

A Four-Year Trend of Acute Hepatitis B Virus Infection at a Tertiary Health Facility in Lagos, Nigeria

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ABSTRACT

Hepatitis B virus (HBV) infection is an important public health challenge. More than 350,000,000 people worldwide have chronic hepatitis B (CHB). Hepatitis B core Immunoglobulin M (HBc IgM) is an important marker used to classify whether an existing HBV is a new infection or an existing one, differentiating acute from chronic HBV infection. When an individual is HBc IgM positive, it shows a new infection, while negative IgM indicates a previous infection. The study aimed to determine the trend of acute HBV infections among hepatitis B-positive patients in a tertiary health facility in Lagos, Nigeria, over a four-year period. Patients accessing HBc IgM tests at a tertiary health facility in Lagos, Nigeria. Five (5) ml of blood samples were collected in K⁺EDTA vacutainers and centrifuged at 3500 rpm for 5 minutes. Plasma (2 ml) was collected in plain tubes, and HBc IgM assay was performed using DIA-Pro (BIORAD) kits according to the manufacturer's instructions. The study period was from January 2014 to December 2017. The total number of patients who accessed this assay within the study period was 1,422. The male population was 896 (61.1%). Total HBc IgM positive and HBc IgM negative results were 197 (13.8%) and 1,225 (86.1%) respectively, and there was 1 (0.07%) equivocal. Rates of HBc IgM positivity, indicating acute infection, were 12.9%, 13.0%, 11.9%, and 15.1% in the years 2014, 2015, 2016, and 2017 respectively. The rate of acute HBV infection increased from 12.9% in 2014 to 15.1% in 2017, indicating likely new infection transmission ongoing in communities. These high and increasing rates require the sustenance of public health interventions.

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1. INTRODUCTION

Hepatitis B virus (HBV) infection is an important public health challenge that affects the liver, is one of the killer diseases according to the World Health Organization (WHO) and is globally distributed. More than 350,000,000 people worldwide have chronic hepatitis B [1] 70% of hepatitis B patients are Africans, and 70% of African children under the age of five are primarily inflicted in Africa 4,500,000, infected individuals take years before symptoms emerge [2]. Additionally, 20,000,000 people in Nigeria are estimated to be infected with the chronic disease, with an overall frequency of 8.1% [3]. The chronic state is just one side of the divide, as there are also millions of acute

infections. Hepatitis B core Immunoglobulin M (HBc IgM) is an important marker, a particular immune response produced in the body, at an early stage of immunological response. It is utilised to classify an existing hepatitis B virus as a new infection or an existing one, differentiating acute from chronic HBV infections [4], [5]. HBc IgM levels can be monitored over time to assess the course of the disease and response to treatment. A decline in HBc IgM levels or their disappearance may indicate the resolution of acute infection [6]. The absence of HBc IgM antibodies and the presence of HBsAg for more than six months typically indicates a chronic HBV infection. In chronic cases, HBc

IgM levels tend to decline over time, and the antibody may no longer be detectable [7].

When an individual is HBe IgM positive, it shows a new infection, while negative IgM indicates a previous infection. IgM antibody to hepatitis B core antigen (IgM anti-HBe) positivity indicates recent infection, usually less than 6 months infected [8]. Its presence indicates acute infection [9], [10]. Symptoms of an acute infection may include loss of appetite, joint and muscle pain, low-grade fever, and possible stomach pain. Although asymptomatic people do not experience symptoms they are referring to as asymptomatic, they can appear 60–150 days after infection, with the average being 90 days or 3 months. Some people may experience more severe symptoms such as nausea, vomiting, fatigue, abdominal pain, clay-colored stool, fever, dark urine, itching (generalized itching of the skin) jaundice (yellowing of the eyes and skin), or a bloated stomach that may cause them to see a health care provider [11].

If treatment for an acute hepatitis B infection is required, a person may be hospitalized for general support. Rest and managing symptoms are the primary goals of this medical care. A rare, life-threatening condition called “fulminant hepatitis” can occur with a new acute infection and requires immediate, urgent medical attention since a person can go into sudden liver failure [12]. The objective of this study was therefore to determine the trend of acute HBV infections among hepatitis B positive patients in a tertiary health facility in Lagos over a four-year period.

