

Prevalence of Hepatitis B Virus among Febrile Patient in General Hospital Okigwe, Imo State, Nigeria

C. C. Anaele^{1*}, O. P. Emeonye², M. S. B. Nwatu², S. A. Cosmas³, U. J. Chukwu², U. Idabor³, E. F. Alozie²

¹Department of Public Health, Abia State University, Uturu, Nigeria

²Department of Nursing Sciences, Abia State University, Uturu, Nigeria

³Department of Biochemistry, Abia State University, Uturu, Nigeria

Email: *charleschigozie9@gmail.com

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Abstract

Introduction: Hepatitis B virus (HBV) infection is a major cause of prenatal death worldwide. Chronic hepatitis B (CHB) infection is associated with an increased risk of cirrhosis, hepatic decomposition, and hepatocellular carcinoma (HCC). **Objective:** This project work surveyed the prevalence of hepatitis B among febrile patients as well as to detect hepatitis B virus in the blood and the stage of the infection of hepatitis B on the affected patients and carrier stage or state of immunity of the affected patients. **Methodology:** A well-designed questionnaire/checklist was used to gather information regarding age, HIV-Status, and sex from 50 febrile patients. 2 ml of blood sample was obtained by venin-puncture using a sterile hypodermic syringe and emptied into a clean dry tube (without anticoagulant) observing the necessary aseptic techniques. The blood was centrifuged and the sera obtained and stored at 2 - 8 c for HBsAg screening. Hepatitis B virus was tested using an *in-vitro* diagnostic kit called HBsAg one-step rapid test strip. The HBsAg one-step rapid test is a lateral flow chromatographic immunoassay based on the principle of the double antibody-sandwich technique. The membrane is pre-coated with anti-HBsAg antibodies on the test line region of the test. During testing, the serum specimen reacts with the particle coated with anti-HBsAg antibody. The serum moves up with capillary action to react with the coated antibody on the membrane. Then, the colored line (positive) will be generated which shows the presence of the virus. But negative shows absence of the virus. The blood in the test tube was spun using a centrifuge to separate the red cells from the serum. The test pouch, serum, and control were allowed to equilibrate to room temperature before testing. The test strip was removed from the sealed pouch and used immediately. The test strip was

immersed vertically into the serum with the arrows pointing towards the serum for about 10 - 15 seconds, without exceeding the maximum line on the test strip. The strip was placed on a non-absorbent flat surface. The time was set and the result read after 15 minutes and recorded. The procedure was repeated for each sample and the results were recorded accordingly. The test is positive when two red lines appear on the test region (T) and control region (C) only. The result is said to be invalid when one line appears on the test region (T) and non on the control region (C) and also when no line appears on both the test region (T) and control region (C). **Results:** After interpretation of the result of the test on fifty patients, **Table 1** shows the age range of the population. The total distribution of subjects concerning age was as follows: 4 out of 50 populations (8%) were observed for the age range of 0 - 10; 7 out of 50 (14%) were observed of the age range of 11 - 20; 28 out of 50 (56%) were observed for a range of 21 - 30; 9 out of 50 (18%) were observed for the age range of 31 - 40; 2 out of 50 (4%) were observed at the age range of 21 - 30 with percentage seroprevalence of 4%. There is no significant correlation in the age group concerning percentage seroprevalence ($P = 0.05$). Also, the sex of the study population as seen in **Table 2** shows that 21 were males and 29 were females. Out of the 21 males population, 3 (14.24%) were positive. In the female population, 5 out of 29 (17.24%) were positive. The prevalence of the population concerning their sex was tested using Pearson's chi-square and it was concluded that there is no significant relationship between sex and seroprevalence of hepatitis B. **Table 3** shows the HIV of the study population and it shows that 6 out of 14 HIV positive patients (42.56%) were positive and 3 out of 36 HIV-negative patients (4.55%) were positive. The prevalence of the population concerning HIV status was tested using Pearson's chi-square and it was concluded that there is a significant association between HIV status and seroprevalence of hepatitis B. **Conclusion:** In conclusion, this study shows that there is a low prevalence of hepatitis B among febrile patients at the study area, hence limiting fever as a major determinant of hepatitis B infection. Considering the high risk of HBV in HIV co-infected patients, there is a need for the screening of HIV-infected patients for hepatitis B and appropriate therapy followed up on possible HBV-HIV co-infected patients. Appropriate preventive measures especially vaccination against hepatitis B virus should be encouraged among the susceptible population.

