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Awareness of Hepatitis B Virus Infection and Vaccination Rate Among Adults Attending the Out-Patient Clinic of General Hospital, Ilorin, Nigeria

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Received 21st June 2023; Revised 27th August 2023; Accepted 31 August 2023

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ABSTRACT

Background: Hepatitis B virus (HBV) is a potentially life-threatening infection affecting the liver from acute disease to chronic infection state and sometimes even leading to death. This study was done to determine the level of awareness of the hepatitis B virus as a disease, the availability of its vaccine, as well as the vaccination rate among the study population.

Methods: This study was a descriptive cross-sectional study, and it was done at the General Hospital Ilorin, Kwara State, Nigeria. The study population was adults aged 18 years and above attending outpatient clinics. The sample size for this study was 377, with a male to female ratio of 128:249. The study instrument was a structured and semi-structured interviewer-administered questionnaire. The data was analyzed using Statistical Packages for Social Sciences IBM (SPSS) 21.

Results: The overall level of awareness of HBV infection was very low (19.4%), only 38% of the participants knew HBV infection as a disease, while very few of them knew the causative agent (4.9%), and only 15.4% of the participants knew the transmission routes of the HBV. However, about half of the participants were aware of the existence of the HBV vaccine (50.8%). Only very few participants had ever received the vaccine as an adult, with a vaccination rate of 4.6%. There were statistically significant associations between HBV vaccination status, knowledge of the disease, knowledge of HBV causative agent ($P < 0.001$), and knowledge of HBV transmission routes ($P < 0.001$). These factors positively impact vaccination uptake in this study. It was also observed that more young people were more likely to have received the HBV vaccine when compared to the elderly ones ($P < 0.001$). Similarly, secondary education students were more likely to receive the HBV vaccine ($P = 0.039$).

Conclusion: The awareness of HBV infection and the knowledge of the disease were very low, same with vaccination uptake. Young people and those with formal education would likely obtain the HBV vaccination.

Keywords: Hepatitis B infection, Awareness, Knowledge, Vaccination.

1.0 INTRODUCTION

Hepatitis can be defined as the inflammation of the liver caused by infectious viruses and non-infectious agents [1]. There are five common types of viral hepatitis, namely A, B, C, D, and E [1]. Globally, viral hepatitis is one of the leading causes of mortality and disability its annual mortality is comparable to tuberculosis, AIDS, or malaria [2].

Hepatitis B virus (HBV) is a potentially life-threatening infection affecting the liver from acute disease to chronic infection state and sometimes even leading to death [2, 3]. The World Health Organization (WHO) estimates that hepatitis B resulted in 820,000 deaths, mostly from cirrhosis and hepatocellular carcinoma [3].

HBV is usually transmitted majorly from mother to child during birth and delivery. Also, body fluids such as blood, semen, and vaginal secretions, unsafe injections, or exposures to sharp instruments can be the transmission route [3]. Hepatitis B is a partially double stranded DNA virus belonging to the Class *Hepadnaviridae*. It has a nucleocapsid core, surrounded by the outer lipoprotein coat containing three related envelope glycoproteins or surface antigens [4]. The T cell response to the hepatitis B virus (HBV) is robust, polyclonal, and multi-specific in patients with acute infection who clear the virus totally and relatively weak and narrowly focused in patients with chronic infections, suggesting that clearance of HBV is T cell-dependent [4]. Other factors that could contribute to viral persistence are immunological tolerance, mutational epitope inactivation, T cell receptor antagonism, incomplete down-regulation of viral replication and infection of immunologically privileged tissues [4]. Persistent infection can manifest as chronic liver cell injury, regeneration, inflammation, widespread damage, and insertional deregulation of cellular growth control genes eventually leading to liver cirrhosis and hepatocellular carcinoma [4]. In acute infection, hepatitis B surface antigen (HBsAg) is the first serological marker in serum. In contrast, the appearance of hepatitis B envelope antigen (HBeAg) in the serum usually indicates active replication in the hepatocyte and infectivity [5].

