



THE HEALTH PROTECTIVE STRATEGIES AGAINST HEPATITIS B VIRUS INFECTION IN DEVELOPING COUNTRIES: THE CASE OF NIGERIA

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ABSTRACT

Hepatitis B Virus infection is one of the commonest infectious disease of public health importance globally. About 2 billion people worldwide have serological evidence of HBV. In Nigeria, more than 22 million people are living with this deadly contagious virus which has more prevalence, virulence and devastating complications than HIV.

Despite its high prevalence, not much effort has been made to protect the at-risk population group. This study identified HBV as a neglected biohazard of public health importance, especially in developing countries where infectious disease control are poor. It highlighted the strategies of early detection, control and prevention of HBV in endemic regions such as Nigeria using health protective tools (HPTs). This was a review study of 24 references majorly related to HBV in Nigeria and the population at risk. Two keywords: (HBV/HPTs in Nigeria) were used as search strategy to identify answers to research questions. Pub Med, Medline, Cochrane Database, Google Scholar, African Journal Online (AJOL) were the search database reviewed. A critical appraisal and integration of current evidences in identifying key issue worsening the HBV burden in Nigeria were captured. It further elaborated on the application of HPTs as strategies for preparedness and response plans to reduce the burden in the region. The recommendations from this study will go a long way in proffering replicable solutions on how to reduce the burden of HBV in developing countries including Nigeria.

Conclusion: HBV is a global health problem and so requires proactive measures to prevent or significantly control its burden worldwide. These measures include declaring it as an emergency natural disaster and establishing suitable frameworks to fight the menace. In Nigeria, where the burden is high, there is a need to activate the HPTs such as surveillance, auditing, screening tests, immunization and therapeutic interventions into useful frameworks in preparedness and response plan against the increasing prevalence of HBV.

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INTRODUCTION

One of the significant public health problems of this age is caused by Hepatitis B virus (HBV) [1]. It is a partially double-stranded enveloped DNA virus of the hepadnaviridae family [2-3]. It is the smallest known DNA virus first recognized in 1968 in an Australian aborigine [4]. It is responsible for chronic liver disease and other hepatitis-related liver diseases such as liver cirrhosis or hepatocellular carcinoma. Approximately one-third of the world's population, that is, more than 2 billion people have serological evidence of infection with HBV [5]. Over 350 million of them have chronic HBV infection, with an annual mortality rate of 0.6 to

one million from chronic liver disease, including cirrhosis and hepatocellular carcinoma [6-7].

More than 22 million people are living with HBV in Nigeria making the nation a hyper-endemic region with a wide prevalence range of 2.0% to 20% [8-11]. This integrative review essay used a holistic approach to highlight HBV as an identified biological hazard of public health importance in the Nigerian population. The at-risk population groups and the epidemiological evidence-based reports from the six geopolitical zones that make up Nigeria were captured. The HPTs therefore, are modes of intervention to prevent, detect and control the burden of HBV infection in Nigeria

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HBV Infection in Nigeria and the Population at Risk

HBV is a pathogenic microorganism that can cause potentially life-threatening disease in humans. HBV is transmitted through exposure to blood and other potentially infectious materials (OPIM) as defined by the Occupational Safety and Health Administration (OSHA). Any worker who has reasonably anticipated contact with blood or OPIM during the performance of his job is considered to have occupational exposure and to be at risk of being infected. Workers infected with HBV are at risk of liver ailments and also to transmit the virus to others who are not infected. It is an infectious disease which can cause chronic liver disease, liver cirrhosis, cancer of the liver (Hepatocellular carcinoma on long-term), and bone marrow failure (Hepatitis associated aplastic anaemia) especially with a co-infection of hepatitis C virus [12]. As a result of its mode of transmission (Sexual and Transfusion transmissible infection), HBV is an important occupational hazard to the general populace, but more in particular to the health care providers (i.e., laboratory physicians, technicians, scientists, surgeons and nurses) and commercial sex workers. Other modes of transmission include unsafe blood transfusion, intravenous drug abuse, and feto-maternal transfusion [13-15]. Based on these modes of transmission, the population at risk include the recipients of poorly screened infected blood, intravenous drug abusers (or drug addicts in the society), and the children of HBV-infected mothers. Therefore the target population of HBV infection in Nigeria include health care providers in regular contact with blood and OPIM, commercial sex workers, recipients of poorly screened infected blood, intravenous drug abusers, pregnant women and newborn of HIV-infected mothers [16]. The increased prevalence of HBV infection in Nigeria is attributable to poor infectious control system, poor environmental waste management, lack of health-protecting policies and legislation, poverty, wide income-gap between the rich and ordinary citizens (erosion of the socio-economic strata in the society), and a high level of inequality and inequity in the society.