Keywords

Hepatitis B, Prevalence, Blood, Sex

1. Introduction

Hepatitis B is a viral disease process caused by the Hepatitis B virus (HBV). Hepatitis B virus is a major cause of acute and chronic hepatitis worldwide and is more prevalent in developing countries. More than 2 billion people are infected with HBV worldwide while some 280 million are chronic carriers, harboring the

virus in their liver. The disease is responsible for 80% of all cases of primary liver cases, which is one of the leading causes of death in Asia and Africa [1]. The infection can be acute or chronic, while adults that acquire acute infection usually recover or can be managed by supportive therapy. The chronic type is usually fatal. Diagnosis of HBV infection is usually through serological and virological markers. Hepatitis B surface antigen (HBsAg) is the hallmark of HBV infection and is the first serological marker to appear in acute HBV infection and persistence of HBsAg for more than 6 months suggests chronic HBV infection. Hepatitis B “e” antigen (HBeAg) is present only in HBsAg positive sea and its positivity denotes a high degree of viral replication, disease activity, and infectivity [2]. Hepatitis B virus is normally transmitted through blood or other body fluids (saliva, sweat, semen, breast milk, urine, faces), and body-contaminated equipment (including shared intravenous needles). The virus can also pass through the placenta to the fetus of an infected mother [3]. Hepatitis B virus (HBV) is an envelope double-stranded circular DNA virus of complex structure. HBV is classified as an orthohepadnavirus within the family hepadnaviridae. Serum from individuals infected with HBV contains three distinct antigenic particles: a spherical 22 nm particle, a 42 nm spherical particle (containing DNA and DNA polymerase) called the Dane particle, and tubular or filamentous particles that vary in length. The viral genome is 3.2 kb in length, consisting of four partially overlapping, open-reading frames that encode viral proteins. Viral multiplication takes place predominantly in hepatocytes. The infecting virus encases its double-shelled Dane particles within membrane envelopes coated with hepatitis B surface antigen (HBsAg). The inner nucleocapsid core-antigen (HBcAg) encloses a single molecule of double-stranded HBV and an active DNA polymerase [4]. HBsAg in body fluid is: 1) an indicator of hepatitis B infection; 2) used in the large scale screening of blood for HBC, and 3) the bases for first the vaccine for human use developed by recombinant DNA technology. Diagnosis of HBV is made by the detection of HBsAg in unimmunized individuals or HBsAg antibody or detection of HBV nucleic acid by PRC [5]. The clinical signs of hepatitis B vary widely. Most cases are asymptomatic. However, sometimes fever, loss of appetite, abdominal discomfort, nausea, fatigue, and other symptoms gradually appear following an incubation period of 1 to 3 months. The virus infects hepatic cells and causes liver tissue degeneration and the release of liver-associated enzymes (transaminases) into the bloodstream. This is followed by jaundice, the accumulation of bilirubin (a breakdown product of hemoglobin) in the skin and other tissues with a resulting yellow appearance. Chronic hepatitis B infection also causes the development of primary liver cancer, known as hepatocellular carcinoma [6].

2. Methodology

2.1. Description of Imo State

Imo State is one of the Niger Delta states in Nigeria. The state was formed in

1976. It is located in the southeast region of the country. The state has a border with Abia state, Anambra state, Rivers state, Delta state. Its capital is Owerri. The state has a high cultural heritage, they produced palm oil.

EPIDEMIOLOGY: About two billion people worldwide have serological evidence of past or present HBV infection, and about 350 million are chronically infected and at risk of developing HBV-related liver diseases. Some 15% - 40% of chronically infected patients will develop cirrhosis, progressing to liver failure and or HCC, HBV infection accounts for about 500,000 - 1,200,000 deaths each year (WHO, 2013).

The prevalence of HBV varies markedly between different regions of the world.

2.2. Types of Hepatitis B

1) Acute Hepatitis B

An acute hepatitis B infection may last up to six months (with or without symptoms) and infected persons are able to pass the virus to others during this stage. A patient will test positive for the hepatitis B virus (HBsAg), HBcIgM, and possibly the HBs-antigen [7].