There is paucity of studies on awareness and knowledge of the hepatitis B virus in the study location, although there are several studies on the prevalence of the disease. In a population-based study done in Cross-River State South-south Nigeria by Okonkwo *et al.*, [6] only 45% of their respondents knew that HBV causes hepatitis [6]. Eni

et al., [7] on the other hand, discovered that their respondents had good knowledge of the cause of Hepatitis B (73.7%) and its tendency to cause death (74%). Still, their understanding of the transmission routes was generally poor in a study conducted in three major states in Nigeria, namely Lagos, Ogun, and Abia [7]. It has been reported that the awareness and knowledge of hepatitis B among the general population is poor. Rajamoorthy *et al.*, [8] in a community-based study in Malaysia, found that only 36.9 and 38.8% of the participants had good knowledge and awareness of the hepatitis B virus, respectively [8].

Hepatitis B virus is a preventable disease through vaccination [1]. A WHO study found that an estimated 4.5 million premature deaths could be prevented in low and middle-income countries by 2030 through vaccination, diagnostic tests, medicine, and education campaigns [1]. WHO's global hepatitis strategy aims to reduce new hepatitis infections by 90% and deaths by 65% between 2016 and 2030 [1]. A safe and effective vaccine that provides 98% to 100% protection against hepatitis B is available [3]. Vaccine administration is recommended for all infants as part of the usual immunization schedule and for adults at high risk of infection, for instance, men having sex with men, sexually active individuals who have more than one sexual partner during the previous six months, healthcare workers, older children and adolescents who were not vaccinated as infants, adults with diabetes and household contacts and intimate partners of individuals with chronic hepatitis B infection [9-12].

The recommended vaccination schedule for infants consists of an initial vaccination at birth before hospital discharge, a repeat vaccination at 1-2 months, and another at 6-18 months [9, 12]. The recommended vaccination schedule for adults consists of an initial vaccination, a repeat vaccination at one month, and another at six month [9, 12].

A highly effective recombinant DNA vaccine for hepatitis B was introduced into the Nigeria National Program on Immunization in 2004 [13]. However, vaccination programs in Nigeria have not received adequate attention and funding [14]. Gaps such as low awareness fuelled by myths and misconceptions, lack of available information on hepatitis, poor health care system [14]. Also, high cost of diagnostic testing and out of pocket expenses for viral hepatitis treatment, low capacity of health care providers, and the proliferation of sub-standard treatment centers across Nigeria constitute a challenge to the elimination

goal of hepatitis in the country [14]. All these factors could account for poor birth-dose HBV vaccination in Nigeria, which has a 51-53% coverage rate [15,16].

There are several studies on the awareness of the hepatitis B vaccine among healthcare workers, but there are very few reports among the general population [17-19]. Although, healthcare workers belong to the high risk group, poor vaccination rate has been reported among them. Tastilong and colleagues in Cameroun, found that Forty seven percent (47%) of health care workers had good level of knowledge of HBV infection, however, only 19 % of the HCWs had received at least one dose of the vaccine [20]. In a study among HCWs in Sudan by Alege et al, Uptake of hepatitis B vaccination was found to be low at 44.20%, only 48.8% had received one dose, 29.1% received two doses, and 22.1% had received all three doses [21]. In a study done in Sokoto by Bello et al among healthcare professionals, (workers and students), about 52.9% were aware of the HBV vaccine, and 43.4 % had HBV vaccination [19]. Ibrahim et al among medical students in the Middle East, found that most of first-year students 98.44% were not vaccinated against hepatitis B, which makes them vulnerable to the disease [18]. Their study raises concerns about the high number of medical students who were not vaccinated or unsure about their vaccination status [18]. This is low compared to 86.0% of the students who had the hepatitis B vaccine in Turkey, a developed country, according to the findings of Ayla et al., [22] and Ochu et al., [23] in Kaduna State, Nigeria, found Hepatitis B vaccination coverage and knowledge to be poor among Federal Road Safety Corps members, less than 47% of the participants were aware of Hepatitis B vaccination coverage, and only 30.5% of participants had a full dose of HBV vaccine [23]. Also, Eni et al., [7] among the adult population in cities, found out that about a third of their respondents (31.96%) were aware of the existence of a vaccine for HBV [8]. Cost, availability of the vaccine and vaccination guidelines were factors associated with poor hepatitis B vaccination in most centers in Africa. Therefore, it can be inferred from previous studies that HBV remains a major cause of morbidity and mortality with poor awareness of the disease and vaccination rate especially in the developing world, which may be responsible for the high burden of the disease in this part of the world. There is paucity of studies on knowledge of the disease, vaccine awareness and rate among adult patients attending general out-patient clinic. Therefore, the aim of this study was to determine the level of awareness of hepatitis B virus disease and its vac-

