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Five-Years Epidemiology of Hepatitis B and C Viruses Infection in The Federal Polytechnic Nasarawa School Clinic, Nasarawa State.

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ABSTRACT

The study titled five-years epidemiology of hepatitis B and C viruses' infection was carried out in the federal Polytechnic Nasarawa School clinic, Nasarawa State. For hepatitis B virus a total of eight hundred (800) respondents participated and thirty-five subjects tested positive to Hepatitis B virus antibodies giving a prevalence of 4.38 %. Out of the samples collected three hundred and sixteen (316) blood samples were collected from males, while, four hundred and eighty-four (484) blood samples were collected from females. Eighteen (18) of the samples collected from males tested positive with a prevalence 5.70%, while twelve (12) of the samples collected from females tested positive with a prevalence 2.48% for Hepatitis B virus antibody. The prevalence of hepatitis B virus antibody in relation to age group of respondents showed prevalences of 3.85% out of 182 samples, 3.83% out of 261sample, 4.85% out of 206 samples, and 5.30% out of 151 samples among the age groups of 11-15, 16-20, 21-25 and 26-30 years old respectively. The overall prevalence by age group was 4.37%. For hepatitis C virus antibody one thousand and eighty-nine (1089) samples were analysed of which twenty-four (24) tested positive giving a prevalence of 2.20%. among the four hundred and sixty-six samples obtained from males fifteen (15) samples tested positive with a prevalence of 3.22%, while the six hundred and twenty-three samples collected nine (09) tested positive with a prevalence of1.44%. The prevalence of hepatitis C virus antibody and relation to age group of respondents showed prevalences of 0.00%, 1.77%, 2.99%, and 2.39% among the groups of 11-15, 16-20, 21-25 and 26-30 years old respectively.

KEYWORDS: *Hepatitis, Antibody, prevalence, Virus.*

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Inroduction

Hepatitis B virus is a debilitating and widespread impairment disease of the liver, scientific research data indicated that millions of people are affected all over the world (Weinberger *et* al.2000; Ohnuma *et al*., 1990; Zanetti *et al.,* 1988; Wilson *et al* 2000; Bock et al., 2002). The terrible pathological outcome of persistent HBV infections consists of plethora of conditions such as the degeneration into chronic hepatic inadequacy, cirrhosis, and hepatocellular carcinoma (HCC). Also, HBV carriers can serve as vehicles for the spread of the disease for many years (Ohnuma *et al*., 1990; Wilson *et al* 2000; Melegari and Scaglioni, 1998; Chuang *et al.,* 1993). HBV infections is acquired frequently in early childhood with asymptomatic condition which mostly leads to the chronic carrier state. About 2000 million people are currently infected with HBV at one time or the other in their lives. Among these, almost 350 million stayed infected chronically and become carriers of the virus (Weinberger *et* al.2000; Zanetti *et al.,* 1988; Wilson *et al*., 2000; Chuang *et al.,* 1993).

A large number of the world's population inhabits areas where regions of very high cases levels of infection. Annually, approximately more than 4 million acute clinical cases of HBV, and about 25% of carriers, about one million people a year, die from chronic active hepatitis, cirrhosis or primary liver cancer (Wilson *et al.,* 2000; Hepatitis B has also been called type B hepatitis, serum hepatitis, homologous serum jaundice (Wilson *et al.,* 2000). Hepatitis B is caused by the HBV, which is an enveloped virus consisting a partially double-stranded, circular DNA genome, and domiciled among the family *Hepadnaviridae* (Ohnuma *et al*., 1990; Zanetti *et al.,* 1988; Wilson *et al.,* 2000). The virus impedes the normal activities and functions of the liver while producing its progenies in the livers' hepatocytes. The immune system is triggered to elicit a specific reaction to arrest and halt the growth and spread of the infectious agent. As a result of enormous destructions caused, the liver degenerate into an inflamed condition. HBV may cause around 80% of all cases of Hepatocellular carcinoma all over the world, which comes behind only tobacco among known human carcinogens (Zanetti *et al.,* 1988; Chuang *et al.,* 1993).

