

Seroprevalence Of Hepatitis B Virus Infection and Associated Risk Factors Among Apparently Healthy Individuals in Lagos

Philip Olayiwola Oshun¹, Emuobor Odeghe²

Departments: 1. Medical Microbiology and Parasitology, College of Medicine, University of Lagos; 2. Department of Medicine, College of Medicine, University of Lagos.

Abstract

Background: Hepatitis B virus (HBV) is an important cause of chronic liver disease with 296 million people worldwide living with chronic HBV infection as at 2019. Most people infected with the hepatitis B virus are asymptomatic and often unaware of their infection. This study was conducted to determine the prevalence of and risk factors for HBV infection among apparently healthy individuals in Lagos. **Method:** This was a retrospective cross-sectional study in which the prevalence of hepatitis B virus surface antigen (tested using the Roche Elecsys HBsAg II Qualitative assay) was determined among apparently healthy individuals who presented for health screening at a private laboratory facility in Lagos from May 2014 to June 2016. The health records of those who met the inclusion criteria were systematically reviewed to extract demographic and clinical information. **Result:** Out of 1448 apparently healthy individuals included in the study, 60.8% were male. The mean age of the participants was 47.1±12 years, and 840 (58.1%) of them were in the age group 31 – 50 years. The prevalence rate of hepatitis b surface antigen was 5.3%. Males had a statistically higher prevalence of HBV infection than females (7.2% versus 2.5%) ([OR, 3.55 (95% CI 1.89 – 6.68], p = 0.00009). The liver enzymes, aspartate transaminase and alanine transaminase, were significantly higher in those with Hepatitis B virus infection (p = 0.04 and p = 0.02 respectively). **Conclusion:** Strategies for population-based screening of HBV need to be instituted, with appropriate linkage to care of those who test positive.

Keywords: Hepatitis B, seroprevalence, risk factors, apparently healthy

INTRODUCTION

Hepatitis B virus (HBV) is a hepatotropic virus well known to be a leading cause of chronic liver disease such as chronic hepatitis, liver cirrhosis and hepatocellular carcinoma. In 2019, 296 million people were estimated to be living with chronic HBV infection, and its global prevalence was 3.5%.¹ Hepatitis B virus infection was said to be responsible for 820,000 deaths in 2019.¹ The burden of hepatitis constitutes a global public threat which in 2016 led the World Health Assembly to approve a global health sector strategy (GHSS) on viral hepatitis.² The GHSS calls for the elimination of viral hepatitis by the year 2030 by reducing new infections by 90% and mortality by 65%.³ Therefore if people living with hepatitis B infection are not diagnosed and treated, the number of deaths will continue to rise.³

As of 2016, 27 million people worldwide (10.5% of all people estimated to be living with

hepatitis B) were aware of their HBV infection, while 4.5 million (16.7%) of those diagnosed were on treatment.³

Correspondence:

Dr Philip O. Oshun FMCPATH, Senior Lecturer and Clinical Microbiologist, Department of Medical Microbiology and Parasitology, College of Medicine, University of Lagos. Sampydee@yahoo.com, 08023299445.

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

How to cite this article: Oshun OP & Odeghe E. Seroprevalence of Hepatitis B Virus Infection and Associated Risk Factors Among Apparently Healthy Individuals in Lagos. *Ann Trop Pathol*, 2023; 14 (1): 11-15

Most people with chronic HBV infections are asymptomatic and most often have no knowledge of their infection. Testing for HBV is poor as shown by a report of the World Health Organization (WHO) that only 9% of those living with HBV infection knew their status.³ Therefore, testing for HBV is very important in order to assess the burden of infection, as well as to know those who need to be linked to healthcare and treatment. In Nigeria, antiviral therapy for chronic hepatitis B include tenofovir (first line) or entecavir and pegylated interferon gamma.

