

Prevalence of Hepatitis B Virus Infections Amongst Students of Government Secondary School Heipang District, Barkin Ladi Local Government Area, Plateau State, Nigeria

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ABSTRACT

Despite tremendous biotechnological and therapeutic advances, hepatitis B Virus (HBV) still constitutes a significant global health challenges. Hepatitis B virus (HBV) infection affects 262 million people worldwide leading to over 824,000 deaths annually. With Nigeria known to be a high HBV burden country, increasing knowledge about viral hepatitis in rural and urban settings combined with testing and vaccination for exposed individuals could be effective strategy to eliminate these viruses in Nigeria. Aim: The study aimed to ascertain the prevalence of HBV infection and risk factors among students of government secondary school Heipang in Plateau State. Objectives: Determine the prevalence infections among the students, identify risk factors associated with HBV infections and to assess student knowledge and awareness on HBV. Materials and methods: A total of 120 whole blood samples 50 males and 70 females were aseptically obtained from the subjects in Government Secondary School Heipang between the ages of 10-25 years were screened for the present or absent of HBsAg surface antigen using a rapid test kit. Results: of the 120 whole blood samples screened for HBsAg showed sero-positive 10 (8.33%) for hepatitis B virus infection, males had 3 (6.0%) positive, female 7 (10%) positive higher than male. Prevalence of hepatitis B surface antigen according age showed that 10-15 years were 70 in number and had 10(14.28%) positive. Demographic characteristics of the respondents on the knowledge and risk factors association with hepatitis B virus shown that 42(35%) had the knowledge about hepatitis, 40(33.33%) known that hepatitis B is caused by virus. On risk factors associated with virus infection, indicated that those sharing piecing objects with others had 21(17.5%), tooth brushes 5(4.17%), those with family history of HBV had 3 (2.5%) with non ever had blood transfusion. Conclusion: The study revealed the presence and circulation of HBsAg among the students in the study area was 8.33% which is high, hence it is suggestive of the need to adopt the WHO recommendations which means mass screening and vaccination of the school and the community at large. Recommendations: There is need for more public awareness the on possible risk factors of the transmission of virus, free screening and treatment of infected persons with antivirus medicines.

Key words: *Prevalence, Hepatitis virus, Hepatitis B virus, cirrhosis, silent killer, students*

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I. INTRODUCTION

Hepatitis means inflammation of the liver caused by several prevailing factors which can lead to cancer or severe liver damage called cirrhosis (World Health Organization, 2002 cited in Gufom 2024). Hepatitis is a silent killer disease of human beings that has infected about two billion people with 350-400 million of the remaining chronic carriers and is responsible for almost millions of deaths annually (Chen & Chang, 2010; WHO 2010; Uleany & Obidiko, 2015) cited in (Gufom, 2024).

Human hepatitis B is caused by hepatitis B virus (HBV), an enveloped virus containing a partially double genome (Centre of Disease Control and Prevention, 2010. WHO, 2002 cited in Gufom (2024) considered hepatitis B virus infection (HBV) to be second to tobacco among carcinogen.

Historically, hepatitis surface antigen (HBSA) formerly called Australia antigen because it was first found in the sera of Australian by Blumberg (in 1965) at the time he was searching for tools to identify and track genetic differences in the different human population (Mauss *et al.*, 2010). Among the severe viruses, HBV is the only hepadria virus causing infection in human. It cannot yet be grown in an artificial medium or media but can be transmitted to certain -primates such as the chimpanzees in which are able to replicate. It has been noticed to exist on almost any surfaces for about one (1) month; however, it has also proved that sodium hypochloride 0.5% (1:10) household bench destroys the HBV antigenicity within 3 minutes but the virus is stable at -20°C for about 20 years (Emechebe *et al.*, 2009 cited in Gufom, 2024).