Promiscuity with numerous persons or with persons with multiple partners can be dangerous. Fortunately, hepatitis B is the sole sexually contacted disease with a protective vaccine (Wilson *et al.,* 2000l) persons who are hepatitis B surface antigen (HBsAg) positive are potentially infectious. Millions of people all over the world with HBV carrier state are constant sources of new infections for people not infected by the virus (Bock *et al.,* 2002). Consequent of acute HBV infection, the risk of degenerating into a chronic infection state varies with age. Chronic HBV infection occurs among about 90% of infants infected at birth, 25–50% of children infected at 1–5 years of age and about 1–5% of persons infected as older children and adults. Research have shown that the chronic HBV infection is prevalent among persons with immunodeficiency (Ohnuma *et al*., 1990, Zanetti *et al., 1998*, Wilson *et al* 2000; Bock *et al.,* 2002). The most important route of HBV spread universally is perinatal, from a mother to her newborn baby. If a pregnant woman is an HBV carrier and is also HBe Ag-positive, her newborn baby has 90% likelihood to be infected and become a carrier. Of these children, 25% will die later from chronic liver disease or liver cancer (Zanetti *et al., 1998*). HBsAg is identified as the major clinical marker showing an acute or chronic infection state and prevalence as well as endemicity of HBV infection is defined by the presence of HBsAg. (Whitle *et al.,* 2002; Coursager *et al.,* 1994; Ferlay *et al.,* 2010). HBsAg testing is the primary way to identify persons with chronic HBV infection and several characteristics of this serological marker increase the precision of HBsAg estimates, including high specificity, long serum persistence, low possibility of chronic cases losing HBsAg (Whitle *et al.,* 2002). The hepatitis B vaccine is the major step in the prevention of hepatitis B infection. This vaccine has been in use as the accepted preventive measure since 1982. (Hyams, 1995; Shepad *et al.,* 2006). World Health Organization recommended vaccination of an infant from birth, If possible. About two to three or more doses are recommended at a later time for maximum protection. This vaccine has an efficiency of up to 95% (Hyams, 1995; Brechot *et al.,* 2001). Approximately, higher than one third of the world's population is projected to be infected with HBV. Chronic HBV carriers are about 5% of the world's population, while HBV this pathogen has been reported to cause over one million deaths every year (WHO, 2016). The HBsAg carrier rate varies from 0.1% to 20% among different world'. In low-risk regions, the highest incidence of HBV infection is recorded among teenagers and young adults. Approximately 240 million people are chronically infected with hepatitis B (WHO, 2016). The prevalence of chronic HBV infection differs geographically, ranging from 1% to 20%. Populations with high rates include Alaskan Eskimos, Asian-Pacific islanders, Australian aborigines, and populations of the Indian subcontinent, sub-Saharan Africa, and Central Asia. In some locations, such as Vietnam, the rate is as high as 30% (Te *et al*., 2010). The prevalence of the HBV carrier state is related to differences in the mode of transmission, including iatrogenic transmission, and the age of primary infection. In low-prevalence (< 2%) regions, the lifetime risk of HBV infection is less than 20%. Sexual transmission and percutaneous transmission during early adulthood are the main routes of spreading the infection. About 12% of HBV-infected individuals live in the low-prevalence regions, which include North America, northern and Western Europe, Australia, and New Zealand (Te *et al*., 2010).

The viral pathogen that causes type C hepatitis C (HCV) has a genome of Ribonucleic acid found in the family of flaviviridae. This viral particle is implicated as the causative agent of liver disease all over world, this pathogen infects more than150 million people. Hepatitis C virus particle has been identified as a leading cause of chronic liver hepatitis, likewise liver cirrhosis, primary liver disease and liver failure (WHO, 2015; Gower *et al*., 2014). In Nigeria, 18.7% - 38% of liver cancer patients have indicators of HCV (Bouwoye, 1997). The virus is either intramuscularly or intravenously transmitted; the prevailing predisposing intrinsic factors include blood intromission, preceding surgery and teeth operation, indiscriminate use of sharps objects for various cosmetic procedures, likewise during passage through the birth canal and unprotected conjugal indulgence. Complication during medical procedures have been reported in a number of localities

burdened with high cases of HCV, like Egypt and Cameroon (Gower *et al*., 2014; Karaca et al., 2006).

Cases of chronic HCV infection ultimately progresses to the manifestation of liver cirrhosis, hepatocellular cancer, liver failure, and death (Lauer, 2001) this is very common among Human Immunodeficiency Virus (HIV) victims during their chemotherapy (Onyekwere and Hamid, 2015). Studies and reports have estimated that the occurrence of HCV infection may appear to have reduced in the advanced world, death rate associated to HCV infection have been projected to be on the rise for the next two decades (Razavi et al., 2013) Scientific reports have projected that HCV disease could be vanquished in the next 1 to 2 decades with well-orchestrated concerted curative strategem (Wedemeyer et al., 2014; Martin et al., 2013).