Hepatitis B virus infection is transmitted through contact with infected blood and body fluids, needle stick injuries, transfusion of blood and blood products. In highly endemic regions, the main route of transmission is from mother to child. Sexual transmission may occur mostly in those with multiple sexual partners and men who have sex with men. Infection with HBV may lead to acute or chronic infection, with the presentation ranging from an asymptomatic infection to a severe, often fatal, disease. Acute infections are usually self-limiting and are characterised by acute inflammation and hepatocellular necrosis. Chronic or persistent infection is characterised by the presence of the hepatitis B surface antigen in the blood for more than 6 months; it is a risk factor for liver fibrosis, liver cirrhosis and hepatocellular carcinoma. Chronic infection commonly occurs following infection acquired in infancy (leading to chronic hepatitis in about 90% of cases), but seldom occurs in infection acquired in adolescence and adulthood (in about 5% of cases).⁴

In the WHO Africa region, the prevalence of hepatitis B virus infection is 6.1% in adults.³ The national prevalence of Hepatitis B virus infection in Nigeria, obtained from a national survey among apparently healthy population was 12.2%,⁵ while a systematic review and meta-analysis showed a pooled prevalence of 13.6%.⁶ Prevalence of hepatitis B among apparently young adults in Omuaran was 5.5%, among pregnant women in Yenogoa, it was 5.3% and among blood donors in Ekiti, it was 9.8%.⁷⁻⁹

Hepatitis B virus infection is one of the vaccine preventable infections with 95% efficacy. The WHO recommends that all infants receive the hepatitis B vaccine, with the first dose being given as soon as possible after birth, within 24 hours.¹⁰ One of the strategies for the elimination of viral hepatitis is testing and treatment. Most of the studies on hepatitis B virus in Nigeria have tested few individuals and subgroups of the population. This study was conducted to determine the prevalence and risk factors of HBV among apparently healthy individuals in Lagos from data collected from a health screening programme.

This study aims to determine the seroprevalence of hepatitis B viral infection in apparently healthy individuals and describe the risk factors associated with infection.

MATERIAL AND METHODS

Study design

This was a retrospective cross-sectional study to determine the prevalence of hepatitis B virus surface antigen among apparently healthy individuals who presented for health screening between May 2014 and June 2016 at a private medical diagnostic centre in Lagos. The health records of those who met the inclusion criteria were systematically reviewed to extract the demographic and clinical information including age, sex, history of blood transfusion, alcohol use, surgery and results of serum liver enzymes and serological tests for antibodies to Human immunodeficiency virus (HIV). The detail of the identity of the subjects was kept confidential with all identifiers removed except for the demographic and clinical information mentioned above.

The centre is a leading medical diagnostic centre in Lagos state. It has a health assessment clinic with different health check-up plans consisting of a range of laboratory and radiological tests and clinical examination to detect lifestyle diseases early (when chances of treatment and cure are better) or prevent their occurrence. The participants were notified of their laboratory and radiological results. Those who were hepatitis B positive were referred for specialist care. The eligibility criteria included individuals aged 18 years and above who registered for health check-up plans that included screening tests for Hepatitis B virus surface antigen (HBsAg) within the study period.

Ethics approval

Ethical approval was obtained with no ADM/DCST/HREC/APP/455 from the health research and ethics committee of the Lagos University Teaching Hospital Idi – Araba Lagos.

Laboratory procedures

Hepatitis B surface antigen was tested on samples collected from the clients using the Roche Elecsys HBsAg II Qualitative assay. This is an electrochemiluminescence immunoassay (ECLIA) performed on cobas e 411 immunoassay analyser (Roche, Germany). Antibodies to Human immunodeficiency virus were tested for using the Alere Determine HIV 1/2 test kit (Alere, USA). The tests were done according to manufacturer's instructions. The liver enzymes were tested using the Roche cobas c 311 chemistry analyser (Roche, Germany).

Data analysis

Data was analysed using Statistical Package for the Social Sciences (SPSS) version 20. Categorical variables were summarised using frequency and

percentages, while quantitative variables were summarised as mean and standard deviation. Categorical variables were analysed using the Chi-square test, while Student's t-test was used to evaluate differences between means. Odds ratio (OR) was used as a measure of the strength of association, while a p value < 0.05 was statistically significant.

