

**RESEARCH ARTICLE****Seroprevalence of hepatitis B virus amongst patients attending selected hospitals in Niger State, Nigeria****Aishatu Adamu<sup>1\*</sup>, Faruk Adamu Kuta<sup>1</sup>, Musa Galadima<sup>1</sup>, and Abubakar Abdulkadir<sup>2</sup>**

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**ABSTRACT**

Hepatitis B virus (HBV) is a major public health problem globally and accounts for about one million deaths worldwide annually. This study determined the seroprevalence, distribution of HBV infection, and factors associated with the infection amongst patients attending selected hospitals in Niger State. A total of 500 blood samples were collected from five selected hospitals in Niger state. The samples were screened using Hepatitis B Surface Antigen (HBsAg) test kit for the qualitative detection of Hepatitis B Surface Antigen in serum. Prevalence of Hepatitis B infection was 13.0% cumulatively in the study area. Female participants had a higher prevalence (6.8%) of HBsAg infection compared to their male counterparts with 6.2%. Participants within the 41- 50 years' age group recorded a higher rate of infection (5.2%), while those  $\geq$  50 years had a lower prevalence of (2.3%). The civil servants had a higher percentage prevalence of 6.4% followed by housewives and the least was observed with participants who are students. Patients without a history of blood transfusion recorded a higher percentage prevalence (7.8%) compared to those with a history of blood transfusion (5.2%). The results reveal that participants with polygamous family types recorded a higher prevalence of HBV infection (11.4%) compared to those belonging to the monogamous type (1.6%). The results obtained from this study suggest that HBV is in circulation in the study areas; thus necessitating more awareness campaigns among the general population about HBV and its modes of transmission and associated risk factors.

**Keywords:** *Hepatitis B virus; Niger State; Seroprevalence; Hospitals; socio-economic factors*

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**1.0 Introduction**

Hepatitis is a condition defined by the inflammation of the liver [1]. It is caused by infectious and noninfectious agents. The former includes hepatotropic viruses (hepatitis A, B, C, D, and E) of which hepatitis B is the most infectious and most virulent, while the latter is induced by an overactive immune system, use of drugs, alcoholism, chemicals, and environmental toxins [1].

Hepatitis B virus (HBV) is a member of the Hepadnavirus family; it is a partially double-stranded DNA virus with a core antigen surrounded by a shell containing hepatitis B surface antigen (HBsAg) [1, 2]. HBV has numerous antigenic components such as hepatitis B surface antigen (HBsAg), hepatitis B core antigen (HBc-Ag), and hepatitis B e antigen (HBeAg) [3]. The HBV genome harbors 3200 nucleotides and it can encode four groups of proteins and their regulatory components by shifting the reading frames over the same genetic matter [3]

Hepatitis B virus (HBV) is a public health problem and it is responsible for 60-80% of liver cancer worldwide despite the infection being preventable through vaccination [4]. The initial infection after exposure is acute (resolved within six months), with either complete recovery, or progression to chronic disease that lasts more than six months [4].

The risk of chronic infection is related to age, approximately 90% of infected infants become chronically infected, compared with 2%–6% of adults [5]. Transmission of this disease is commonly through blood transfusion, blood products, body fluids (Urine, semen, sweat, saliva, and tears), use of contaminated needles, and mother-to-child transmission through infected birth canal [6]. Approximately 70–140 million of the chronic HBV infections and 250,000 of the 1.3 million HBV-related deaths recorded each year around the world occur in Africa [7].

There have been previous studies on the seroprevalence of HBV amongst some target groups like pregnant women attending ante-natal care clinics [8-1, with different percentage prevalence reported. The present study was designed to determine the seroprevalence of HBV across all groups attending different hospitals located in three zones of Niger state, Nigeria. This is the first study designed to cover this scope.

