International Journal of Biology Research
www.biologyjournal.in
ISSN: 2455-6548
Received: 19-05-2023, Accepted: 04-06-2023, Published: 19-06-2023
Volume 8, Issue 1, 2023, Page No. 60-67

Prevalence of hepatitis B and C virus and their effect on serum albumin and liver aminotransferases among staff and students of Federal College of Education, Pankshin, Plateau State, Nigeria

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Abstract
Infection with hepatitis B and C viruses is a serious health issue that causes a sizable part of liver illnesses globally. This study examined the prevalence of hepatitis B and C viruses in Federal College of Education, Pankshin, Plateau State. The blood samples of 3000 consenting Staff and students were randomly collected and screened using rapid serological methods. HBV markers were determined using a HBV 5 in 1 Panel cassette (Century Care Ltd); while antibody to HCV was detected using anti-HCV test strip (Nantong Egens Biotechnology Co. Ltd Hamburg, Germany (FEDECO). The demographic and clinical information of the participants were collected using structured questionnaires. The prevalence of each viral infection (HBV and HCV) was determined using simple percentage. The t- test was employed to determine the relationships between age and presence of risk factors with HBV and HCV infection at $P < 0.05$. Also, t-test was used for AST, ALT and albumin level. The results of the prevalence of hepatitis B revealed that out of the 260 number of positive samples, 128 (49%) were male and 132 (51%) were female. 0 (0%) were 16-20yrs, 124 (48%) were 21-25yrs, 127 (49%) were 26-30yrs and 9 (3%) were ≥31yrs above. 253 (97%) were single and 7 (3%) were married. 259 (100%) were students and 1 (0%) were staff. The prevalence of hepatitis C virus results revealed that out of the 12 number of positive samples, 12 (100%) were male and 0 (0%) were female. 0 (0%) were 16-20yrs, 4 (33%) were 21-25yrs, 7 (58%) were 26-30yrs and 1 (8%) were ≥31yrs above. 11 (92%) were single and 1 (8%) were married. 11 (92%) were students and 1 (8%) were staff. Risk factors associated with the occurrence of hepatitis B and C virus infection includes sharing of sharp objects, history of blood transfusion, tattooing/ear piercing, sharing of toothbrush, smoking, intravenous drug use and sexual intercourse. In HbsAg and HCV, the number of positive samples of AST was higher compared to the ALT. The blood plasma protein (Albumin) of hepatitis B and C virus revealed that in both HbsAg and HCV, the number of positive samples of Albumin was higher compared to the negative samples. The authors concluded that hepatitis B and C infection is present among staff and students of Federal College of Education, Pankshin with a low prevalence rate of 1.5%, whereas there was no record of HBV/HCV co-infection among the study population, therefore the on-going public health campaign programme against Hepatitis B and C should be sustained.

Keywords: liver disease, hepatitis, HBsAg, albumin, prevalence

Introduction

Hepatitis B virus and hepatitis C virus (HCV) are major causes of morbidity and mortality worldwide. Viral hepatitis due to hepatitis B and C is a global public health problem affecting millions of people worldwide, causing an estimated 1.3 million deaths each year from acute infection and hepatitis-related liver cancer and cirrhosis (WHO, 2016–2021) [39]. It is estimated that more than two billion people are infected with hepatitis B virus (HBV) worldwide and about 350 million of them suffer from chronic HBV infection (Lavanchy, 2014) [11]. There are also about 177.5 million carriers of hepatitis C virus (HCV), resulting in about 350,000 global deaths annually (Petruzziello *et al.*, 2016) [24]. The burden of hepatitis B and C infection is highest in the developing world and mostly affects resources limited countries, where screening and access to care and treatment are not readily available (Lemoine *et al*., 2015) [12]. Viral hepatitis B and C are blood-borne infections, with significant transmission occurring through unsafe injections and medical procedures, and less commonly through sexual contact (Ugbebor *et al.*, 2011) [33]. Health-care workers are, thus, at greater risk of acquiring these two blood-borne infections from percutaneous (needlestick/sharp instrument) injuries or other types of occupational exposures, and the incidence of this infection among them has been estimated to be four times the level in the general population (Coppola *et al.*, 2016) [4]. Needlestick accidents with percutaneous inoculation is a well-documented HBV and HCV transmission, with seroconversion rate of 10–30% following needle stick exposure to HBV infected blood and about 2.0% for HCV (Tarantola *et al.*, 2016) [30].