RESULTS

Demographic characteristic of study participants

Out of 1448 apparently healthy individuals included in the study, 878 (60.6%) of them were males. The mean age of the participants was of 47.1±12 years, while 840 (58.1%) were in the age group 31 – 50 years. There was no significant difference (p=0.22) between the mean ages of male (47.4 ± 11.7 years) and females (46.6 ± 12.5 years). Majority (87.6%) of the participants were married, while 8.6% were single. Few participants had history of blood transfusion (4.2%), while 28.4% had prior surgery and 2% were HIV positive (Table 1).

Prevalence of hepatitis B

In this study, the prevalence of hepatitis B infection was 5.3% (n = 77, 95% CI 4.2 – 6.5%). The prevalence of hepatitis B infection in females was 2.5% (n = 14, 95% CI: 1.2 – 3.8%), while it was 7.2% (95% CI 5.3 – 9.0%) in males.

Table 1: Socio-demographic and clinical characteristics of the study participants

Characteristic	Frequency	Percentage (%)
Sex (N = 1448)		
Female	570	39.4
Male	878	60.6
Transfusion (N = 1447)		
Yes	61	4.2
No	1386	95.8
Age group (years) (N = 1446)		
≤30	94	6.5
31-50	840	58.1
>50	512	35.4
Surgery (N = 1447)		
No	411	28.4
Yes	1036	71.6
Alcohol (N = 1446)		
Yes	602	41.6
No	844	58.4
HIV (N = 1341)		
Yes	27	2
No	1314	98
Marital Status (N = 1430)		
Married	1253	87.6
Single	123	8.6
Widow	44	3
Divorced/Separated	10	0.8
AST*	28 ± 14.4	
ALT*	28.2 ± 18.7	

*Presented as mean ± standard deviation; ALT- Alanine aminotransaminase, AST – Aspartate aminotransferase

Table 2: Prevalence and risk factors associated with Hepatitis B virus infection.

Characteristic	Hep B positive n = 77	Hep B negative n = 1371	Odds ratio	P val
Sex				
Female	14(2.5)	556 (97.5)	1	
Male	63 (7.2)	815 (92.8)	3.07 (1.70 – 5.53)	0.000
Transfusion				
Yes	3 (4.9)	58 (95.1)	0.92 (0.18 – 2.92)	1.0
No	74 (5.3)	1311 (94.7)	1	
Age group				
<30	3 (3.2)	91 (96.8)	1	
31-50	48 (5.7)	792 (94.3)	1.84 (0.56 – 6.02)	0.31
>50	26 (5.1)	486(94.9)	1.62 (0.48 – 5.47)	0.43
Surgery				
No	17 (4.1)	394 (94.9)	0.70 (0.40 – 1.22)	0.21
Yes	60 (5.8)	976 (94.2)	1	
Alcohol				
Yes	24 (4)	578 (96)	0.62 (0.38 – 1.02)	0.06
No	53 (6.3)	791 (93.7)	1	
HIV				
Yes	3 (11.1)	24 (88.9)	2.26 (0.66 – 7.67)	0.17
No	69 (5.3)	1245 (94.7)	1	
Marital status				
Married	69 (5.5)	1184 (94.5)	1.73 (0.62 – 4.83)	0.4
Single	4 (3.3)	119 (96.7)	1.14 (0.20 – 6.44)	1
Widow	2 (3.7)	52 (96.3)	1	
Liver Enzymes				
AST*	31.4 ± 15.6	27.8 ± 14.3		0.04
ALT*	33.3 ± 23.6	27.9 ± 18.4		0.02

*Presented as mean standard deviation ALT- Alanine aminotransaminase, AST – Aspartate aminotransferase

The mean age of participants who tested positive for HBsAg was 47.4 ± 12.4 years. The prevalence of HBsAg was highest in the age group 31 – 50 years (5.7%), but there was no statistical significance (p = 0.31). The prevalence of HBsAg in those who tested positive to HIV was high at 11.1% but this was not statistically significant.

Factors associated with Hepatitis B virus infection.