## **2.0 Materials and Methods**

### **2.1 Description of the Study Areas**

Niger state is located in North Central Nigeria. The state lies on latitude 3.2<sup>0</sup> East and longitude 11.30<sup>0</sup> North, with Minna as the capital It is 150km away from the Federal capital city of Nigeria. Two of Nigeria's major hydroelectric power stations; the Kainji and the Shiroro dams, and an upcoming one in Zungeru are located in Niger state. The state has a population of 3,950,249. The three senatorial zones under study have three dominant ethnic groups; the Nupe, Gbagyi, and Hausa. The state is located in North Central of Nigeria and has Minna as its Capital. The State lies on latitude 3.20 East and longitude 11.30 North. It is 150km away from Abuja the Federal Capital. Two of Nigeria's major hydroelectric power stations, the Kainji and the Shiroro Dams, are located in Niger State.

### **2.2 Sample population**

Blood samples were collected from 500 (male and female) patients attending General Hospital Minna (GHM), General Hospital Kontagora (GHK), Umaru Sanda Ndayako Hospital Bida (USNHB), General Hospital Lapai, and General Hospital Suleja (GHS). One hundred (100) samples were collected from each of the selected hospitals.

### **2.3 Ethical Approval and Written consent of patients**

Approval to conduct this research was granted by the Ethics and Publications Committee of Niger State Hospitals Management Board. In accordance with the guidelines of the Ethics and Publications Committee, patients were provided with consent forms to obtain the socio-demographic data covering the following variables: age, gender, marital status, and family type.

### **2.4 Inclusion and Exclusion Criteria**

Patients below 18 years of age and those with established HBV and HIV infection were excluded from this study. Only apparently healthy individuals were included in the study.

### **2.5 Samples Collection and Preparation**

A total of five hundred (500) blood samples were collected aseptically from the patients attending the selected hospitals using a 2 mL syringe and transferred into EDTA vacutainer bottles. The samples were

centrifuged at 6000 rpm for one minute. The samples were collected and stored in a non-EDTA container at -20°C until needed for analysis.

## 2.6 Detection of HBs-Ag in samples

The HBsAg rapid test (Capital. Bio 300082) was used for the qualitative detection of Hepatitis B Surface Antigen in samples as described by the manufacturer. The samples were thawed at room temperature for 1 hour. The strip was immersed into the serum vertically until the absorbance occurred. The strip was removed and placed on a non-absorbance flat surface and allowed to stand for 20 minutes. The results were interpreted and observations made in accordance with the manufacturer's instructions.

## 2.7 Administration of Questionnaires

Questionnaires requesting information on the following socio-economic factors; gender, marital status, blood transfusion, family type, age, and occupation were administered on the study population. The information generated was subjected to correlation analysis.

## 2.8 Data Analysis

The data obtained in this study were subjected to statistical analysis using IBM SPSS 20.0 and the Chi-square test was carried out to check for significant differences in the prevalence of hepatitis B virus infection in each of the selected hospitals and the incidence rate among males and females in each of the locations. Binary Logistic Regression analysis was also performed to ascertain if certain factors such as gender, marital status, and family structure contributed significantly to the likelihood that an individual tested positive for hepatitis B virus. Questionnaire responses of five hundred individuals from the five selected Hospitals in Niger state were also analyzed and the results obtained were used to correlate HBV infection with risk factors.

## 3.0 Results

### 3.1 Sero-prevalence of HBs-Ag infection in the study area

Out of the 500 blood samples screened for HBsAg infection, 65 were positive, representing 13.0% prevalence. Patients attending General Hospital Minna (GHM) recorded the highest prevalence (4.0%) followed by Umaru Sanda Ndayako Hospital Bida with 3.2% and the least of 0.6% was recorded for General Hospital Suleja (Table 1).