2) Chronic Hepatitis B

The risk of developing a chronic hepatitis B infection is directly related to the age at which one becomes infected with the virus. 90% of infants exposed to the hepatitis B virus will develop chronic hepatitis B infections. Up to 50% of young children exposed to hepatitis B virus between the age of 1 and 5 years will develop chronic infections. 5% - 10% of healthy adults who are infected will develop chronic infection [8].

2.3. Hepatitis D Co-Infection

Hepatitis D is a type of viral hepatitis caused by the hepatitis D virus (HDV), which needs the hepatitis B virus to exist. Only people who are already infected with hepatitis B can be infected with hepatitis D. Transmission of hepatitis D is through same the route as hepatitis B [4].

Prevention of HDV infection is by preventing hepatitis B infection. There is no effective treatment for HDV infection, only supportive care for symptoms can be provided. For a chronic HDV infection, interferon-alpha may slow down disease progression [4].

3. Results

After interpretation of the result of the test on fifty patients, **Table 1** shows the age range of the population. The total distribution of subjects concerning age was as follow: 4 out of 50 populations (8%) were observed for the age range of 0 - 10; 7 out of 50 (14%) were observed of the age range of 11 - 20; 28 out of 50 (56%) were observed for a range of 21 - 30; 9 out of 50 (18%) were observed for the age range of 31 - 40, 2 out of 50 (4%) were observed at the age range of 21 - 30 with percentage seroprevalence of 4%. There is no significant correlation in

Table 1. Socio-demographic characteristic of the respondents.

S/N	Variables	Frequency	Percentage (%)
1	Gender		
	Male	33	33%
	Female	67	67%
2	Age		
	25 - 35	28	28%
	36 - 41	15	15%
	42 - 47	32	32%
	48 - 55	20	20%
	56 and above	5	5%
4	Religion		
	Christianity	85	85%
	Islam	0	0
	Traditional Worshipers	15	15%
	Others	0	0
4	Marital Status		
	Single	35	35%
	Married	60	60%
	Widow/widower	3	3%
	Divorce	1	1%
	Separated	1	1%
5	Educational Qualification		
	RN	31	31%
	RN/RM	20	20%
	Tertiary	43	43%
	Others	5	5%
5	Years of Working Experience		
	0 - 5 years	8	8%
	6 - 10 years	33	33%
	11 - 15	40	40%
	16 - 20	13	13%
	21 and Above	7	7%

the age group concerning percentage seroprevalence ($P = 0.05$). Also, the sex of the study population as seen in **Table 2** shows that 21 were males and 29 were females. Out of the 21 males population, 3 (14.24%) were positive. In the female population, 5 out of 29 (17.24%) were positive. The prevalence of the population concerning their sex was tested using Pearson's chi-square and it was concluded that there is no significant association between sex and seroprevalence of hepatitis B. **Table 2** shows the HIV of the study population and it shows that 6 out of 14 HIV positive patients (42.56%) were positive and 3 out of 36 HIV-negative patients (4.55%) were positive. The prevalence of the population concerning HIV status was tested using Pearson's chi-square and it was concluded that there is a significant association between HIV status and seroprevalence of hepatitis B.

The gender distribution of the respondents shows that out of the 100 respondents, females constituted the majority with 67 (67%) as against 33 (33%) males. This implies that the females were more willing to participate in the study than their male counterparts, couple with the fact that nursing staff most of who are

Table 2. Prevalence of hepatitis B in relation to sex.

Sex	Number of samples	Number of positives
Male	21	3 (75.8%)
Female	29	5 (17.5%)
Total	50	8 (100%)

females may also explain the higher representation of females in the study. The age distribution reveals that the matured health professionals constituted majority of the respondents in General hospital Okigwe Imo state. Regarding the age distribution of respondents, **Table 1** shows respondents within the age bracket of 61 and above were 5 (5%), while respondents between the ages of 51 - 60 were 20 (20%), respondents between the ages of 41 - 50 years 32 (32%), while those within 30 years and below are 28 representing (28%) of the respondents. The table also shows that majority of the respondents who participated in the study, 60 (60%) were married, while 35 (35.0%) were single, 3 (3.0%) of the respondents were widows/widower, 1 (1.0%) were separated and another two (1.0%) persons were divorced. This can be attributed to the fact that majority of the respondents were within the age range 36 - 41 years and above and it is therefore believed that most people of this age categories were usually married, which is a true reflection in the variable indices of the respondents. It is worth noting that respondents in **Table 3**. Regarding religious affiliation of respondents, 85 (85%) were of the Christian faith, while 15 (15%) persons were identified as a Traditional worshiper. Concerning the academic qualification of the respondents, **Table 1** has 74 (37.6%) respondents with tertiary education, these include graduates from universities, colleges, polytechnics and other higher institutions, 74 (74%) were secondary school certificate holders, 13 (13%), while 5 (5%) of the respondents possess other qualifications. The high percentage of respondents with tertiary education signifies the high level of awareness on the prevention of infant and under-five mortality. The above table shows the prevalence of hepatitis B with respect to age of the study population, with the age of 21 - 30 showing the highest prevalence following by 31 - 40.