In the bivariate analysis, Hepatitis B virus infection was significantly associated with gender; Males had a statistically higher prevalence of Hepatitis B infection than females ([OR, 3.55 (95% CI 1.89 – 6.68)], p = 0.00009), Aspartate transaminase (AST) (p = 0.04) and Alanine transaminase (ALT) (p = 0.02). The mean AST and ALT were significantly higher in those who were seropositive for HBV compared to those who were negative. Alcohol use was less frequent in those who were HBsAg positive (OR, 0.62 [95% CI 0.38 – 1.02], p = 0.06). Hepatitis B virus infection was not significantly associated with history of blood transfusion, prior surgery, HIV status, age and marital status (Table 2). Of the married participants, 5.5% tested positive for HBsAg, but there was no statistical significance between hepatitis B virus infection and marital status (p = 0.4).

DISCUSSION

In this study of hepatitis B virus in apparently healthy, adult Nigerians, the prevalence of hepatitis B surface antigen seropositivity was 5.3%. This is similar to the prevalence that has been reported in other studies of asymptomatic individuals, such as apparently healthy young adults in Omuaran (5.5%),⁷ among prospective blood donors in Calabar (4.1%),¹¹ among teachers in Ibadan (4.8%),¹² and among asymptomatic community residents in Ibadan (7.3%).¹³ It is also similar to the prevalence of 6.1% in the WHO Africa region.³ The

prevalence of HBV obtained in this study is lower than the prevalence of 8.1% based on the recent Nigeria HIV/AIDS indicator and impact survey (NAIIS),¹⁴ the pooled prevalence of 13.6% obtained in a systematic review and meta-analysis⁶ and a national survey with a prevalence of 12.2%.⁵ This difference may be due to different patient characteristics such as the asymptomatic nature of the participants, differing levels of exposure to the virus, awareness of the virus, vaccination, and the screening method used.

The seroprevalence of HBV was significantly higher in males than females, as has been shown in other studies,^{11,13}. One of the reasons given for a higher prevalence of HBV in males is the universal practice of male circumcision in Nigeria, with more than one-third being performed by traditional circumcisionists, and “group” circumcision in nearly half but we did not ask for history of circumcision in our study.¹⁵ These factors may result in increased exposure of males to HBV. In contrast, HBsAg positivity was not associated with gender in a national survey, though its prevalence was higher in the males.⁵

Horizontal transmission in early childhood among children, and vertical transmission from mother to child are the most common modes of transmission in Nigeria.¹⁵ More than half of the population has serological evidence of previous exposure to the virus, and 5% has occult HBV infection.^{5,16,17} These findings underlie the fact that HBV infection is a serious health challenge in Nigeria, and this may have implications for blood transfusion.⁵

Study participants who were HBV positive had significantly higher levels of the transaminases (ALT and AST), and this may be a surrogate marker of underlying liver disease in these individuals. Hepatitis B virus is recognized as the most common cause of liver disease in Nigeria and globally, causing about 60% of cases of chronic liver disease and liver cancer in Nigeria.^{18,19} Data on HBV e antigen and antibody status, and HBV viral load was not available to determine the phase of HBV infection, and association with the transaminases in these subjects who will require further evaluation to confirm the presence of underlying chronic liver disease.

In this study, HBV was not associated with blood transfusion, surgery, or alcohol. Similar findings have been reported in other studies.^{5,20} This may be because of similar exposure of study participants to HBV earlier in life due to its local hyperendemicity, local practices such as circumcision, and lack of childhood HBV vaccination. Less than 5% of the study participants had a history of previous blood transfusion, and this may also explain the lack of association. The lack of association with alcohol may be because most participants did not take alcohol, or because participants were aware of the negative effect of alcohol especially in people with underlying HBV infection. Indeed, more HBV negative subjects took alcohol than those who were HBV positive (42.2% vs 31.2%). These findings contrast with another study

where blood transfusion and surgery were found to be associated with HBV.²¹ In another study, the factors that were associated with HBV positivity were local circumcision, having a dental procedure outside a health facility, and uvulectomy.⁵

The predominant mode of HBV acquisition in sub-Saharan Africa is the horizontal child to child transmission before age 5 and then probably perinatal transmission.²² Adult to adult transmission does happen but is occurs less frequent and significantly less likely to cause chronic HBV infection. The findings of this study support this in that we found little or no association between HBV and most of the stated risk factors. This implies longstanding child acquired infection. It is therefore important to ensure high uptake of childhood hepatitis B vaccination which is part of the national program on immunization in Nigeria and incorporate the routine antenatal screening of pregnant women for HBsAg.