**Table 1:** Sero-prevalence of HBsAg infection in the study area

Hospitals	NSS	NPS	Prevalence (%)	P-value
GHS	100	3	0.6	
GHM	100	20	4.0	
GHK	100	12	2.4	0.007
GHL	100	14	2.8	
USNHB	100	16	3.2	
<b>Total</b>	500	65	13.0	

**Key:** GHS - General Hospital Suleja, GSM - General Hospital Minna, GHK – General Hospital Kontagora, GHL - General Hospital Lapai, USNHB -Umaru Sanda Ndayako Hospital Bida, NSS- Number of samples screened, NPS- Number of positive samples

### 3.2 Distribution of HBV infection according to gender

The distribution of HBsAg infection according to gender shows that female participants had more rate of infection (6.8%) with HBV compared to their male counterparts with 6.2% (Table 2). Females from Kotangora and Bida had a high prevalence of HBV infection of 1.8% similar to males attending Lapai General Hospital (Table 2).

**Table 2 :** Distribution of HBV infection according to gender

Locations	Gender	NSS	NPS	Prevalence (%)	P-value
<b>GHS</b>	Male	50	0	0.0	0.079
	Female	50	3	0.6	
<b>GHM</b>	Male	50	12	2.4	0.317
	Female	50	8	1.6	
<b>GHK</b>	Male	50	3	0.6	0.65
	Female	50	9	1.8	
<b>GHL</b>	Male	50	9	1.8	0.249
	Female	50	5	1.0	
<b>USNHB</b>	Male	50	7	1.4	0.580
	Female	50	9	1.8	
<b>Total</b>		<b>500</b>	<b>65</b>	<b>13.0</b>	

**Key:** GHS - General Hospital Suleja, GSM - General Hospital Minna, GHK – General Hospital Kontagora, GHL - General Hospital Lapai, USNHB -Umaru Sanda Ndayako Hospital Bida, NSS- Number of samples screened, NPS- Number of positive samples

### 3.3 Sero-prevalence of HBV infection according to age

The result in Table 3 shows the distribution of HBV according to the age of patients in all the hospitals under investigation. It was observed that patients within 41- 50 years had the highest prevalence of 5.2% while  $\geq 50$  years recorded the lowest prevalence of (2.3%).

**Table 3:** Distribution of HBV infection according to age group

Age group	NSS	NPS	Prevalence (%)	P-value
<b>18 – 30</b>	121	21	4.2	0.095
<b>31 – 40</b>	136	10	2.0	
<b>41 – 50</b>	202	26	5.2	
<b><math>\geq 50</math></b>	41	8	1.6	
<b>TOTAL</b>	<b>500</b>	<b>65</b>	<b>13.0</b>	

**Key:** NSS- Number of samples screened, NPS- Number of positive samples

### 3.4 Distribution of HBV infection based on occupation

The civil servants recorded the highest prevalence of 6.4% followed by house wives and the least was observed for participants who are students

**Table 4:** Distribution of HBV infection based on occupation

Occupation	NSS	NPS	Prevalence (%)	P-value
Civil servant	247	32	6.4	
House wife	131	16	3.2	
Student	50	6	1.6	0.74
Others	72	9	1.8	
<b>Total</b>	<b>500</b>	<b>65</b>	<b>13</b>	

**Key:** NSS- Number of samples screened, NPS- Number of positive samples

### 3.5 Distribution of HBV based on History of blood transfusion

Patients without history of blood transfusion recorded higher prevalence (7.8%) compared to those with history of blood transfusion (5.2%).

**Table 5:** Distribution of HBV infection based on History of blood transfusion

Blood transfusion	NSS	NPS	Prevalence (%)	P-value
Yes	169	26	5.2	
No	331	39	7.8	0.568
<b>Total</b>	<b>500</b>	<b>65</b>	<b>13</b>	

**Key:** NSS- Number of samples screened, NPS- Number of positive samples

### 3.6 Distribution of HBV according to Family type

The results in Table 6 reveals that participants with polygamous family type recorded higher prevalence of HBsAg (11.4%) compared to those belonging to the monogamous type (1.6%).