The hepatitis B virus (HBV) is 10 times more infectious than hepatitis C virus (HCV) with many carriers not realizing they are infected with the virus, thus referred to as a "silent killer" (Seyi *et al.*, 2019) [25]. The risk of developing a chronic form depends on age at infection: The younger the patient, the higher the risk of developing chronic hepatitis: chronic infection is seen in 90% of infants infected at birth, 30 to 50% of children infected between the age of one to four years, and 1 to 10% of those infected at older age or as adults (European Center for disease and control, 2010) [5]. Approximately, half of the world's population lives in HBV endemic areas and hepatitis B surface antigen (HBsAg) seroprevalence is more than 8% (Inan, 2015) [7]. HBV infection has been the most significant factor associated with the development of liver cancer, which is one of the most malignant cancers; the second most frequent cause of cancer death in men, and the sixth leading cause of cancer death in women (Ishikawa, 2011). The incubation period of hepatitis B is four to 12 weeks,

followed by the acute infection phase, icteric, or anicteric course, once again with a variable duration of two to 12 weeks (Kayser *et al.*, 2015). HBV can effectively be prevented by vaccination, here, a safe and effective HBV vaccine has been available since the 1980s and can prevent acute and chronic infection with an estimated 95% success (European Center for disease and control, 2010) [5].

Hepatitis C virus is a spherical, enveloped single stranded hepatotropic RNA virus that belongs to the flaviviridae family (Seyi *et al.,* 2019) [25]. It was first established in 1975, that the majority of the observed 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 disease was therefore called non-A non-B hepatitis (NANBH), and the presumed etiological agent was called non-A non-B hepatitis virus (WHO, 2017) [38]. Hepatitis C virus was later identified in 1989, as the agent responsible for most of the transfusion-associated NANBH (WHO, 2021) [39]. Most new infections with HCV are subclinical and the majority of HCV patients (70–90%) develop chronic hepatitis, many of which are at risk of progressing to chronic active hepatitis and cirrhosis (10–20%). In some countries, like Japan, for instance, HCV infection often leads to hepatocellular carcinoma (Seyi *et al.,* 2019) [25]. A large number of people carrying the HCV virus are not aware of being infected due to the high proportion of asymptomatic infections. About 25,000 individuals die annually of chronic liver disease and cirrhosis in the United States. HCV appears to be a major contributor to this burden, approximately 40% [10]. According to the World Health Organization, there is no vaccine against HCV infection and a person with HCV can infect others from one to several weeks before symptoms begin to show up (Seyi *et al.,* 2019) [25]. In case of chronic infections, infectivity may persist indefinitely. Relevant measures to reduce transmission are an early diagnosis, effective prevention and screening programmes, as well as appropriate treatment (Seyi *et al.,* 2019) [25].

Nigeria contributes significantly to the burden of chronic viral hepatitis globally. Viral hepatitis is the seventh leading cause of death globally (World Health Organization, 2017) [38]. An estimated 95% of individuals with chronic HBV infection, or both, are unaware of their infection and so do not benefit from clinical care, treatment, and interventions that are designed to reduce onward transmission (Spearman *et al*.,2017) [28]. Majority of the Nigerian population are not aware of its chronic complications of liver cirrhosis and primary liver cell cancers (National AIDS/STIs Control Program, 2016) [17]. The prevalence and incidence of a disease are among the most fundamental measures in epidemiology. Prevalence is a measure of the burden of disease in a population in a given location and at a particular time, as represented in a count of the number of people affected. Counts of the number of people affected with a disease are required to plan appropriately for their health care needs. Prevalence may also be used to compare disease burden across locations or time periods. However, because prevalence is determined by not only the number of persons affected but also their survival, prevalence is a less useful measure in studies of etiology than incidence rates (Ward, 2013) [36]. Hepatitis B and C prevalence is highest in the WHO Western Pacific Region and the WHO African Region, where 6.2% and 6.1% respectively of the adult population is infected. In the WHO Eastern Mediterranean Region, the WHO South-East Asia Region and the WHO European Region, an estimated 3.3%, 2.0% and 1.6%% of the general population is infected, respectively. 0.7% of the population of the WHO Region of the Americas is infected (World Health Organization, 2017) [38].