The prevalence of HIV of 2% in this study is like the national HIV prevalence of 1.5% in those aged 15-64 years from the NAIIS report.¹⁵ About Of those who tested HIV positive, 11.1% were also HBsAg positive, as has been reported in other studies.²³⁻²⁵ Three of the study participants had HIV – HBV co – infection. People who are HIV-HBV co-infected have higher rates of liver disease such as advanced fibrosis, and cirrhosis than those who are only infected with HBV.^{26,27} Therefore, this group of individuals will require further evaluation and close monitoring.

The strengths of this study include the large sample size, testing of apparently healthy adults, and the use of ECLIA for HBsAg testing. Limitations include its retrospective design, lack of HBV viral load testing, hepatitis e antigen and lack of HIV confirmation with Western blot.

CONCLUSION

In conclusion, this study showed a moderately high prevalence of HBV in apparently healthy Nigerian adults. Hepatitis B virus infection was significantly more prevalent in males than females and was associated with significantly higher levels of markers of liver disease. There was a high prevalence of HBV infection in those who were HIV positive but no association between HBV and risk factors such as surgery and blood transfusion. Strategies for population-based screening of HBV need to be instituted, with appropriate linkage to care for those who test positive.

Source of support: There was no financial support for this study.

Acknowledgements: We acknowledge the laboratory staff who conducted the tests and the medical doctors who did the health assessment.

Disclosures: The authors declare that they have no conflict of interests.