Critical Appraisal and Integration of Current Evidences Identifying Key Issues Worsening the Burden of HBV Infection in Nigeria: Recommendations

HBV infection is a public health problem globally but more especially in Nigeria where over 22 million of the populace are living with the virus based on the 2%-20% prevalence range [8-11]. It poses a huge economic and social burden to the government. The cost of managing people living with HBV infection could be devastating, especially when considering the immediate and long-term complications of the disease. The fascinating thing about this disease is that it could be preventable if adequate health protective tools are put in place to prevent, screen, immunize and treat the target population. Nigerian ranks 214th among the United Nations member nations concerning average life expectancy from birth with an average life expectancy of 53.9 years from birth. It is the 8th worst nation to be born with an infant mortality rate of 69.7 per 1000 live births [17]. The overall implication is that Nigeria is an unhealthy nation to be born and to live. Morbidity and mortality of infectious origin contribute significantly to the poor health indices of the nation.

Based on the risk assessment of HBV infection, the health care providers, the commercial sex workers, recipients of unscreened blood, intravenous drug abusers, pregnant women and newborn of HBV-infected mothers are the target groups

during surveillance in order to reduce the burden of HBV infection in Nigeria [16]. To conduct satisfactory surveillance on the target group, the dose-response and exposure assessments become necessary. Several studies on HBV infection in Nigeria were mainly on the prevalence of the disease in the geopolitical zones of the country.

However, the findings based on previous studies showed an increase in prevalence as one moves from eastern Nigeria (1.5%-5.6%) [16,18] to the Northern part of the country [19]. The average prevalence in Western Nigeria was intermediate (7.5%) [20]. The reasons for these disparities in the prevalences in the various geopolitical zones in Nigeria are not known. However, a recent evidence-based cross-sectional study on the sero-prevalence of HBV infection among health workers in Eastern Nigeria highlighted possible risk factors of contamination. The study showed an overall prevalence of HBV was 1.5% (4/275). The prevalence in females 3/180 (1.7%) was insignificantly higher than in males 1/95 (1.1%) ($P>0.05$). Concerning the age group, the younger age group (< 20 years) has a significantly higher prevalence (1/5 (20%) compared to other age groups ($P=0.02$). It showed that blood transfusion and vaginal discharge (STD) were the highest predisposing factors to HBV infection with odd ratios (ORs) of 5.9 and 4.2 respectively (Table 1) [16]. These confirm that unsafe blood transfusion, poor screening practices, and commercial sex are the predominant risk groups of HBV in Nigeria. In terms of risk stratification, they are the high or extreme risk groups for HBV. Therefore, a history of vaginal discharge or sexually transmitted infection must be followed up with screening for HBV. Also, the younger and older age groups of the population were mostly at risk of acquiring HBV infection and these age groups will benefit from screening and prophylactic treatment (immunization) against HBV [21]. Other potential predictors of HBV status of the population include level of education, history of contact with a person with jaundice (yellowness of eye), tattoos or scarification marks, genital ulcers, location (urban versus rural), ethnicity, occupation, and immunization history [22]. These are potential candidates for HBV screening and prophylactic treatment.

The major challenge confronting people living with hepatitis B viral disease (HBV) in Nigeria is making accurate diagnosis and provision of their comparable estimates. When diagnoses are made in some cases, they are faced with another major challenge of treatment. HBV management incorporates assessment and control of the HBV burden using screening, diagnosis, and surveillance, auditing, vaccination/immunization and therapeutic interventions as HPTs [23-25]. In a recent study which used a hypothesis-generating questionnaire and screening of blood samples of 275 consented health workers, a prevalence of 1.5% of HBsAg was recorded among the health workers. However, this was small compared to previous studies where the prevalence ranged from 5.6%-14.3% in other parts of Nigeria. This low prevalence gave room for the need to explore other possible measures (including a panel of tests) for accurate validation of the diagnosis. The fall-outs of the brainstorming showed that: i) the fact that the studied population was a selected group of individuals from one health institution might be contributory to the low prevalence (i.e., faulty method of selection or selection bias). Hence, a larger population size and method of selection may be preferable in a future study to validate the result; ii) HBsAg test is a screening test. It is detected within the 4th and 6th week of the incubation period of the virus.