The hepatitis B and C viruses (HCV) are major global causes of disease and mortality. Hepatitis B and C-related viral hepatitis is a major public health issue that affects millions of individuals globally and is thought to be responsible for 1.3 million annual fatalities. Patients with dual HBV/HCV infection have a higher risk of progression to cirrhosis and decompensated liver disease and have an increased risk of hepatocellular cancer (HCC). The financial loss due to hepatitis B and C viruses annually is estimated to be about N132 billion (USD 906 million) in the form of treatment costs, prevention, loss of man-hours, amongst others. Government has been collaborating with international organizations, including the World Bank, World Health Organization, UNDP and UNICEF on a campaign to "Roll Back hepatitis B and C viruses." Also, accessing HBV testing in Nigeria has numerous challenges but the major reasons are a lack of awareness on the importance of the test among the population or importance of knowing one's status, and the cost of HBV tests. Apart from this, because of the exertion of the right of choice (freedom to health decisions), children especially adolescents below the age of 18 years could exhibit an intention of HBV testing but need to get the approval of parents who may think otherwise for various reasons. Furthermore, little or no research has been reported about the prevalence of hepatitis B and C viruses in Plateau State. So, this has prompted the researcher to examine the prevalence of hepatitis B and C viruses in Federal College of Education, Pankshin, Plateau State.

Materials and methods

Study area

The study area is in Pankshin Local Government Area of Plateau State, Nigeria with its headquarters in the town of Pankshin. It has an area of 1,524 km^2 and a population of 191,685 at the 2006 census. The geographical co-ordinates of Pankshin are Latitude 9.3279^0 E and longitude $9,54312^0$ E, and an altitude of 1371 meters elevation above sea level. Pankshin enjoys a more temperate climate than much of the rest of the local government areas in plateau state. Average monthly temperatures range from $20\text{-}24^0$ (70-79 ^{0}F) and the annual rainfall is at average of 1150 mm (45.26 inch) per year, or 95.8 mm (3.77 inch) per month

Duration of study

The study was carried between the months of November, 2022 and July,2023.

Study population

Staff and students from different Departments of Federal College of Education, Pankshin were the target population. They consist of male and female within the age range of 16-60 years, from different ethnic, religious and cultural group.

Sample size

A total of 3000 consenting Staff and students from various Departments of Federal College of Education, Pankshin, Plateau state form the sample of the study.

Data collection

Clinical information was obtained from the participants through the administration of prepared questionnaires. Each questionnaire had a unique participant identification number (PIDN). The first part of the questionnaires contained the biodata of the patients e.g. name, sex, age, study level and marital status. Second part included history of HBV and HCV Infection, risk factors, personal hygiene and health care-seeking behavior. Responses to a structured questionnaire administered were used to collect data on epidemiology, demographic trends and causes of vulnerability for both HBV and HCV Infection. For reasons of privacy, all data were kept confidential in accordance with World Medical Association Declaration of Helsinki (2008) and for each participant, only the PIDN was recorded on the laboratory forms.

Laboratory analyses of sample

A strap (tourniquet) was tied around the top of the patients arm to temporarily restrict the blood flow from the arm back to the heart. This made the vein inside the elbow "pop out", and therefore easier to find. The area where the needle was inserted was wiped with a sterile alcohol wipe to reduce any risk of infection. A needle was inserted into the vein and a small amount of blood was drawn into the vial attached to the needle. After the procedure, a small wad of cotton was pressed on the entry point to stop the flow of blood. The blood samples was divided into 2, bottle A and B. bottle A was transported to Jos University Teaching Hospital for liver function test while sample B was taken to the biology laboratory of Federal College of Education Pankshin. Serum was separated by low speed centrifugation at 1,500 revolutions per min. Serum was tested for Hepatitis B surface antigen (HBsAg) and Hepatitis C virus using a One Step HBsAg kit (Century Care Ltd) and HCV kit (Nantong Egens Biotechnology Co. Ltd Hamburg, Germany (FEDECO).