REFERENCES

1. Global progress report on HIV, viral hepatitis and sexually transmitted infections, 2021. Accountability for the global health sector strategies 2016–2021: actions for impact. Geneva: World Health Organization; 2021.
2. WHO, 2016. Global Health Sector Strategy on viral hepatitis, 2016–2021. http://apps.who.int/iris/bitstream/10665/246177/1/WHO-HIV-2016.06_eng.pdf?ua=1. Accessed 10 March 2018
3. WHO, 2017. Global Hepatitis Report 2017. Available at: <http://apps.who.int/iris/bitstream/handle/10665/255016/9789241565455eng.pdf?sequence=1>. Accessed 8th February 2018.
4. McMahan BJ, Alward WL, Hall DB, Heyward WL, Bender TR, Francis DP, Maynard JE. Acute hepatitis B virus infection: relation of age to the clinical expression of disease and subsequent development of the carrier state. *J Infect Dis* 1985;151:599–603.
5. Olayinka AT, Oyemakinde A, Balogun MS, Ajudua A, Nguku P, Aderinola M et al. Seroprevalence of Hepatitis B Infection in Nigeria: A National Survey. *Am J Trop Med. Hyg* 2016; 95:902–907
6. Musa BM, Bussell S, Borodo MM, Samaila AA, Femi OL. Prevalence of hepatitis B virus infection in Nigeria, 2000–2013: A systematic review and meta-analysis. *Niger J Clin Pract* 2015;18:163 – 172.
7. Ndako JA, Ojo S, Dojumo VT et al. Sero-Epidemiological Analysis of Hepatitis B Virus Infection among Apparently Healthy Young Adults in Omuaran-Community. *International Journal of Pathogen Research* 2020;4(4):31-38
8. Oje OJ, Sule WF, Famurewa D. Dual positivity of hepatitis B surface antigen and anti - hepatitis C virus antibody and associated factors among apparently healthy patients of Ekiti State, Nigeria. *Viral Immunol* 2012;25:448 – 455.
9. Buseri F, Seiyaboh E, Jeremiah Z. Surveying infections among pregnant women in the Niger Delta, Nigeria. *J Glob Infect Dis* 2010;2:203 – 211.
10. WHO. Hepatitis B vaccines. *Wkly Epidemiol Rec* 2009;84:405–20.
11. Okoroiwu HU, Okafor IM, Asemota EA, Okpokam DC. Seroprevalence of transfusion-transmissible infections (HBV, HCV, syphilis and HIV) among prospective blood donors in a tertiary health care facility in Calabar, Nigeria; an eleven years evaluation. *BMC Public Health* 2018;18:645 – 652.
12. Olusola BA, Gometi EA, Ogunsemowo O, Olaleye DO, Odaibo GN, 2017. High rate of Hepatitis B virus infection among hairdressers in Ibadan, Nigeria. *J Immunoassay Immunochem* 2017;38:322 – 332.
13. Bakarey AS, Olaniyan OD. Hepatitis B virus infection among asymptomatic residents of low income community in Ibadan, Southwest, Nigeria. *J Immunoassay Immunochem* 2018;39:377 – 389.
14. Adeyinka DA, Olakunde BO, Oladimeji O, Ezeanolue EE. HIV Indicator and Impact Survey: considerations for Nigeria. *Lancet HIV* 2019;6:e348 – e350.
15. Abdur-Rahman LO, Musa OI, Oshagbemi GK. Community-based study of circumcision practices in Nigeria. *Ann Trop Med Public Health* 2012;5:231 – 235
16. Hou J, Liu Z, Gu F. Epidemiology and Prevention of Hepatitis B Virus Infection. *Int J Med Sci* 2005;2:50 – 57.
17. Olotu AA, Oyelese AO, Salawu L, Audu RA, Okwuraiwe AP, Aboderin AO. Occult Hepatitis B virus infection in previously screened, blood donors in Ile-Ife, Nigeria: implications for blood transfusion and stem cell transplantation. *Virology* 2016;13:76 – 83.
18. Lesi OA, Kehinde MO, Anomneze EE. Chronic liver disease in Lagos: a clinicopathological study. *Niger Postgrad Med J* 2004;11:91 – 96.
19. Ndububa DA, Ojo OS, Adeodu OO et al. Primary hepatocellular carcinoma in Ile-Ife, Nigeria: a prospective study of 154 cases. *Niger J Med* 2001;10:59 – 63.
20. Angyo IA, Yakubu AM. Lack of association between some risk factors and hepatitis B surface antigenaemia in children with sickle cell anaemia. *West Afr J Med* 2001;20:214 – 218.
21. Ezeilo MC, Engwa GA, Iroha RI, Odimegwu DC. Seroprevalence and associated risk factors of Hepatitis B Virus Infection among children in Enugu metropolis. *Virology (Auckl)* 2018;9: 1 – 7.
22. Spearman CW, Afihene M, Ally R et al. Hepatitis B in sub-Saharan Africa: strategies to achieve the 2030 elimination targets. *Lancet Gastroenterol Hepatol*. 2017;2(12):900 – 9.
23. Adewumi MO, Donbraye E, Sule WF, Olarinde O. HBV Infection Among HIV-Infected Cohort and HIV-Negative Hospital Attendees in South Western Nigeria. *Afr J Infect Dis* 2015;9:14 – 17.
24. Otegbayo JA, Taiwo BO, Akingbola TS et al. Prevalence of hepatitis B and C seropositivity in a Nigerian cohort of HIV-infected patients. *Ann Hepatol* 2008; 7:152 – 156.
25. Lesi OA, Kehinde MO, Oguh DN, Amira CO. Hepatitis B and C virus infection in Nigerian patients with HIV/AIDS. *Niger Postgrad Med J* 2007;14:129 – 133.
26. Hawkins C, Agbaji O, Ugoagwu P et al. Assessment of liver fibrosis by transient elastography in patients with HIV and hepatitis B virus coinfection in Nigeria. *Clin Infect Dis* 2013;57:e189 – 192.
27. Stabinski L, Reynolds SJ, Ocama P et al. High prevalence of liver fibrosis associated with HIV infection: a study in rural Rakai, Uganda. *Antivir Ther* 2011;16:405 – 411.