Hepatitis C Viruses have predilection for liver cells and some B-lymphocytes. The genome is a single-strand, positive-sensed RNA that encoded 3-structural and 7 non-structural proteins (Kesson, 2002). The genome is surrounded in a protein coat, wrapped in a lipid envelope which was derived from the infected host cell. The virus is composed of an envelope obtained from host membranes. Sequence differentiation of the genome takes place precisely in the NS2, E1 regions with a prominent degree of preservation noted in the non-coding C, NS3, NS4 and NS5 regions (Finalayson *et al*., 1999).

Hepatitis C virus is an orbicular, wrapped single-stranded liver cell predilection RNA virus found in the flaviviridae family (Sharma, 2010). This virus was discovered in 1975, a large number of the recorded transfusion-associated hepatitis cases were caused by neither hepatitis A virus nor hepatitis B virus (the only two known human hepatitis viruses at that time). The new infection was therefore called non-A non-B hepatitis (NANBH), and the presumed pathological agent was called non-A non-B hepatitis virus (WHO, 2002). Hepatitis C virus was later established in 1989, as the agent responsible for most of the transfusion-associated NANBH (WHO, 2002; Choo et al., 1989).

Hepatitis C virus (HCV) is implicated for both acute and chronic types of hepatitis. After the initial infection, about 80% of people are asymptomatic (WHO, 2000). Approximately 75–85 % of newly infected individuals will develop into chronic disease (WHO, 2000; Seeff, 1999). Estimated 20% of infected individuals' progresses to fibrosis and cirrhosis; of these, about 20% will progress to hepatocellular carcinoma (HCC) (Seeff, 1999). In 25 % of all liver cancer patients, the causative agent is Hepatitis C Virus (WHO, 2002).

The typical method of Hepatitis C virus spread is majorly through exposure to infected blood that occur mostly by contaminated blood, blood products, transfusions and organ transplants; hypodermal injections given with contaminated syringes and needles, needle-stick injuries in health-care settings, intravenous injection drug during abuse; and being born to a hepatitis C virus infected mother (Lavanchy and Gavino, 2000; Lavanchy, 1999). To a lesser extent, the virus may be spread through sexual indulgence with an infected person or by sharing of blood-contaminated personal items (WHO, 2000).

Methodology

This is a five-year epidemiological study of students and staff who attended the Federal Polytechnic Nasarawa school clinic from 2020 to 2025 who were tested for both HBV and HCV antibodies. This study was done at the Federal Polytechnic Nasarawa school clinic, Nasarawa-Toto local government area of Nasarawa state, in north-central, Nigeria. This clinic caters for both students and staff comprising of in-patient and out-patient cares, also its' laboratory has the capability to undertake many laboratory diagnoses including HBV and HCV screening. Hepatitis B and C screening is compulsory for all newly admitted students and newly employed staff and their respective families attending the clinic facilities. Likewise, voluntary blood donors and all staff members attending the clinic for medical check-up and all those presumed healthy individuals. Rapid diagnostic test was used to determine the prevalence of HBsAg and anti-HCV antibodies among all the respondents that attended this clinic.

Eligibility criteria: only clients who were screened for HBV and HCV and had complete information including results for HBV and HCV documented on the registers used for data extraction were included in this study. All individual students and staff members screened for HBV and HCV had their results treated with utmost confidentiality with their complete information revealed to them only. This study was conducted in accordance with the guidelines and regulations of the approving institution. Written permission was also gotten from the head of the laboratory unit to access the registers and data from the laboratory.

Collection of biodata: the laboratory result register was used to collect data. The register contained information on the age of the patient, address, sex, the category of the patients and the various investigations the patient was requested to do, the register contained the results of the investigation done

in addition to the other information on the request register.

Limitations of study: The retrospective nature using secondary data collection may have been a limitation to this study as some data were missing from the laboratory registers reviewed. However more than one registers were used to reduce the number of missing data. Also, HBV and HCV were only tested using rapid test kits. Additional tests to determine the presence of Hepatitis B envelope antigen (HBeAg) and HCV ribonucleic acid (RNA) test should have been done to determine active infection among those who tested positive to HBV and HCV respectively.

Result

Prevalence of hepatitis B virus antibody in relation to gender of respondents.