The rapid test kit was immersed into the serum for 10-15 seconds. The maximum line (max) on the strip was observed in order to avoid exceeding the line. The strip was then placed on a non-absorbent surface. The timer was set for fifteen (15) minutes, awaiting the red line to appear or not. Two distinct red lines, one on the control region (C) while the other on the test (T) region.

Interpretation of results for HBsAg

Positive

In addition to a pink colored control band, a distinct pink colored band will also appear in the test region.

Negative

Only one colored band will appear on the control region.

Invalid

No band appearing in the control region which could be as a result of procedural error and/or the test reagent has deteriorated. Specimen should be re-tested.

Interpretation of results for anti-HCV

Negative

Only one-color band appears on the control region. No apparent band on the test region. This indicates that there is no detectable anti – HCV in the specimen.

Positive

Distinct color bands appears on the control and test region. Both test line and control line indicate that the specimen contains detectable amount of anti-HCV.

Invalid

No visible band at all or only one colored band appears on the test region, this is an indication of a possible error in performing the test.

Liver function test

Liver Function tests (LFTs) are groups of clinical biochemistry laboratory assays designed to give information about the state of a patients Liver.

The parameters measured include Prothrombin time (PT), albumin, bilirubin (direct and indirect). Liver transaminases AST/ALT. These are called Liver damage test-biomarker of Liver injury in a patient with some degree of intact liver function. For the purpose of this research, albumin, Aspartate transaminase (AST), Alanine transaminase (ALT) will be determined on the students and staff who are positive to HBV and HCV infection.

Albumin test

Albumin is a protein made specifically by the liver. It is the main constituent of total protein the remaining from globulins). Albumin levels are decreased in chronic liver disease such as cirrhosis (Medline plus Encyclopedia).

Principle

The measurement of Serum albumin is based on its quantitative binding to the indicator 3,3:5.5 – tetraboron-cresol sulphone phthalein (bromocresol green, BCG). The albumin – BCG – complex absorbs maximally at 578nm, the absorbance being directly proportional to the concentration of albumin in the sample.

Data analysis

The prevalence of each viral infection (HBV and HCV) was determined from the proportion of the positive individuals in the total population under consideration and expressed as a percentage. The chi-square test will be employed to determine the relationships between age and presence of risk factors with HBV and HCV infection at $P < 0.05$. Also, t-test for AST, ALT and albumin level among FCE Pankshine students and staff will be tested to determine if their level is significant or not in the study at $P < 0.05$.

Results

Table 1: Prevalence of hepatitis B virus surface antigen in relation to socio-demographic characteristics of the study participants.

Characteristics	Category	Number of serum examined	Number of positive N (%)	Number of negative N (%)	P-value
Sex	Male	1102	128 (49)	974 (36)	0.089

	Female	1898	132 (51)	1766 (64)	
	Total	3000	260 (100)	2740 (100)	
Age group	16-20	0	0 (0)	0 (0)	0.118
	21-25	1456	124 (48)	1332 (49)	
	26-30	1324	127 (49)	1197 (44)	
	≥31-	220	9 (3)	211 (8)	
	Total	3000	260 (100)	2740 (100)	
Marital Status	Single	2548	253 (97)	2295 (84)	0.315
	Married	452	7 (3)	445 (16)	
	Total	3000	260 (100)	2740 (100)	
Group	Students	2858	259 (100)	2599 (95)	0.421
	Staff	142	1 (0)	141 (5)	
	Total	3000	260 (100)	2740 (100)	

