

Serological Prevalence of Hepatitis B and C Viral Infections in North Central Nigeria

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Abstract

Viral hepatitis is an inflammatory disease of the liver that triggers a series of complex immune responses that could eventually result in damages to the liver tissue if persistent. It has been estimated that Hepatitis B Virus (HBV) and Hepatitis C Virus (HCV) infections mortality combined far exceeded the number of mortalities occasioned by HIV/AIDS, Tuberculosis, and Malaria combined globally. The global HBV and HCV pandemic has its highest prevalence in the WHO Western Pacific and the WHO African regions. The WHO Eastern Mediterranean and the WHO European Regions carries the highest burdens of the HCV infection. The prevalence of HBV in Nigeria is very high as reported in several studies, and the prevalence of HCV is reported to be rising steadily. The low level of public awareness about the danger of HBV and HCV infections has contributed to the steady rise in the incidence of these infections among the Nigerian population. This study shows a 16% HBV prevalence, with a 2% HCV prevalence among the study population. The male population in this study have a higher prevalence of HBV infection (20%), with the female population having a 13% HBV prevalence. Only the female population has a prevalence of 4% for HCV infection in this study. The high prevalence of HBV and HCV infections in this study clearly requires all stakeholders to intensify advocacy and public health education on ways of preventing and managing HBV and HCV infections among the Nigerian population.

Keywords: *Sub-Saharan Africa (SSA), North Central Nigeria, Viral Hepatitis, Prevalence, HBV, HCV.*

Introduction

Viral hepatitis is an infection of the liver that causes damages to the liver through inflammatory responses (Chisari, 1997; Guidotti and Chisari, 2006). Many chemical and environmental elements and autoimmune conditions can cause hepatitis (WHO, 2019), but a few specific viruses are also responsible for the etiology of this pathological condition (CDC, 2019). It has been estimated that the Hepatitis B Virus (HBV) and Hepatitis C Virus (HCV) causes about 1.3million deaths per year (WHA, 2019). Currently, about 300 million people are living with viral hepatitis without being aware of their status. Also, the vaccine dose needed to protect babies from birth costs only 20 cents, yet this vaccine is not been used in 48% of countries worldwide (WHA, 2019). HBV and HCV present in either acute or chronic forms. Infection with HBV or HCV can sometimes be self-limiting or it may sometimes degenerate the liver into fibrosis, cirrhosis, or liver cancer (WHO, 2018). HBV or HCV

infection can range from a mild illness, lasting for only a few weeks to a more serious life-long or fulminant chronic condition (CDC, 2019). About 15% - 25% of HBV chronically infected people develop chronic liver diseases, while about 75% - 85% of people who are infected with HCV develop chronic conditions (CDC, 2019). As a damaged liver can perform little or no function, adequate measures and steps need to be taken in order to protect the world population against these preventable but deadly infectious disease conditions.

Aim of the study

This study aims to determine the Serological Prevalence of HBV and HCV among the apparently healthy and asymptomatic population in a North Central Nigerian Setting.

Review of literature

Viral hepatitis is a global pandemic that cuts across all regions of the world. New WHO data has estimated about 325 million people globally

living with HBV or HCV infection (*WHO, 2017*). In 2015 alone, viral hepatitis caused about 1.34 million deaths, with approximately 1.75 million people newly infected with HCV in 2015 alone (*WHO, 2017*). The prevalence of HBV and HCV varies in different regions of the world, with the WHO African and Western Pacific regions bearing the largest burdens of the global HBV and HCV infections (*WHO, 2017*). In Africa, about 70 million people are estimated to be living with HBV and HCV, with roughly 60 million living with chronic HBV and about 10 million living with chronic HCV (*WHO, 2020*). As a result of the lack of much-needed care for this disease in Africa, an estimated 200,000 cases of HBV and HCV Infection mortalities are recorded in Africa annually (*WHO, 2020*). Treatment access is still low, but a few countries are already taking giant steps towards scaling up access to viral hepatitis services (*Pedrana, 2018; MHM, 2019; Heffernan, 2019*). Since infection with HBV and HCV accounts for about 96% overall global hepatitis mortality, efforts are now being directed towards eliminating these two infectious diseases (*EMCDDA, 2019*).