Hepatitis B virus is one of the major public health diseases of mankind and is a serious global health problem which is more prevalent in the

developing countries (Braia&Memahon, 2004; Obi *et al.*, 2006; Bankele *et al.*, 2012; Isa *et al.*, 2015 cited in Gufom, 2024). Hepatitis B virus is 50-100 times more infectious than HIV and 10 times more infectious than hepatitis C virus (Pennap *et al.*, 2011 cited in Gufom, 2024). The prevalence of HBV varies from countries to countries or regions in the world as well as in different ethnic groups. HBV endemicity has been classified into three (3) categories: high ($>8\%$), intermediate (2-8%) and low ($<2\%$) depending on the prevalence of hepatitis B surface antigen (HBSAg) sero positivity. The highly endemic areas in the world include East and South Asia, the Pacific, sub-Saharan Africa and parts of southern Europe. In North America, Western and Northern Europe, HBV infections are relatively rare, with prevalence rate of 0.19% (Chen & Chang *et al.*, 2010 cited in Gufom, 2024).

The wide range of HBV prevalence varies from 0.1-20%, low prevalence areas (0.1-2%) are western Europe (with wide variation within Europe, United States and Canada, Australia and New Zealand. Intermediate prevalence (3.5%) are central Asia, the middle East and Latin and South America, Japan. The high prevalence of HBV infection has been noticed more in the countries with low income or poor standard of living especially South East Asia, China and sub-Saharan Africa (10-20%) prevalence. Mauss *et al.*, 2010).

Hepatitis B virus infection has reached pandemic proportion all over the world with areas of the highest prevalence being the sub-Saharan Africa, South East Asia, the Pacific, Amazon Basin, Alaska, Northern Canada, Eastern Europe, Greenland.

It has been estimated that 25-30% of the chronic carriers will die of the sequel in Africa. The number of HBV carriers is estimated to be about

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50 million representing 10-20% of the general population. As many as 12.5 million will eventually die due to complications from chronic hepatitis, cirrhosis and hepatocellular carcinoma (HCC). Annually mortality directly related to hepatitis B liver disease and cancer worldwide has been between 600-1 million (Uleanga & Obidiko, 2015 cited in Gufom, 2024).

Chen & Chang (2010) cited in Gufom *et al.*, (2018) opined that after Asia, Africa has the second highest number of individuals with chronic hepatitis B virus infections, approximately 58 million. Although overall prevalence is considered as high in endemic areas with 7-26% prevalence of HBSAg. Some countries in West Africa such as Senegal and Gambia have been reported that over 90% populations are exposed to and become infected with HBV during their lives (Gufom *et al.*, 2018).

Nigeria is a tropical country in west Africa with 211.4 million people in 2021 by United Nations reports which found to have prevalence of 9.5% HBV, which translated that nearly 20,083 million Nigerians are infected. That about 15 million persons in Nigeria who are unaware that they have been infected with the virus. The danger of this is that some of them could go on to develop liver disease including cancer as well as could also continue to infect other healthy individuals or persons around them especially family members, colleagues, classmates and sexual partners (Gufom, 2024).

Plateau state located in middle-belt Nigeria, has been documented to exhibit significant prevalence rates of hepatitis B virus (HBV) infection. Recent studies have highlighted that HBV prevalence in the general population remains high, with estimates ranging from 10-15% in various locations within the state (Okonkwo *et al.*, 2021).

HBV can be transmitted through any of the following routes; sexual intercourse, per cutaneous (intravenous drug use), Perinut, horitozal transfusion, nosocomial infection (including needle-stick injury) and organ transplantation. Transmission of HBV through blood and blood products transfusion has significantly decreased due to routine screening of blood donors for hepatitis B surface antigen (HBSAg) (Wasmuth *et al.*, 2024; Mauss *et al.*, 2010).

The incidence of new infections of the virus has decreased in most developed countries most likely due to the implementation of the vaccination strategies (Rantala, 2008 cited in Wasmuth, 2010). Some developed countries like Germany showed that HBV has decreased as 1.4% per 100,000 inhabitants and United States decreased by 78% from 1990 to 2005 (Wasley, 2008 cited in Mauss, 2010). HBV related complications such as cancer and deaths are on the increase probably due to the delay in vaccination effects, improved diagnosis (Wasmuth, 2010 cited in Gufom, 2024). At the moment globally, more than 250 million people suffer from chronic HBV infection, resulting in 0.8 million deaths per year (Egbe *et al.*, 2023; WHO, 2021).