The table 1 above shows the prevalence of hepatitis b virus surface antigen in relation to socio-demographic characteristics of the study participants. Out of the 260 number of positive samples, 128 (49%) were male and 132 (51%) were female. Also, out of the 2740 number of negative samples, 974 (36%) were male and 1766 (64%) were female. Out of the 260 number of positive samples, 0 (0%) were 16-20, 124 (48%) were 21-25, 127 (49%) were 26-30 and 9 (3%) were ≥31 above. Also, out of the 2740 number of negative samples, 0 (0%) were 16-20, 1332 (49%) were 21-25, 1197 (44%) were 26-30 and 211 (8%) were ≥31 above. Out of the 260 number of positive samples, 253 (97%) were single and 7 (3%) were married. Also, out of the 2740 number of negative samples, 2295 (84%) were single and 445 (16%) were married. Out of the 260 number of positive samples, 259 (100%) were students and 1 (0%) were staff. Also, out of the 2740 number of negative samples, 2599 (95%) were students and 141 (5%) were staff.

Table 2: Prevalence of hepatitis C virus surface antigen in relation to socio-demographic characteristics of the study participants.

Characteristics	Category	Number of serum examined	Number of positive N (%)	Number of negative N (%)	P-value
Sex	Male	1102	12 (100)	1090 (36)	0.066
	Female	1898	0 (0)	1898 (64)	
	Total	3000	12 (100)	2988 (100)	
Age group	16-20	0	0 (0)	0 (0)	0.092
	21-25	1456	4 (33)	1452 (49)	
	26-30	1324	7 (58)	1317 (44)	
	≥31-	220	1 (8)	219 (7)	
	Total	3000	12 (100)	2988 (100)	
Marital Status	Single	2548	11 (92)	2537 (85)	0.290
	Married	452	1 (8)	451 (15)	
	Total	3000	12 (100)	2988 (100)	
Group	Students	2858	11 (92)	2847 (95)	0.386
	Staff	142	1 (8)	141 (5)	
	Total	3000	12 (100)	2988 (100)	

The table 2 above shows the prevalence of hepatitis c virus surface antigen in relation to socio-demographic characteristics of the study participants. Out of the 12 number of positive samples, 12 (100%) were male and 0 (0%) were female. Also, out of the 2988 number of negative samples, 1090 (36%) were male and 1898 (64%) were female. Out of the 12 number of positive samples, 0 (0%) were 16-20, 4 (33%) were 21-25, 7 (58%) were 26-30 and 1 (8%) were ≥31 above. Also, out of the 2988 number of negative samples, 0 (0%) were 16-20, 1452 (49%) were 21-25, 1317 (44%) were 26-30 and 219 (7%) were ≥31 above. Out of the 12 number of positive samples, 11 (92%) were single and 1 (8%) were married. Also, out of the 2988 number of negative samples, 2537 (85%) were single and 451 (15%) were married. Out of the 12 number of positive samples, 11 (92%) were students and 1 (8%) were staff. Also, out of the 2988 number of negative samples, 2847 (95%) were students and 141 (5%) were staff.

Table 3: Distribution of hepatitis B and C virus surface antigen of the study participants in relation to risk factors

Characteristics	Responses	No. of participants N (%)	No. Positive N (%)	No. Negative N (%)
Knowledge/Awareness of Hepatitis B Virus Infection	Yes	2126 (71)	32 (2)	2094 (98)
	No	874 (29)	10 (1)	864 (99)
Received Hepatitis B vaccine	Yes	100 (3)	0 (0)	100 (100)
	No	2900 (97)	20 (1)	2880 (99)
History of blood transfusion	Yes	10 (0)	5 (50)	5 (50)
	No	2990 (100)	10 (0)	2980 (100)
History of organ transplant	Yes	10 (0)	0 (0)	10 (100)
	No	2990 (100)	10 (0)	2980 (100)
History of dialysis	Yes	50 (2)	0 (0)	50 (100)
	No	2950 (98)	10 (0)	2940 (100)
Tattooing/ear piercing	Yes	80 (3)	20 (25)	60 (75)