2. MATERIALS AND METHODS

2.1. Ethical Considerations

Ethical approval was obtained and the protocol and safety guidelines satisfied the conditions of the Nigerian Institute of Medical Research (NIMR) Institutional Review Board (IRB) and policies regarding experiments that use specimens from human subjects.

2.2. Study Location and Duration

This study was conducted at the Centre for Human Virology and Genomics (CHVG) of NIMR, Lagos, Nigeria. CHVG is an ISO 15189:2012 accredited and World Health Organisation (WHO) pre-qualification laboratory. The laboratory implements a quality management system (QMS) and offers the best services to its various clients, who come mostly from the Lagos metropolis of over 20,000,000 people. The study was carried out in four years, from January 2014 to December 2017.

2.3. Sample Collection and Analysis

The procedure used was the Enzyme Immunoassay (ELISA) for the qualitative determination of IgM class antibodies to the core antigen of the hepatitis B virus in human plasma and sera. Patients accessing HBe IgM test at the Centre for Human Virology and Genomics (CHVG) in NIMR. Five ml venous blood samples were collected in K⁺EDTA vacutainers and centrifuged at 3500 rpm for 5 minutes. Subsequently, plasma was separated and collected in plain sterile 2 ml tubes. HBe IgM assay was

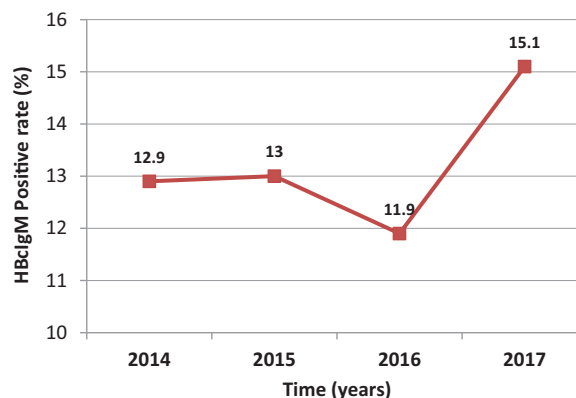


Fig. 1. Trend of acute hepatitis B virus infection over a period of four years (2014–2017).

performed using DIA Pro kits (BIORAD, Italy) according to the manufacturer’s instructions. Data were collected using FileMaker Pro version 10, and statistical analyses using STATA version 18.

3. RESULTS

The total number of patients that accessed the HBe IgM assay during the four-year study period was 1,422. The total HBe IgM positive results were 197 (13.85%), which indicates acute hepatitis B infection. This indicates the proportion of individuals who had recently contracted HBV. The total HBe IgM negative results were 1,225 (86.1%) and 1 (0.07%) sample result was equivocal. Rates of HBe IgM positivity were 12.9%, 13.0%, 11.9%, and 15.1% in 2014, 2015, 2016 and 2017 respectively as shown in Table I and Fig. 1.

4. DISCUSSION

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 time. Acute and chronic hepatitis B are two possible forms of hepatitis [13]. While chronic hepatitis is debilitating and requires treatment, the acute disease however should not be overlooked. More males than females were observed in this population. In hepatitis infection, most studies report a higher population for males and less for females, and this was corroborated also in our study. Data shows that five to ten percent of healthy adults (18 years and older) who are infected will develop chronic hepatitis B infection (in essence about 90% will recover from the exposure) [14]. However, in a country as Nigeria with over 220,000,000 people, that rate translates to a significant number of likely fatalities.

Acute HBV is a common cause of acute icteric hepatitis in adults. The vast majority of these patients resolve this acute infection and develop long-lasting immunity. With an average rate of almost 13.1% over the course of four years, it appears that acute hepatitis B is a significant public health issue in Nigeria. In contrast, the vast majority of patients who develop chronic HBV have minimal symptoms and do not develop jaundice after becoming

TABLE I: DISTRIBUTION OF HBc IGM POSITIVITY OF LAGOS, NIGERIAN PATIENTS SEEN AT A TERTIARY HEALTH FACILITY FROM 2014 TO 2017