In Nigeria, vaccination against HBV is still relatively low when compared to the level of scale-up in other Sub-Saharan African countries (*Musa, et al. 2015*). The pooled prevalence of HBV in Nigeria stood at 13.6% at 95%CI, while the prevalence of HCV ranges between 4.7% and 20% (*Ejiofor et al. 2010*). Recent studies in Nigeria have shown a high prevalence of these viral infections (*Odjimogho, et al. 2018*).

Pathology of HBV and HCV

HBV and HCV among all other non-cytopathic pathogenic viruses seem the most virulent due to their capacity for causing chronic or persistent infection (*Guidotti and Chisari, 2006*). The series of immunological responses and events occasioned because of infection with these viruses is what defines the pathogenesis and outcome of these infections. Complex immune responses associated with the initiation and activation of cytotoxic T-Lymphocytes (CTLs) induces corresponding immuno-pathological responses that if persistent, eventually leads to the damage of the architecture of the liver tissue, thereby altering its ability to function effectively. It has been noted that the majority of Hepatocellular Cellular Carcinoma (HCC) cases

are closely related to the chronic forms of HBV and HCV infections (*El-serag, 2012*)

Transmission of HBV and HCV

HBV is transmitted via contact with infected blood and other infected blood products, semen, and other body fluids (*Kennard, 2020*). HCV is mostly transmitted through infected objects used in injecting narcotics, needle-stick injuries among healthcare workers, through infected blood and other infected blood products used in a transfusion, and through poor safety practices especially in healthcare settings (*Kennard, 2020*). Direct contact or exposure to infected blood and other blood products is the most efficient mode of HCV transmission (*Mast, et al. 2005*)

Signs and Symptoms of HBV/HCV Infections

The incubation period for HBV and HCV differs. Many patients infected with these viruses are asymptomatic; whereas, those who eventually become symptomatic develop flu-like symptoms that include loss of appetite, vomiting, fever, nausea, malaise, and aching abdomen (*Smith, 1968*). Advanced symptoms include the development of jaundice, production of dark urine, fever, and light-colored stool (*Sim, 2019*). Sometimes, the symptoms and stage of this infection can also be detected by testing for some liver enzymes (*Krajden, 2005*) such as Alanine aminotransferase (ALT) and Aspartate transaminase (AST).

Diagnosis of HBV and HCV

Accurate diagnosis of the type and severity of hepatitis can only be made in the Laboratory through tests involving the collection of blood samples. Serological tests involve the detection of corresponding antibodies in a given blood sample (*Peeling, 2017*). In HBV however, the blood sample is tested for the surface antigen of the HBV. Nucleic acid tests help to detect the rate at which the virus is replicating in the host and to monitor the effectiveness or efficacy of any given ant-HBV or anti-HCV therapy (*Krajden, 2005*). A liver biopsy is taken for histological analysis to check for the extent of liver damage after HBV or HCV infection (*Christian, 2017*).

Treatment of HBV and HCV

The treatment for acute HBV and HCV infection differs. Acute state infections can be

managed through adequate resting, adequate fluid intake, relieving symptoms, and avoidance of unnecessary intake of drugs and alcohol (Samji, 2017). Treatment of chronic HBV and HCV infection states however involve the use of chemotherapies (Samji, 2017). With the availability of new treatment options for these infections, the diseases can now be better managed, thus avoiding the usual complications associated with the fulminant forms of these diseases (Koziel and Peters, 2007). Medications for chronic HBV include oral entecavir and tenofovir. Medication for chronic HCV includes oral daclatasvir, ledipasvir or sofosbuvir, ritonavir + Dasabuvir, and Ribavirin, simeprevir + sofosbuvir, daclatasvir + sofosbuvir, paritaprevir or ritonavir or ombitasvir + dasabuvir. As the research into finding and developing better, safer, cheaper, and more effective anti-HBV and anti-HCV therapeutic agents aimed at eradicating this infectious agent is ongoing, many of these currently available drugs may no longer be in use as newer and safer ones gradually emerges (Charles, 2019).

Prevention of HBV and HCV Infections

HBV and HCV can be prevented through various proactive and protective measures such as the avoidance of contact with blood and other body fluids (WHA, 2018). Also avoiding sharing needles and any other sharp objects. Proper sterilization of any skin piercing equipment, avoiding sharing toothbrushes and any other manicure and pedicure equipment, and proper laboratory screening of blood and other blood products before transfusion (WHO, 2012). Taking the complete dose of the HBV vaccine by individuals who are non-reactive to the HBV surface antigen (VanHerck, 2008), and staying away from injecting drugs. Also, through education and counseling on options for care and treatments after infection (Buffington, 2007).