	No	2920 (97)	10 (0)	2910 (100)
Share sharp objects	Yes	10 (0)	10 (100)	0 (0)
	No	2990 (100)	15 (1)	2975 (99)
Share tooth brush	Yes	20 (1)	0 (0)	20 (100)
	No	2980 (99)	10 (0)	2970 (100)
Smoke cigarette	Yes	900 (30)	10 (1)	890 (99)
	No	2010 (67)	5 (0)	2005 (100)
Drink alcohol	Yes	1000 (33)	10 (1)	990 (99)
	No	2000 (67)	30 (2)	1970 (99)
Use intravenous drugs	Yes	600 (20)	10 (2)	590 (98)
	No	2400 (80)	5 (0)	2395 (100)
Engage in sexual intercourse before	Yes	400 (13)	0 (0)	400 (100)
	No	2600 (87)	10 (0)	2590 (100)
Use condom/barriers	Yes	50 (2)	0 (0)	50 (100)
	No	2950 (98)	10 (0)	2940 (100)
Change Sex Partner recently	Yes	500 (17)	0 (0)	500 (100)
	No	2500 (83)	10 (0)	2490 (100)
Number of Sex Partner	None	2650 (88)	10 (0)	2640 (100)
	1	100 (3)	0 (0)	100 (100)
	2	50 (2)	0 (0)	50 (100)
	3	120 (4)	0 (0)	120 (100)
	>3	80 (3)	0 (0)	80 (100)

From the data obtained, risk factors associated with the occurrence of hepatitis B and C virus infection among the study population include sharing of sharp objects, history of blood transfusion and tattooing/ear piercing among others recorded a higher percentage of 97-100%. On the other hand, history of organ transplant/dialysis, sharing of toothbrush, smoking, intravenous drug use and sexual intercourse recorded a range of 67-80%. Furthermore, 71% of the participants in this study indicated to have knowledge and awareness of hepatitis B and C infection.

Table 4: Biochemical Parameters of hepatitis b and c virus surface antigen of the study participants

Group	Parameter	Number of positive	Number of negative	P-value
HbsAg	AST	260	0	0.463
	ALT	0	2740	
HCV	AST	12	0	0.424
	ALT	0	2988	
HbsAg	Albumin	260	0	0.387
HCV	Albumin	12	0	

The table 4 above shows the biochemical parameters of hepatitis b and c virus surface antigen of the study participants. In HbsAg, the number of positive samples of AST was 260 compared to the ALT which was 0. The number of negative samples of AST was 0 compared to the ALT which was 2740. Similarly, In HCV, the number of positive samples of AST was 12 compared to the ALT which was 0. The number of negative samples of AST was 0 compared to the ALT which was 2988. The blood plasma protein (Albumin) of hepatitis b and c virus surface antigen of the study participants revealed that HbsAg, the number of positive samples of Albumin was 260 compared to the negative samples which was 0. Similarly, In HCV, the number of positive samples of Albumin was 12 compared to the negative samples which was 0.

Discussions

Hepatitis B virus (HBV) and Hepatitis C virus (HCV) infections account for a substantial proportion of liver diseases worldwide (Shawa, 2019) [26]. Nigeria belongs to the group of countries highly endemic for viral hepatitis, with varying seroprevalence depending on the study population and also the geographical setting (Odemuyiwa *et al.*, 2015) [19]. The present study investigated the prevalence of Hepatitis B and C virus infection among students and staff of Federal College of Education, Pankshin, Nigeria.