**Table 6:** Distribution of HBV infection based on Family type

Family type	NSS	NPS	Prevalence (%)	P-value
Polygamy	450	57	11.4	
Monogamy	50	8	1.6	0.000
<b>TOTAL</b>	<b>500</b>	<b>65</b>	<b>13</b>	

**Key:** NSS- Number of samples screened, NPS- Number of positive samples

## 4.0 Discussion

This study determined the prevalence, distribution of Hepatitis B virus (HBV), and factors associated with infection among patients attending five selected hospitals in Niger state. The study is the first to determine the seroprevalence of HBV among the general population attending the selected hospitals in Niger state. The study established a 13% HBV prevalence that indicates high endemicity in the study

area. A number of studies have reported the percentage prevalence of HBV among different populations in Nigeria. In a report by Adabara et al. [8], 6.5% prevalence of Hepatitis B virus among women attending antenatal Clinic, General Hospital, Minna, Niger state was observed, while a study by Kuta et al. [9] on seroprevalence of Hepatitis B Virus Surface Antigen infection among pregnant women visiting Garki Hospital, Abuja, Nigeria for Antenatal care, reported 10% prevalence. The two studies were centered on women attending ante-natal clinics, while the present study cut across different groups attending selected hospitals.

In a National Survey undertaken by Adebola et al. [10] on seroprevalence of Hepatitis B Infection in Nigeria, 12.2% prevalence was reported. A review article on the same subject matter reported a prevalence rate of 4.3 – 23.3% [11]. It is pertinent to note that our study is different from those reported above because it is the first to focus on the general population of patients (males and females of varying ages, marital status, family type, and occupation) attending selected hospitals within a period, from different zones of Niger State. However, the cumulative percentage prevalence of 13% reported in our study falls within the ranges reported in all the reports cited above. It might indicate a stable prevalence, but the need for continuous monitoring of HBV prevalence amongst our growing population cannot be overemphasized because Nigeria with an estimated population of 190 million people has an 8.1% prevalence of hepatitis B [5].

Female participants had a higher prevalence of 6.8% HBsAg infection compared to their male (6.2%) counterparts. This finding disagrees with other previous studies [12-14], where a higher prevalence of HBV was observed in men. In spite of the observed differences in infection rate between males and females, sex is not a significant factor influencing HBsAg infection in the study area.

Furthermore, the high positivity rate (2.4 and 1.8%) observed for the male gender in Minna and Lapai hospitals respectively may not be unconnected with the fact that a large proportion of families in these areas are polygamous (Table 5). Moreover, high-risk behaviors like sharing of barber clippers nail cutters, tribal marker scalpel, violence, and conflicts in which blood contact may occur are associated with male folklore in these study areas.

The results obtained further revealed that the age groups; 41 - 50 and 18 - 30 years had the highest prevalence of 5.2 and 4.2% HBV infection respectively. This could be attributed to the fact that these groups are supposedly sexually active. More so, polygamous family type is very common in the study areas. However, despite the difference in the infection rates, there is no significant relationship between the age of the patients and the rate of infection with HBV

## 5.0 Conclusion

It can be concluded from the results obtained in this study that HBV infection in the different zones of Niger state is increasing in the general population and coupled with large-scale ignorance on the risk factors associated with the infection, we cannot be complacent in terms of sensitization of people on preventive measures.

**Author's contributions:** Adamu Aishatu is a PhD student in the Department of Microbiology, Federal University of Technology, Minna: Study proposal; methodology; data collection, original draft writing. Prof. Faruk Adamu Kuta: Major supervisor; reviewed draft and edited, Prof. Musa Galadima: Co-supervisor; reviewed and edited the draft, Dr. Abubakar Abdulkadir: Co-supervisor; scrutinized the final draft paper before it was put up for publication.