Table 1 Distribution of Potential Risk factors of HBV based on Clinical history of a southeastern Nigerian tertiary health center staff HBsAg results

Variables	HBsAg (+ve) n=4 N(%)	HBsAg (-ve) N (%)	Total	FT	p-Value
Past History of STI					
No	4(1.5)	268(98.5)	279 (98.9)	0.05	1.0
Yes	0	3(100)	3(1.1)		
Past history of Vaginal Discharge					
No	3(1.2)	256(98.8)	259(94.2)	2.73	0.21
Yes	1(6.2)	15(93.8)	16(5.8)		
Past History of Genital Ulcer					
No	4(1.5)	267(98.5)	271(98.5)	0.06	1.0
Yes	0	4(100)	4(1.5)		
Past History of Dental/Surgery					
No	3(1.5)	129(98.5)	195(70.9)	0.03	1.0
Yes	1(1.2)	79(98.8)	80(29.1)		
History of IV Drug use					
No	3(1.5)	196(98.5)	199(72.4)	0.01	1.0
Yes	1(1.3)	75(98.7)	76(27.6)		
History of Scarification/tatoon					
No	4(1.5)	262(98.5)	266(96.7)	0.14	1.0
Yes	0	9(100)	9(3.3)		
History of Blood Transfusion					
No	3(1.2)	257(98.8)	260(94.5)	3.0	0.20
Yes	1(6.7)	14(93.3)	15(5.5)		
Past history of Contact Jaundice					
No	4(1.8)	223(98.2)	227(82.5)	0.86	1.0
Yes	0	48(100)	48(17.5)		
Past history of Hepatitis					
No	4(1.5)	259(98.5)	263(95.6)	0.19	1.0
Yes	0	12(100)	12(4.4)		
Past history of Jaundice					
No	4(1.5)	270(98.5)	274(99.6)	0.02	1.0
Yes	0	1(100)	1(0.4)		

Note: FT-Fischer's exact test used when and expected cell count is less than 5 [16]

Thus, one could assume that the number of HBV-infected individuals would be higher if more hepatitis B serologic and virologic markers such as HBeAg, Anti-HBc, Anti-HBs, Anti-HBe, and HBV DNA were recruited in the study. These markers can detect the virus and its infectivity at a much earlier stage than the HBsAg. However, these were not possible because of the financial implications in resource-limited settings in Nigeria. It was expected that future studies would include more specific and accurate diagnostic tests to produce a reliable result. However, the government needs to take the lead to scale up screening, early detection, and immunization of the Nigerian populace against HBV.

This study has therefore raised the possibility that HBV infection in Nigeria is under-diagnosed. There is a need for the government to improve the method of screening and diagnosis of HBV to meet up with the international best practices, provide consensus national guidelines for prevention, treatment, and care of people living with HBV in Nigeria. This is the only strategic leadership approach to reduce the burden of HBV in the country.

On this note, we therefore, recommend the establishment of frameworks such as HBV Surveillance Agency (HSA), HBV Screening Agency (HBVSA), HBV Immunization agency (HIA) and HBV Therapeutic Intervention Agency (HTIA).

It is expected that these frameworks will go a long way in curbing the increasing prevalence of this deadly virus in Nigeria.

Application of the Key Principles of Health Protection

Health protection is simply defined as the protection of the population from a harmful environment and health-threatening conditions which could arise from disease conditions. The protection of the Nigeria populace from HBV infection and its health burden could not be possible without protective health interventions [26]. Health protective interventions in this context include all the health protective tools (HPTs) namely surveillance, vaccination, auditing, screening, health needs assessment, policies, and regulations. Health protection can protect the population health through infectious disease control, environmental health, and emergency preparedness and readiness by application of these health protection tools. In most of the evidence-based studies of the impact of HBV infection in the Nigerian population health, the health protection tools were used as modes of intervention. The evidence-based studies on the prevalence and case ascertainment of HBV infection in Nigeria were surveillance and screening interventions. In this first case, there was systematic collection, management, analysis, interpretation of routinely reported data [23] while the second case is a secondary preventive intervention aimed at retarding the existing disease through early diagnosis [24, 27]. The primary

preventive intervention which has to do with preventing the disease occurrence through education, awareness creation, and vaccination against HBV in the target population are the upstream approach of HBV prevention. The primary intervention is the best approach and most practiced in healthy high-income nations. The later intervention was minimally used in Nigeria, and this could be contributory to the high burden of HBV infection in Nigeria. Another health protective tool that was not used in the above public health issue was policies and regulation. Most healthy nations of the world are driven by health policies. They are usually implemented to enforce and protect vulnerable groups from health hazards. It is one of the health determining factors of a population. There is no implementable policy and regulation guiding prevention, control, immunization and treatment of HBV infection in Nigeria. This could be another reason for the high prevalence rate of HBV in Nigeria.