cine, as well as the vaccination rate among the study population.

2.0 METHODOLOGY

This study was a hospital-based descriptive cross-sectional study, and it was carried out at the General Hospital Ilorin (GHI). The hospital is a 400-bed hospital providing care from primary level to tertiary medical services. Ilorin is Kwara State's capital in Nigeria's North central geopolitical zone. The study population was adults aged 18 years and above attending the outpatient clinic in General Hospital Ilorin Kwara State, Nigeria who satisfied the inclusion criteria. Sample size was estimated using the Open-Epi online sample size calculator for the population survey at a 5% confidence limit and expected frequency of 50% [24, 25]. The calculated sample size was 377 participants. A systematic random sampling technique was used to recruit eligible participants. All consenting adults were included in the study. Patients with life-threatening illnesses and mentally ill patients were excluded from the study.

In accordance with the Helsinki Declaration, the study was presented to the Ethical Review Committee of GHI. Structured and semi-structured questionnaires were developed to obtain socio-demographic and some clinical information from the participants. This study's overall level of awareness was defined as the average of the prevalence rates of the Knowledge of HBV disease, Knowledge of HBV disease causative agent, and Knowledge of HBV transmission routes.

2.1 Data Analysis

The data generated was analyzed using Statistical Packages for Social Sciences IBM (SPSS) 21 for Windows (Inc., Chicago, IL) [26]. Results were presented using frequency tables and charts. Frequency distribution was generated to reveal percentages and proportions of the various variables. Associations were tested using chi square and multivariate analysis was used to predict socio-demographic factors associated with HBV vaccine uptake among participants.

3.0 RESULTS

3.1 Percentage Socio-demographic Characteristics

The majority of the participants were adults between the ages of 25-59 years (69.8%) and most of them were females (66.0%). Also, the majority are Yoruba by tribe

(89.8%), practiced the Islamic religion (71.6%) and were working (67.0%). The results are shown in Table 1.

Table 1. Socio-demographic Characteristics (N = 377)

Variables	Frequency (n)	Percentage (%)
Age groups (years)		
Youth (18-24)	107	28.4
Adults (25-59)	263	69.8
Elderly (≥60)	7	1.8
Gender		
Male	128	34.0
Female	249	66.0
Religion		
Christianity	107	28.4
Islam	270	71.6
Education level		
No formal education	29	7.7
Primary	44	11.7
Secondary	133	35.2
Tertiary	171	45.4
Ethnicity		
Yoruba	339	89.8
Others	38	10.2
Monthly income (₦)		
Less than 30,000	224	59.4
30,000-100,000	124	33.0
Greater than 100,000	29	7.7
Occupation		
Working	253	67.0
Not working	124	33.0
Marital status		
Married	218	57.7
Divorced	20	5.2
Widow	11	3.1
Single	128	34.0

N = Total number of participants, n = Number of participants per group
 ₦ = Naira (Nigerian currency); \$1 = ₦420

3.2 Level of Awareness of HBV Infection and HBV Vaccine

The overall level of awareness of HBV infection (average of the prevalence rates of the Knowledge of HBV disease, Knowledge of HBV disease causative agent and Knowledge of HBV transmission routes $38 + 4.9 + 15.4 = 58.3/3 = 19.4$) was very low (19.4%), only 38% of the participants knew HBV infection as a disease while very few of them knew the causative agent (4.9%), and only 15.4% of the participants knew the transmission routes of the HBV. However, about half of the participants were aware of the existence of the HBV vaccine (50.8%). The results are shown in Table 2.