Despite years of implementing the WHO comprehensive hepatitis B vaccination program which encompasses the birth dose and pentavalent vaccine as part of the Nigeria childhood immunization schedule, the prevalence rate for hepatitis B is 8.1% for the 15-64 years population (Egbe *et al.*, 2023).

The risk factors for hepatitis B are diverse, contributing significantly to the burden of the disease. The include; unprotected sex, multiple sex partners, people who receive unscreened blood, sharing of unsterilized objects, injection drug users, health care workers, household

contacts of infected individuals, infants born to infected mothers, men who have sex with men, organ transplants and dialysis patient (Lemoine *et al.*, 2020; Wandelarset *et al.*, 2021; Li *et al.*, 2024). Complications in hepatitis B has serious consequences on the victim such as chronic liver disease, cirrhosis, cancer, kidney disease and extrahepatic manifestations (WHO, 2022).

II. Materials and Methods

The study was carried out among students of government secondary school Heipang District, Barkin Ladi Local Government Area, Plateau State, Middle Belt, Nigeria. Heipang is located about 45km from Jos City the capital of Plateau, and it lies between latitude 9.6995°N and longitude 8.8575°E.

Study Population

The study population comprised 120 students male and female ages between 10 to 25 years were recruited for the research.

Sample Size

The sample size was determined by using Fisher's formula

$$n = \frac{Z^2 \times Pq}{d^2}$$

Where:

n= sample size

d= degree of accuracy (0.05)

Z= confidence limit at 95% (1.96%)

P= prevalence in the population *being tested 7.5%*
Musa et.al.,2015

q = 1-P

$$n = \frac{1.96^2 \times 0.75 (1-0.075)}{0.05^2}$$

$$n = 103$$

Therefore the sample size that was used is
103+10.3 = 113.3

n=113.3

n=120 (round up)

Therefore a total of 120 blood samples collected from students of Government Secondary School Heipang District both males and females between the ages of 10-25 years were screened for the present or absent of HBsAg surface antigen using a rapid test kit.

Ethical Considerations

The present research was approved by the school authority. The approval was on the agreement that good laboratory practice quality control be ensured, that every findings must be treated with utmost confidentiality and the purpose for this research only, all work performed according to the international guideline for the human experimentation in inclusion criteria. Those who consented in the research were given consent form.

Exclusion Criteria

Forms were not given to those who did not consented to participant in the research.

Questionnaires

A well structured questionnaire was developed and administered to the consented students to obtained information on then socio-demographics characteristics, clinical data and potential factors associated with HBV infections.

Blood Sample Collection

5ml of whole blood were collected from each participants by standard aseptic techniques, with the help of sterilize needle and syringes, dispensed into a well labeled sterilize tubes accordingly. The blood was allowed to clot and transported to microbiology laboratory of Plateau State Polytechnic Main Campus Heipang. The clotted blood centrifuges at 1000 time gravity for 10 minutes. The serum was aspirated using sterilize pipette into a clean sterilize tubes (Agu *et. al*; 2024, Padarth *et. al*; 2024).

Laboratory Analysis

All serum samples were screened for HBSA using hepatitis rapid kit test kits according to manufacture instruction based on the principle that hepatitis B antibodies present in the serum bind to the hepatitis antigen in the strip forming an immune complex.

Test Procedure for HBV

All the serum samples for HBV screening were brought to room temperature and rapid strip was deep into the serum vertically for 15 seconds, each strip were then removed and placed on a flat non-absorbent material or a tile and results read after 15 minutes take approximate precautionary measure (Gufom, 2024).

Interpretation of Results

The reaction is visualized by the pressure of a chromogenic impregnated in the strip showing red coloration which indicated a single red line for negative reactions and two red lines which indicates positive reaction.

III. RESULTS

A total of one hundred and twenty whole blood samples from individual participated in the study were both males and females. 50(41.67%) of the participants were males while 70(58.33%) of them were females.

The prevalence of hepatitis B surface antigen (HBSAg) was positive 10(8.33%) in the samples (seen in table 1).

Table 2 showed the prevalence rates to gender. Males had 3(6.0%) positively while female had 7(10,0%) higher than males.

