministry of Health Nigeria (FMH).** National HIV/AIDs and Reproductive Health Survey, Abuja 2003; 24:18-20.
 - 13- **UNSN.** Nigeria Common Country Assessment World Health Organization, Geneva 2001; 563.
 - 14- **Ekuma OO, Mawak JD, Uwakwe A, Ogbu O, Okoh FN, Agah MV, et al.** Prevalence of Hepatitis B surface antigen among the newly admitted students of University of Jos, Nigeria. *Am. J. Life Sci* 2014; 2(1):35-39
 - 15- **Enitan SS, Adebola OK, Adejumo EN, Itodo GE.** Prevalence of Hepatitis B and C Virus Infection among students of a private tertiary institution in South-Western Nigeria. *Int. J. Trop. Dis. Health* 2019; 36:1-15
 - 16- **Pennap GR, Aliyu Y, Odula O, Forbi J.** Prevalence of Hepatitis B and C virus Infection among People of a Local Community in Keffi, Nigeria. *Afr. J. Microbiol. Res* 2010; (4):274-278
 - 17- **Strickland GT.** HCV in developing Countries. *Postgrad. Doc.* 2002.
 - 18- **Egah DZ, Banwat EB, Audu ES, Iya D, Mandong BM, Awele AA, et al.** Hepatitis B surface antigen, Hepatitis C and HIV antibodies in a low risk blood donor group, Nigeria. *East. Mediterr. Health. J* 2007; 13:211-215.

- 19-**Solomon O, Mahafroz K, Mashor M, Arome F, Neha D.** Prevalence of HBV and HIV among students and staffs at the University of Jos, Nigeria: Results from a medical outreach screening program. *Int. J. Sci. Res. Publ* 2014; 4(11):2250 - 3153.
- 20-**Tula MY, Iyoha O.** A cross-sectional study on the Sero-prevalence of hepatitis B surface antigen (HBsAg) among apparently healthy students of a tertiary institution in North - Eastern Nigerian. *Int. J. dis. Health* 2015; 7(3):102-108.
- 21-**Imarenezor EPIC, Brown STC, Yakubu OE, Soken DC.** Survey of Hepatitis B and C among Students of Federal University Wukari, Taraba State, Nigeria. *Int. Res. J.Med Sci* 2016; 4(3):31 -37.
- 22-**Wasa AA, Maigana A.** Prevalence of hepatitis B surface antigen among undergraduate students of Gombe State University, Gombe. *J.Pharm. Biol. Sci* 2013; 6(6):24-27.
- 23-**Alter M.** Epidemiology and prevention of hepatitis B. *Semin. Liver Dis* 2003; 23(1):39-46.

Agabi Y A, Nkup J Y, Cifrat N A, Okechalu J N, Vincent G O. Prevalence of hepatitis B and C surface antigens among students in Jos, Nigeria. *Microbes Infect Dis* 2024; Article-In-Press, DOI: 10.21608/mid.2024.253156.1699.