Gender	Number Sampled	Number Positive	% Positive
Male	316	20	6.33
Female	484	15	3.10
Total	800	35	4.38

Prevalence of hepatitis B virus antibody in relation to age group of respondents.

Age-Group (years)	Number Sampled	Number Positive	% Positive
11-15	182	7	3.85
16-20	261	10	3.83
21-25	206	10	4.85
26-30	151	8	5.30
Total	800	35	4.38

Prevalence of hepatitis C virus antibody in relation to gender of respondents.

Gender	Number Sampled	Number Positive	% Positive
Male	466	13	2.79
Female	623	11	1.77
Total	1,089	24	2.20

Prevalence of hepatitis C virus antibody in relation to age of respondents.

Age-Group (years)	Number Sampled	Number Positive	% Positive
11-15	70	00	0.00
16-20	282	05	1.77
21-25	234	07	2.99
26-30	503	12	2.39
Total	1,089	24	2.20

Discussion

This study Hepatitis B virus antibody revealed prevalences of 4.85% among the 21-25 and 5.30% among 26-30 years age groups respectively, this is comparable to a similar study carried out by Adabara et al 2012 in General hospital Minna who reported lower values of between 4.2% and 6.5%for age groups of 20-29 years to 40-49 years (Salawu *et al*., 2011), This study revealed an over all HBsAg of 4.38 %, which is lower compared to 16.7% reported by Odinachi *et al.,* in 2014 on 300 students of university of Jos. Another study among blood donors in North Central Nigeria, at the Bishop Murray Medical Centre in Makurdi, age group prevalence of HBV was reported at 11.90%, 13.05% and 6.53% within the age ranges of 18-22, 23-27 and 28-32 years respectively (Aernan *et al*., 2011), this Makurdi survey is higher than the reported prevalences of 3.85 % and 3.83% for age groups of 11-15 and 16-20 years old age groups in this study. This study reported prevalence of 5.30% for age group of 26-30 which is in agreement with 6.53% for 28-

32 age groups (Odinachi *et al.,* in 2014). This study reported a higher prevalence among males than females with HBV prevalence of 6.33 % for male and 3.10 % for female, which is contrary to a study conducted by Ndako *et al.* (2014) where female subjects recorded 17.3% prevalence chigher than the 16.7% recorded by the Male subjects.

This research on Hepatitis C virus antibody revealed a prevalence of 2.20% is in tandem with the 2.50 % prevalence estimated for Africa and Asia (Mohammad et al., 2013). The prevalence recorded for different groups are 3.85 % for 11-15 years' age group, 3.83% for 16-20 years age group, 4.85% for 21-25 years age group and 5.30% for 26-30 years' age group, the results of this research is much higher than the 0.40% reported among blood donors in Kano, Nigeria, Senegal (0.80%), Ghana (0.90%), Namibia (0.90%), and 1.91% reported for Sudan (Jeremiah et al., 2008; Imoru et al., 2003). However, researches carried out in other geographic regions within Nigeria reported some similar and higher prevalence than those reported by this study, such as 4.50% among sickle cell patients in Benin; 5.70% among HIV patients in Jos, 8% among undergraduates in the University of Ilorin and 12.30% in Port Harcourt (Nwannadi et al., 2012; Udeze et al. 2011; Inyama et al., 2005). This study reported an HCV antibody prevalence of 2.79% for males and 1.77% for females, indicating a higher prevalence in males than in females which is tandem with Udeze et al (2009) study carried out among HIVAIDS patients in Ibadan Oyo State. However, this study report was not in agreement with Udeze et al, (2011) findings carried out in Ilorin, Jos and Niger Delta that reported higher prevalence in females than males.

Conclusion

This five-year epidemiological study of students and staff who attended the Federal Polytechnic Nasarawa school clinic from 2020 to 2025 who were tested for both HBV and HCV antibodies. This study was done at the Federal Polytechnic Nasarawa school clinic, Nasarawa-Toto local government area of Nasarawa state, in north-central, Nigeria. Eighteen (18) of the samples collected from males tested positive with a prevalence 5.70%, while twelve (12) of the samples collected from females tested positive with a prevalence 2.48% for Hepatitis B virus antibody. Of the four hundred and sixty-six samples obtained from males fifteen (15) samples tested positive with a prevalence of 3.22%, while the six hundred and twenty-three samples collected nine (09) tested positive with a prevalence of1.44%. The overall prevalence for HBsAg 4.84% and anti-HCV was 2.20% in whole blood.

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