Application of Screening, Surveillance, and Preventive Interventions (Primary, Secondary and Tertiary) As the HPTS in Preparedness and Response Plan against HBV Infection

Primary Preventive Measures

- ***Human Preventive Measures***

An employer must develop an exposure control plan and implement the use of universal precautions and control measures such as engineering control and work practice control measures.

Personal protective equipment (PPE) such as apron/overall/laboratory coat, hand gloves, goggles, face mask, and booths, to protect all workers with occupational exposure must be mandatory. HBV vaccines should be made available by the employer to the workers at no cost. The universal safety precaution must guide the laboratory and OPIM procedures.

- ***Pre-vaccination counselling and training***

The employer must ensure that all occupationally exposed workers are trained about the vaccine, and vaccination, including efficacy, safety, method of administration, and the benefits of vaccination. Vaccination must be offered after training within ten days of initial assignment to a job where there is occupational exposure unless the worker has previously received the vaccine series. The employer must obtain a written opinion from the licensed healthcare professional within 15 days of completion of the evaluation for vaccination. This written opinion is limited to whether hepatitis B vaccination is indicated for the worker and if the worker has received the vaccination.

Workers who refuse vaccination are advised to sign declination form by their employers for notification purpose.

- ***HBV vaccination***

Hepatitis B vaccination is recognized as an effective defence against HBV infection. Hepatitis B vaccine has been available since 1982 [28-29]. It is a non-infectious vaccine prepared from recombinant yeast cultures, rather than human blood or plasma. There is no risk of contamination from other blood-borne pathogens nor is there any chance of developing HBV infection from the vaccine.

The standard requires employers to offer the vaccination series to all workers who have occupational exposure. Example of

workers who may have occupational exposure includes, but not limited to, healthcare workers, emergency responders, morticians, first-aid personnel, correctional officers and laundry workers in hospitals/ commercial laundries, and service healthcare or public safety institutions.

It is recommended that the HBV vaccine administration must be according to standard recommendations. To ensure immunity, it is important for individuals to complete the entire course of vaccination contained in standard recommendations. The great majority of those vaccinated will develop immunity to the hepatitis B virus. The vaccine causes no harm to those who may be HBV carriers. Although workers may desire to have their blood tested for antibodies to see if vaccination is needed, employers cannot make such screening a condition for receiving vaccination and employers are not required to provide pre-screening.

HBV vaccine should be made available to everybody, but more especially to the extreme and high-risk groups such as commercial sex workers, health care providers, pregnant women, intravenous drug abusers and recipients of poorly screened blood.

Strategies to Update the Target Population on Their Risk Status Using the Appropriate Modern Mode of Communication (Mass and Social Medias)

There must be a periodic public health awareness campaign on HBV infection, especially to the target audience. This awareness campaign must be educative, informative and must be culturally friendly to mitigate the challenges variations in the levels of health literacy of the target population. The implication is that to appropriately disseminate the information about hepatitis, the cultural language of the various ethnic groups must be considered and used to reach out to the target groups (i.e., in Hausa, Ibo, Yoruba, Efik, etc.). This is the easiest way of adoption innovation. The awareness campaign should also target urban and rural communities, the rich and the poor. The vehicle of information dissemination should include mass media (radio, TV adverts), social media (i.e., Facebook, Whatsapp, Blog, Flicker, Twitter and Instagram, etcetera), posters and bills. The choice of the vehicle of information to be used would be determined by the level of education and health literacy of the target audience. To effectively get to the target group, there is a need to continually engage the community using Community-Based Participatory Research (CBPR) approach. This is based on the belief that it is only the members of a community that could teach their people effectively [30].

CONCLUSION

Infection with hepatitis B virus is a major public health problem worldwide and Nigeria is an endemic zone due to lack of policies and regulation guiding the prevention, control, immunization and treatment of the disease. The government through the federal ministry of health and other stakeholders should scale-up the awareness campaign of HBV and establish national guidelines for hepatitis B prevention and treatment in Nigeria. The proposed HBV prevention policy should liberalize access to hepatitis B immunization in both children and adult population at no cost. This strategic leadership approach will reduce the burden of HBV disease in Nigeria to the barest minimum.

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