Prevalence of hepatitis B surface antigen among the students according to age showed that 10-15 years were positive 10(14.28%). As capture in table 3.

Captured in table 4 is the analysis of the demographic characteristics of respondents in the study area.

Table 1: Prevalence of Hepatitis B (HBSAg) in the Study Area

Result	HBSAg	Prevalence (%)
Positive	10	8.33
Negative	110	91.67
Total	120	100

Table 2: Prevalence of HBSAg in Relation to Gender among the Students

Gender	Number Examined	Number Infected	Prevalence (%)
Male	50	3	6.0
Female	70	7	10
Total	120	10	8.33

Table 3: Prevalence of HBSAg in the relation to age Groups the Students

Age Group	Number Examined	Number Infected	Prevalence (%)
10-15	70	10	14.28
16-20	40	0	0.00
21-25	10	0	0.00
Total	120	10	8.33

Table 4: Demographic characteristics respondents on the knowledge and risk factor associated with hepatitis B virus infection

Characteristic (items)	No Respondents	Percentage (%)
Gender		

Male	50	41.67
Females	70	58.33
Total	120	100
Age years		
10-15	70	58.33
16-20	40	33.33
21-25		
Total	120	100
Knowledge of hepatitis		
Have you ever heard about hepatitis?		
Yes	42	35
No	78	65
Total	120	100
Hepatitis is caused by virus?		
Yes	40	33.33
No	80	66.67
Total	120	100
Have you been vaccinated for hepatitis?		
Yes	45	37.5
No	43	35.83
Cannot remember	32	26.66
Total	120	100
Do you know your hepatitis status?		
Yes	39	32.5
No	81	67.5
Total	120	100

Risk factors associated virus hepatitis B virus infectious		
Do you share piercing objects with others		
Yes	21	17.5
No	99	82.5
Total	120	100
Do you share tooth brushes with other?		
Yes	5	4.17
No	115	95.83
Total	120	100
Have you ever had sex?		
Yes	0	0.00
No	111	92.5
Decline	9	7.5
Total	120	100
Family history of HBV		
Yes	3	2.5
No	114	95
Decline	5	4.17
Total	120	100
Have you ever transfused with blood?		
Yes	0	0.00
No	117	97.5
No idea	3	2.5
Total	120	100

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IV. Discussion

The result of this study demonstrated the existence of hepatitis B virus among students of Government Secondary School Heipang District in Barkin Ladi (Gwol) Local Government Area Plateau State, Middle Belt, Nigeria.

The sero-prevalence of hepatitis B surface antigen (HBsAg) of 10(8.33%) in the blood samples reported among the students in the present research is almost above WHO classification of assessing the severity of HBV in endemic countries. WHO define low prevalence as 2.0-2.8% moderate is from 3-7.5% high as 8% HBsAg positive (WHO, 2010 cited in Gufom, 2024, Aguh et. al; 2024).

The findings in this study aligns with the findings of Aguh et. al; 2024 who reported the sero-prevalence of HBV infection among truck drivers and their assistants as high as 20.8% in Zamfara state, which is higher than what was obtained here.

The prevalence rate of HBsAg in this study is lower compared to those of (***) et. al; 2019 cited in Aguh et. al; 2024) reported 15.7% hepatitis B surface antigen among commercial motor park workers in Jos North, Plateau State, Middle Belt, Nigeria.

The finding is also in agreement with findings of some researchers not in Nigeria such Eunchi et. al; (2022) who conducted study in Bamenda Cameroon, reported that HBV was more prevalent among drivers as high as 16.7% than other occupation. A study on the epidemiology of hepatitis virus infection in truck driver in Brail confirmed that truck drivers are at high risk for hepatitis B virus infections with prevalence of 18.9% (Aguh et. al; 2024). The prevalence rates in this study is 6.9% HBsAg earlier reported among residents of Ikngwakap Mushere Chiefdom Bokkos LGA, Plateau State, Middle Belt, Nigeria. However, the student in

Government Secondary School Heipang District are potentially at risk of infection with the virus.