Table 2. Level of Awareness of HBV Infection and HBV Vaccine (N =377)

Variables	Frequency (n)	Percentage (%)
Knowledge of HBV disease		
Yes	143	38.0
No	234	62.0
Knowledge of HBV disease causative agent		
Yes	18	4.9
No	359	95.1
Knowledge of HBV transmission routes		
Yes	58	15.4
No	319	84.6
Knowledge of HBV vaccine existence		
Yes	192	50.8
No	185	49.2

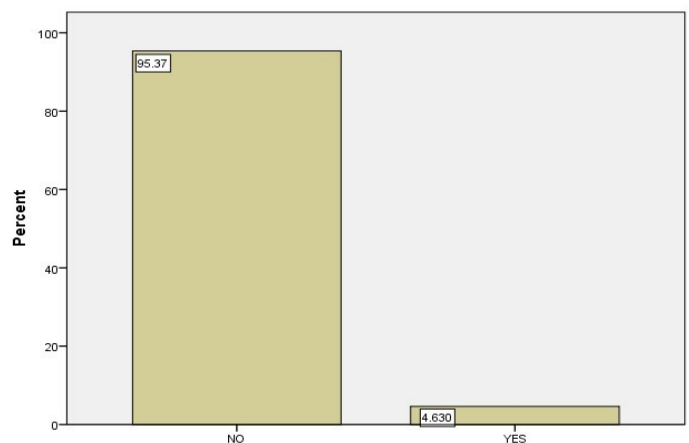


Figure 1. A Bar Chart Showing the Low HBV Vaccination Rate among the Participants

3.3 HBV Vaccine Uptake among the Participants

Only very few of the participants had ever received the HBV vaccine as an adult, with vaccination rate of 4.6%. The result is shown in a bar chart in Figure 1.

3.4 Association between HBV Awareness and HBV Vaccination Status

There is statistically significant associations between HBV vaccination status and knowledge of HBV as a disease ($X^2 = 15.841$, $df = 1$, $P < 0.001$), and with knowledge of HBV causative agent ($X^2 = 74.300$, $df = 1$, $P < 0.001$), and also with knowledge of HBV transmission routes ($X^2 = 17.312$, $df = 1$, $P < 0.001$). The results are shown in Table 3.

3.5 Socio-demographic Predictors of HBV Vaccine Uptake among the Participants

The youths among the participants are statistically significantly twice likely to have received the HPV vaccine compared with the elderly participants (Odds ratio = 2.0, $P < 0.001$). Also, those who had secondary school educa-

Table 3. Association between HBV Awareness and HBV Vaccination Status among the Participants (N = 377)

Variables	HBV Yes (n)	Vac- cination No (n)	X ²	df	P-value
Knowledge of HBV disease			15.841	1	<0.001
Yes	14	129			
No	3	231			
Knowledge of HBV causative agent			74.300	1	<0.001
Yes	8	10			
No	9	350			
Knowledge of HBV transmission routes			17.312	1	<0.001
Yes	9	49			
No	8	311			
Knowledge of HBV vaccine existence			8.735	1	0.003
Yes	5	187			
No	12	173			

Table 4. Socio-demographic Predictors of HBV Vaccine Uptake among the Participants