Year	Number	Male (%)	Female (%)	HBc IgM	
				Pos (%)	Neg (%)
2014	308	184 (59.7)	104 (40.3)	40 (12.9)	268 (87.1)
2015	322	199 (61.8)	116 (38.2)	42 (13.1)	280 (86.9)
2016	387	228 (58.9)	139 (41.1)	46 (11.9)	341 (88.1)
2017	405	258 (63.7)	140 (36.3)	61 (15.1)	344 (84.9)
Total	1422	869 (61.1)	499 (35.1)	189 (13.3)	1233 (86.7)

infected with HBV [13]. These patients will frequently remain undiagnosed for years or decades. Approximately 1% of persons with acute HBV develop acute liver failure. Exploring the risk factors and transmission routes associated with acute hepatitis B infections can provide valuable information for prevention strategies [14]. Factors such as unprotected sexual activity, injection drug use (on the rise especially after the COVID-19 pandemic), healthcare-related exposures (medical personnel), or vertical transmission from mother to child could be assessed to identify specific populations or behaviors at higher risk [15]. This understanding can guide targeted interventions and education campaigns.

Variations in HBc IgM positive rates, despite their tiny size, may nonetheless offer some useful information. For instance, the rise in the percentage of individuals with HBc IgM positive from 11.9% in 2016 to 15.1% in 2017 may indicate a possible increase in acute hepatitis B infections during that particular year. However, it is difficult to ascertain the causes of these variations in the absence of other details [16].

Preventing acute HBV with vaccination is the best form of treatment. Although universal vaccination is now administered to newborns in many countries, majority of adults have not been vaccinated and remain at risk of infection. Due to this fact, assessing the impact of hepatitis B vaccination programs is needed in the region, when compared to the population size to prevent an increase of hepatitis B in the population [17]. Because the majority of patients with acute HBV resolve the infection spontaneously, treatment with an oral anti-HBV agent is not necessary. However, the use of an oral anti-HBV agent is not unreasonable to use in a patient who is developing acute liver failure from severe acute HBV [18]. The significance of ongoing surveillance and monitoring of hepatitis B in Lagos Nigeria is highlighted by the persistent occurrence of acute hepatitis B infections over the course of the four-year period. Such information can assist healthcare professionals and public health officials in tracking the disease burden, spotting possible outbreaks, and evaluating the efficacy of prevention and control measures [3], [19]. To accurately identify the infection status in certain situations, further testing and clinical examination may be necessary. This emphasizes the significance of using thorough diagnostic strategies and taking clinical context into account when interpreting test results.

The study reveals a significant burden of acute hepatitis B infections among patients accessing care at the tertiary health facility in Lagos, Nigeria. The rates of HBc IgM positivity indicate that an average of 13.25% of

patients tested positive for acute hepatitis B during the study period, and there was an increase over the four years [16]. However, changes in rates of HBc IgM positivity were not significant throughout those years, despite some slight variations. This shows that over this time period, the prevalence of acute hepatitis B infection was largely unchanged as reported in other studies [5], [16].

Even though new-born/infant vaccination is largely ongoing, emphasis should still be on adult vaccination, as such would contribute to a multi-pronged approach aimed at reducing the incidence and spread of the infection. Effective but expensive drug therapies exist to manage hepatitis B infection, but prevention by vaccination is a better public health approach. The significance of developing efficient prevention and control methods is supported by the high prevalence of acute hepatitis B infections in this study. This entails raising awareness, increasing immunization rates, and carrying out specific interventions for high-risk groups. Additional investigation is required to identify the causes of the observed variances in HBc IgM positive rates and their ramifications.

5. CONCLUSION

In conclusion, the study highlights the trend of HBc IgM in four years in a Nigerian state and shows a rising tendency, presupposing increasing hepatitis B virus prevalence. To track disease severity, spot trends, and evaluate the success of preventive and control strategies, ongoing monitoring and surveillance of acute hepatitis B infections is required to be sustained.

LIMITATION OF STUDY

The study was focused on a single tertiary health facility and a relatively small sample size. These limitations may impact the generalizability of the findings to the broader population of Lagos or Nigeria.

DECLARATION OF FUNDING STATEMENT

The authors hereby state that this research did not receive any specific funding.

DATA AVAILABILITY STATEMENT

The data harnessed in this study is available upon request.

CONFLICT OF INTEREST

Authors declare that they do not have any conflict of interest.

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