In this study, females were found to be more infected as 7(10%) compared to males who had 3(6%). This may be due to the sample size because more blood was obtained among females. This pattern suggests higher susceptibility to HBV in the younger females which could be linked to exposure through veridical transmission early social activity or lack of vaccination and other preventable measures. In contrast, Olakunde et. al (2025) reported a disparity in the prevalence of HBV in the six geopolitical region of Nigeria in a survey of 5558 adult aged 15-64 years, men have 8.1% infection which was more than that of women 3.2%. The pattern was corroborated by a national study by Olayink et. al; 2024) which found a prevalence of 14.5% in men while 8.5% in women. Similar disparity was also observed in NAILS with a prevalence of 10.3% in men and 5.8% in women. Federal Ministry of Health (FMOH 2019 in Olakunde et. al; 2024).

In age wise, the prevalence of 10(14.28%) was only found among students ages between 10-15 years, whereas none HBsAg was not found in the age groups of 16-25 years in this research. The findings of the prevalence of HBsAg in relation to is in line with the report of Bigwan et. al (2023) who conducted research on hepatitis B virus (HBsAg) among males and female students of Government Secondary School Bet, Pankshin LGA, recorded the highest prevalence of 9(7.3%) of among amongst the age groups 13-19 years and the age groups 6-12 years 3(6.7%). HBV prevalence in the study, however, is higher than findings of (Bigwan et. al; 2023).

Table 4 captured the demographic characteristic of the respondents on the knowledge and risk factor associated with hepatitis B virus infections. The respondents involved 50 males and 70

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females students in Government Secondary School Heipang range between the ages of 10-20 years, out of the 120 students 50 (41.79%) males and 70 (55.33%) females. Participated in the research as well as ages between 10-25 years. From 10-14 years had 70 (55.33%) subjects followed by 16-20 years, 40 (33.33%) and 21-25 years, 10 (8.33%) participants.

Out of 120 students only 39 (32.5%) knew about their hepatitis status among the students, 45 (31.5%) had been vaccinated, 43 (35.38%) not vaccinated with 32 (43.66%) can not remember whether they had been vaccinated or not. This study shows there was risk of contracting HBV among those students who share personal hygiene equipment such as tooth brushes, prercing objects reflecting the high transmissibility of HBV through direct blood contact resulting from sharing a personal hygiene items. These items might have infectious blood or body fluid on them, which when in contact with non-intact skin or mucous membrane, places one at risk for exposure to blood borne pathogen such as HBV. This agree with the findings Aga et al., (2020) who opined that sharing personal hygiene items such as barbing clippers, knives and razor blades as well as other sharp objects significant, factors which can influence the prevalence of hepatitis B virus infections among humans.

In the current study it was found that a family history of HBV infection was 3 (2.5%) which was significant risk factor for contracting student's members can get infected without being aware. Hepatitis B could easily be transmitted from mother to the children during birth delivery and/or breast feeding thus playing a significant role in HBV transmission. (WHO, 2022). Infant mothers are at high risk for HBV infections. This agrees with others studies across the globe. Study on hepatitis B virus infection in Northern Ethiopia reported that adults who had a family history of HBV were 2,025 minus more likely to suffer from HBV than adults who did not have a

family history of HBV and having a spouse exposed to HBV was a risk factor for HBV infection according to a study in Beijing, China also reported that an increased prevalence of infection are associated with female exposure to HBV infection in a nationwide. Surve among Romanian adults Aguh et al., (2025).

Hepatitis B virus elimination target of 2030 by WHO is highly elusive in Plateau/Nigeria without connected efforts by her healthcare system. Vaccination remains the most effective means of controlling HBV but the high cost of the vaccines has affected their availability leading to many missed opportunities in various points in the healthcare system. Another practical challenges is that of diagnosis about 90% of people with chronic hepatitis B are unaware they have the disease. Therefore, to achieve HBV eradication more resources need to be apportioned to scale up interventions such as vaccination, rigorous tests campaigns and increasing capacity to deliver effective treatment.

V. CONCLUSION

This study revealed the sero-prevalence of HBV infection among students in Government Secondary School Hie pang was (8.33%), hence, it is suggestive of the need to adopt the who recommendation which are routines screening and vaccination.

VI. RECOMMENDATION

Intensify Public health awareness on hepatitis infection mode of transmission, screening, vaccinate on and treatment to infected persons.

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