HBV vaccine up- take	Regression (r)	Odds ratio	95% CI	P-value
Age groups				<0.0001
Youth	-13.118	2.008	2.659-1.516	
Adults	-13.727	1.092	1.092-1.092	
Elderly	0 ^a			
Gender				0.879
Male	-0.098	0.907	3.219-0.255	
Female	0 ^a			
Religion				0.089
Christianity	1.621	5.058	32.753-0.781	
Islam	0 ^a			
Education level				0.591
No formal education	0.666	1.946	22.129-0.171	
Primary	16.721	18.450	900.999-0.001	0.993
Secondary	2.407	11.102	108.628-1.134	0.039
Tertiary	0 ^a			
Marital status				0.104
Married	2.268	9.658	149.112-0.625	
Single	2.057	7.820	149.395-0.409	0.172
Divorced	16.545	17.089	900.999-0.001	0.996
Widow (er)	0 ^a			
Monthly income				0.104
Less than 30,000	1.751	5.763	38.145-0.871	
30,000-100,000	1.191	3.291	17.009-0.633	0.172
Greater than 100,000	0 ^a			
Occupation				0.656
Working	-0.385	0.681	3.697-0.125	
Not working	0 ^a			
Ethnicity				0.791
Yoruba	-0.317	0.728	7.564-0.070	
Others				

tion among the participants are statistically significantly more likely to receive the HBV vaccine compared to others (Odds ratio = 11.1, P = 0.039). This is shown in Table 4 above.

4.0 DISCUSSION

The aim of this study was to determine the level of awareness of hepatitis B virus disease and its vaccine, as well as the vaccination rate among the study population. The majority of the participants were adults between the ages of 25 to 59 years. This age group is highly significant because it involves many of those individuals who are actively working in Nigeria thereby making the findings very important to the country's economy. The study participants were more of females, this is so crucial, knowing full well that females usually have a good health-seeking behavior compared to their male counterparts. It is also worthy of note that the female population is mostly involved in the cases of mother-to-child transmission of the hepatitis B virus.

The awareness of HBV disease is very low in the population studied, with the overall awareness of HBV infection less than 20%. This poor awareness level suggests that the transmission of the virus may be difficult to curtail since people are not even aware of the disease. This is further reflected in the finding on knowledge of the causative organism, which is less than 5%. Previous studies by Olorukooba *et al.*, [27] and Idowu *et al.*, [28] in North Western and South Western Nigeria, respectively, detected average leveled knowledge and awareness of hepatitis B virus in the range of 35.6% to 51.8% [27, 28]. The disparity between this index study and the one by other authors may be because of the location and the study settings. The Northwestern study was done among students, and the Southwestern study was done in a teaching hospital.

The percentage of the participants who had knowledge of the causative agent of HBV disease was 4.9%. This finding could be because less than 50% of the participants had tertiary education. This is strikingly low considering the complications that could result from the infection with the virus. Also, this could be a setback in achieving the elimination targets of the World Health Organization, which aims to reduce new hepatitis infections by 90% and deaths by 65% between 2016 and 2030 [1]. In contrast to the study done among healthcare workers by Kalu *et al.*, [29] in the Southern Eastern part of Nigeria, it was found that 91.9 % of their respondents knew infection to be caused by virus [29]. Furthermore, the study by Adejinmi *et al.*, [30] in Lagos among market women also showed that the majority (82.7%) of the participants were aware that HBV was a viral infection [30]. The findings from these studies were

similar despite different settings: health workers versus market women. However, it is important to realize that most urban traders are educated and enlightened. While a few participants were aware of the transmission routes (15.4%) in Adejinmi *et al.*, [30] study, the respondents in the study done by Kalu *et al.*, [29] demonstrated good knowledge on the various means of transmission of the virus [30, 29].

Approximately half of the participants were aware of hepatitis B vaccine for the prevention of hepatitis B virus infection. This finding could be the positive effect of media creating awareness of National Immunization Coverage including Hepatitis B vaccination. With this level of awareness, it is hoped that the prevention of the transmission of the virus will be achievable if more effort is geared towards the availability and accessibility of the vaccine to the populace. In a similar study by Adekanle *et al.*, [17] among hospital workers in Osun state, most participants were aware of the HBV vaccine in the study, perhaps because they were healthcare personnel [17]. This contrasts with a study among healthcare workers in a Federal Medical Center in Nigeria where HBV vaccination knowledge was poor [31]. There is also a disparity with the study by Eni *et al* among students and the general populace in Nigeria, where 31.9% of the study participants were aware of the vaccine [7].