**Conflict of interest statement:** The authors hereby declare that there is no conflict of interest from any of them.

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## References

1. Thio, C. L., Seaberg, E. C., Skolasky Jr, R., Phair, J., Visscher, B., Muñoz, A., & Thomas, D. L. (2002). HIV-1, hepatitis B virus, and risk of liver-related mortality in the Multicenter Cohort Study (MACS). *The Lancet*, 360(9349), 1921-1926.
2. Hollinger, F. B., Dienstag, J. L., Murray, P. R., Baron, E. J., Pfaller, M.A., Tenover, F.C., and Yolken, R. H. (1990). Hepatitis B and hepatitis D Viruses in Manual of Clinical Microbiology, 7<sup>th</sup> edition, American Society for Microbiology. Pg. 1025-1042.
3. Chisari F.V, Ferrari C, and Mondelli, M. U (1989) Hepatitis B Virus Structure and Biology. *Microb Pathog*. 6: 311-325.
4. [World Health Organization \(WHO\) \(2014\). Hepatitis B Wayback Machine](http://www.who.int). www.who.int. Retrieved - 24 - 106, 2021
5. World Health Organization (WHO) (2017). The Journey to Hepatitis Elimination in Nigeria. [Global Hepatitis Report. Geneva](#).
6. Brooks, G. F, Caroll, K. C., Butel, J. S. and Morse, S. A. (2007).Hepatitis B and C virus infections and pregnancy. *Medical Microbiology*, 24th Edition; McGraw Hill Publishers,7(8):566-578.
7. Hübschen, J. M., Andernach, I. E., & Muller, C. P. (2008). Hepatitis B virus genotype E variability in Africa. *Journal of Clinical Virology*, 43(4), 376-380.
8. Adabara, N. U., Ajala, O. O., Momohjimoh, A., Hashimu, Z., & Agabi, A. Y. V. (2012). Prevalence of hepatitis B virus among women attending antenatal clinic in the general hospital, Minna, Niger state. *Shiraz E-Med J*, 13(1), 234-237.
9. Kuta, F. A., Wakaso, S. I., & Adamu, A. (2014). Seroprevalence of Hepatitis B Virus Surface Antigen Infection Among Pregnant Women Visiting Garki Hospital, Abuja, Nigeria for Ante-natal Care. *Journal of Medical and Applied Bioscience*, 2(1), 48-51.
10. Olayinka, A. T., Oyemakinde, A., Balogun, M. S., Ajudua, A., Nguku, P., Aderinola, M., ... & Nasidi, A. (2016). Seroprevalence of hepatitis B infection in Nigeria: a national survey. *The American journal of tropical medicine and hygiene*, 95(4), 902-907.
11. Berinyuy, B. E., Alawode, R. A., Mohammed, A. B., Babalola, B. S., Mustapha, A., Oshevire, R. M., Okunlola, M. B. and Lawal, A. (2019). Prevalence of Hepatitis B Virus in Nigeria: Review Update. *Annal Pub Health & Epidemiol*. 1(1): 2019. APHE.MS.ID.000501
12. Doumbia, M., Kouassi, M. A., Kakou, N. S., & Sevede, D. (2013). Molecular characterization of hepatitis B virus isolated from two groups of patients at risk in Côte d'Ivoire. *J Microbiol Res Rev*, 1, 61-6.
13. Al-Suraifi, A. S., Al-Rubaie, A. D., Al-Mayahie, S. M., & Al-Abedy, N. M. M. (2016). Unusual HBV mixed genotype infections among hepatitis type b Iraqi patients in Wasit province/Iraq. *Int J Biomed Eng Clin Sci*, 2, 1-7.
14. Al-Qahtani, A. A., Pourkarim, M. R., Trovão, N. S., Vergote, V., Li, G., Thijssen, M., ... & Al-Ahdal, M. N. (2020). Molecular epidemiology, phylogenetic analysis and genotype distribution of hepatitis B virus in Saudi Arabia: Predominance of genotype D1. *Infection, Genetics and Evolution*, 77, 104051.

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