Materials and Methods

A one-day medical outreach was conducted at the **Kabong** community of Jos North Local Government Area of Plateau State, North Central, Nigeria, in July 2019. One hundred (100) randomly presenting and apparently healthy adolescents and adults between the ages of 10 years and 75 years were serologically screened for HBV surface antigen (HBSAg) and HCV antibody after their consent was sought and duly

given. The *GIMA*® HCV and HBSAg test strips were used for the screening. The screening strips have a relative sensitivity of >99% and relative specificity of 98.6%. The accuracy of the used test strips was 99.3%. Each participant venous blood samples were aseptically collected following standard phlebotomy procedure into *Ethylene diamine tetraacetic acid* (EDTA) sample tubes before being spurned and the plasma used for the serological reactivity testing. All test results were read at ten (10) minutes after cross-reactivity between the subject's serum sample and the coated antigen or antibody in the test strips. Each participant was screened for both HBV and HCV. Of the 100 participants, 46% were males, while 54% were females. The results of the study were analyzed using simple percentages.

Results and Analysis

Table 1. Distribution of Infection Reactivity

Tests	(+ve) Reactivity	(-ve) Non-reactivity
HBSAg	16 (16%)	84 (84%)
HCV	2 (2%)	98 (98%)

Of the 100 participants, 16% were serologically reactive to HBSAg, while 2% were reactive to HCV. Thus, this study gives a prevalence of 16% HBV infection, while HCV has a prevalence of 2%.

Table 2. HBSAg and HCV Reactivity by Gender

Gender	HBSAg (%)	HCV (%)
Male	9 (20%)	0 (0%)
Female	7 (13%)	2 (4%)

Nine (9) male participants were reactive to HBSAg. This represents 9% of the study population and 20% of the male population. Seven percent (7%) of the female population were reactive to HBSAg, which represents 13% of the total female population. In addition, two (2) female participants were reactive to HCV; this represents 4% of the entire female population in this study. No male was reactive to HCV infection in this study.

Discussion

Findings from this study have shown that a significant population of apparently healthy individuals in North Central Nigeria are serologically reactive to the HBV and HCV infections (16%HBV and 2%HCV reactivity respectively). Sub-Saharan Africa is classified as a region of high endemicity for HBV (WHO,

2019). Studies in this same geographical region have also indicated a very high prevalence of HBV among the population (Ukaeje, 2005). The 16% prevalence recorded in this study is a sure proof that there is a high prevalence of HBV among the population of North Central Nigeria. The 2% HCV prevalence in this study, with the mean age of those infected is 60 years is a possible indication that HCV may be more common among adults with advanced age (CDC, 2020). Further studies aimed at exploring the prevalence of HCV infections in older populations are needed to clarify the age distribution of HCV prevalence. In addition, studies on the serological prevalence of HBV and HCV at the various Geo-political regions of Nigeria need to be carried out in order to ascertain the spread and prevalence of these infections among the Nigerian population.

Conclusion

One hundred (100) subjects participated in this study with 46% males and 54% females. A prevalence of 16% HBV infection was recorded, with the mean age of those infected being 38 years. A high proportion of the male population was reactive to HBSAg (20%) as compared to the female population with 13% prevalence. Of the total 18 (18%) reactive subjects in this study, only one (6%) previously knew her status with 94% not knowing their status. Among the 100 randomly presenting participants in this study, only one (1%) previously took the complete dose of the HBV vaccine, with another one (1%) not completing the dosage. These findings clearly buttressed the assertion of Musa *et al.* 2015, that there is a high prevalence of HBV in Nigeria. This study also clearly shows that the government of Nigeria still has a lot to do in Public Health advocacy and sensitization of the population towards viral hepatitis education and services as the majority of the citizenry are still not aware of the dangers of these infections. Also, because many do not presently know their viral hepatitis serological status and the availability of a preventive vaccine for HBV, more advocacy and public education through campaigns needs to be made regarding the various preventive ways to avoiding infection with HBV and HCV, and on how to protect and prevent the future generations from these deadly infections. The government of Nigeria will also do well in immediately adopting the frameworks and ideas presented in the WHO

“Manual for the Development and Assessment of National Viral Hepatitis Plans: A Provisional Document” (WHO, 2020). This manual can help guide the national strategic approach to this steadily rising neglected health challenge in Nigeria.

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