The uptake rate of the hepatitis B vaccine is low in this study as 4.6% have been vaccinated, this could be because of poor access to vaccination. The very few participants with low uptake further emphasize the need for more energy to be driven towards the accessibility and availability of the vaccine for adults. In contrast, the study by Idowu *et al* showed that 61.3% of the women under study were willing to uptake HBV vaccine for their unborn children [28] and likewise, majority of market traders in the study by Adejinmi *et al.*, [30] opined that HBV vaccine should be given to children and adults [30].

Although the uptake rate is very low from this study, the youth and educated groups were more likely to receive the HBV vaccine. A study among healthcare workers by Ekpeyong *et al.*, [31] showed vaccine uptake was increased among doctors among the study participants. The issue of vaccine uptake is a major issue in Nigeria, especially among adults, because the vaccine is not free and not easily accessible. A country like United States have reported a very low prevalence of Hepatitis infection because of some of the strategies used by the Centre for Disease in the United States, which have been shown to

be effective in reducing the rate of infection, include vaccination of infants and children, vaccination of adults, prevention of perinatal transmission, routine chronic HBV infection testing, surveillance, and post-exposure prophylaxis [10].

There was a statistically significant association between hepatitis B vaccination and knowledge of HBV, knowledge of HBV causative agent, knowledge of HBV transmission routes and knowledge of HBV vaccine existence. This is similar to the study done by Adejimi *et al.*, [30] where there was a significant association between knowledge of HBV and awareness of HBV vaccine.[30] In the study by Alege *et al.*, [21] among health care workers in South Sudan, there was also an association between HBV vaccination status and knowledge of where to get the vaccine [21]. This shows that being informed is important in improving individuals' vaccination status thereby reducing the morbidity and mortality associated with the hepatitis B virus infection. This index study has a significant association between vaccine uptake, age, and education. Young and educated people tend to obtain the HBV vaccine. There was, however no significant association between the knowledge of HBV and being vaccinated in the study by Eni *et al.*, [7]. Also, there was no association between those who had been vaccination against hepatitis B and knowledge of the hepatitis B virus in the participants who were senior high school students in a study done in Northern Ghana by Adam *et al.*, [32]. This shows that there may be other factors impeding vaccination in those places.

Also, from the study by Alege *et al.*, [21] among healthcare workers in southern Sudan, there was no association between the transmission routes (needle stick injury, seminal vaginal fluid, reuse of infected syringes) and vaccination status [21]. There was, however a statistically significant association between the knowledge of HBV and hepatitis B infection prevention in the study among nursing students in Ghana [33].

This study has shown that the awareness of hepatitis B virus infection among the study participants is very low. There is poor awareness of the disease, paucity of knowledge of its transmission and the uptake of the vaccine for Hepatitis B virus infection is highly infinitesimal when compared with the endemic nature of the virus in the sub-Sahara Africa. An effective vaccine targeted at preventing this infection, but this is not made freely accessible and available to adults in Nigeria. Policy makers

should be advocating to intervene by making these vaccines available for adults at all levels of care. The government and healthcare workers need to do more to create public awareness of the infection and modes of prevention. Education was found to be significantly associated with the increased uptake of the vaccine, literacy should be encouraged among the general population in order to maximize its benefit on health. All of these strategies will assist the country achieving the goals of the World Health Organization.

Conflicts of Interest

The authors declare that there is no conflict of interests.

Authors' Contributions

COA conceived and designed the study, contributed to data collection, data analysis tools and manuscript writing. **ARY** contributed to study design and manuscript writing. **IAO** contributed to data analysis tools and analysis of data. **AM, OAO, ANA, TTO** contributed to data analysis tools and manuscript writing. All authors approved the final copy of the manuscript.

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