The table above shows the prevalence of hepatitis B virus infection with respect to sex of patients, with the more prevalence in the male patients than the females. Since χ^2 is greater than χ^2_{table} , we concluded that there is no significant difference in the prevalence with respect to age.

The table above shows the prevalence of hepatitis B virus infection with respect to HIV status, with more prevalence in HIV positive patients.

4. Discussion

In 2010, the world Health Organization Assembly adopted resolution 62.18 to recognize viral hepatitis as a global health problem. In response, the WHO developed a four-prong strategy aimed at raising awareness/mobilizing resources, policy, preventing transmission and screening and treatment. While 180 countries

Table 3. Prevalence of hepatitis B in reaction to HIV status.

HIV Status	Number of samples	Number of positives
Positive	14	6(67.5%)
Negative	36	2(32.5%)
Total	50	8(100%)

included hepatitis B vaccination as part of their routine vaccination schedule and the worldwide coverage approached 80% in 2011, disparities remain between developed and undeveloped countries (WHO, 2013). The result showed that the highest prevalence of HBV infection was found among patients of 21 - 30 years. There could be explained by the relationship between hepatitis infection and high risk sexual practices which is noted to be higher among the younger age group. This observation is similar to the results that were obtained in Zaria and Ethiopia [4].

Similarly, Emechebe *et al.* (2014) [2] studied hepatitis B virus infection in Nigeria, with the highest prevalence rate at 14.8% found among the age of 20 - 30 years. This was explained to the high sexual activity among these age groups. Inverse relationship between HIV-status and HBsAg positivity with HIV positive patients showed the highest positivity has been noted [4]. However, in this study, it was noted that HIV co-infection includes the risk of hepatitis B infection with the result showing 42.86% positive.

The results parallel with the findings of Nassal, 2010 [7], where females had a significantly higher HBsAg prevalence (26.0%) than males with 18.0. These findings suggest that sex difference in HBsAg prevalence appears to be probably due to their body anatomy.

5. Recommendations

1) Immunization with hepatitis B vaccine is the most effective means of preventing HBV infection based on this studied objective. Hepatitis B vaccination is highly cost-effective, in that it prevents infection with HBV and thus reduces the incidence of chronic hepatitis, cirrhosis, and HCC in the vaccinated population. Hepatitis B vaccination is recommended for all unvaccinated adults at risk for hepatitis infection and for all adults requesting protection from hepatitis B infection.

2) Pre-Exposure Prophylaxis

A comprehensive strategy for elimination HBV transmission should start with a pre-exposure vaccination program. This should include universal vaccination of all infants at birth, particularly those born to pregnant women who test positive when screened for hepatitis B surface antigen.

3) Post-Exposure Prophylaxis

Post-exposure prophylaxis should be considered for individual who have had recent exposure (either parenteral or sexual) to blood or other body fluids, if it can be carried out in a timely fashion. Evaluation of the hepatitis B surface anti-

gen status of the infective source and the anti-HBs status of the exposed person should be carried out before the vaccine is administered. Individuals without prior vaccination should receive both HB/g must be at a different infection site.

6. Conclusion

In conclusion, this study shows that there is a low prevalence of hepatitis B among febrile patients in the study area, hence limiting fever as a major determinant of hepatitis B infection. Considering the high risk of HBV in HIV co-infected patients, there is a need for the screening of HIV-infected patients for hepatitis B and appropriate therapy followed up on possible HBV-HIV co-infected patients. Appropriate preventive measures especially vaccination against hepatitis B virus should be encouraged among the susceptible population.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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