The table 1 shows the prevalence of hepatitis b virus surface antigen in relation to the sex of the study participants. A total number of 3000 students and staff (1102 males and 1898 females) were screened using rapid serological methods. Out of the 260 number of positive samples, 128 (49%) were male and 132 (51%) were female. Also, out of the 2740 number of negative samples, 974 (36%) were male and 1766 (64%) were female. The study of Odinachi *et al.*, (2014) [20] showed different relation between male and female HBV infection prevalence rates as we found in the present study. In the work of Odinachi *et al.*, (2014) [20], out of 150 HBsAg-positive individuals, 86 (57.3%) were males and 64 (42.7%) were females. The same rate of high prevalence of hepatitis B among females in the present studies clearly indicates a high exposure of females with risk factors as compared to males. This work, however, agreed with the report by Babatope *et al.*, (2015) [3], who observed a prevalence rate of 2.3% among females and 0.7% among males. According to them, socioeconomic, cultural and biological factors may be responsible for the female gender's vulnerability to HBV infection. The prevalence of hepatitis b virus surface antigen in relation to the age group of the study participants revealed that out of the 260 number of positive samples, 0 (0%) were 16-20, 124 (48%) were 21-25, 127 (49%) were 26-30 and 9 (3%) were $\geq$31 above. Also, out of the 2740 number of negative samples, 0 (0%) were 16-20, 1332 (49%) were 21-25, 1197 (44%) were 26-30 and 211 (8%) were $\geq$31 above. In the present study, the result indicated that 26-30 age group has a high prevalence of HBV in the study area. This study disagrees with the work of Mary *et al.*, (2018) [15] who concluded that all respondents tested HBV positive were in the age group 15-19 years and agree with FMOH, (2016) who noticed the HBV infection common among 20-40 years. This indicated that this is the best age to focus on to prevent HBV by increasing knowledge and awareness of

HBV and changing beliefs/ attitudes and cultural norms that facilitate transmission of the disease among the adult age. More so, awareness and risk perception on HBV infection are low in the study area and also low uptake of HB vaccine among the youths. Also, the prevalence of hepatitis b virus surface antigen in relation to marital status of the study participants revealed that out of the 260 number of positive samples, 253 (97%) were single and 7 (3%) were married. Also, out of the 2740 number of negative samples, 2295 (84%) were single and 445 (16%) were married. From the present study, there is a high prevalence of HBV among the singles participants. This result agrees with the work of Pennap *et al.,* (2016) [23] who reported a prevalence of 27.2% for the singles and 21.3% among the married ones. According to them, the singles are more at risk of having the infection because of their loose lifestyle. The present study differs with the work of Seyi *et al.,* (2019) [25], who concluded in their work that out of the 196 singles screened, 3 (1.5%) of them were found positive for HBsAg; while the 4 married participants were without HBV infection. Furthermore, the prevalence of hepatitis b virus surface antigen in relation to respondents status of the study participants revealed that out of the 260 number of positive samples, 259 (100%) were students and 1 (0%) were staff. Also, out of the 2740 number of negative samples, 2599 (95%) were students and 141 (5%) were staff. From the present study, there is a high prevalence of HBV among the students of Federal College of Education, Pankshin. The prevalence of HBV markers as observed in this current study differ from those of Seyi *et al.,* (2019) [25] who reported a prevalence of 1.7% for HBsAg among students in Private Tertiary Institution in South-Western Nigeria. It was also found to be far lower than those reported by Ndako *et al.,* (2016) [18], among 200 school Children in Riyom Local Government Area (LGA), Plateau state, Nigeria. Clinically, HBsAg, are the important markers in the diagnosis of HBV infection. HBsAg is the first marker to appear in the blood and its presence indicates current infection which might be acute or chronic.

The table 2 shows the prevalence of hepatitis c virus surface antigen in relation to the sex of the study participants. A total number of 3000 students and staff (1102 males and 1898 females) were screened using rapid serological methods. Out of the 12 number of positive samples, 12 (100%) were male and 0 (0%) were female. Also, out of the 2988 number of negative samples, 1090 (36%) were male and 1898 (64%) were female. This disagrees to previous studies conducted in Ilorin, Jos and the Niger delta of Nigeria which all had a higher preponderance of HCV among the female participants (Udeze *et al.*, 2011) [31]. This finding is however, is in agreement to a higher prevalence of HCV among male subjects in studies conducted in Ibadan, Nigeria, among blood donors and in Maiduguri, Nigeria, among AIDS' patients (Udeze *et al.*, 2009; Udeze *et al.*, 2011) [32, 31]. It is difficult to adduce any particular reason to this slightly higher female preponderance because of the general low prevalence of the disease among the study population, more so, that the difference is not statistically significant. The prevalence of hepatitis c virus surface antigen in relation to the age group of the study participants revealed that out of the 12 number of positive samples, 0 (0%) were 16-20, 4 (33%) were 21-25, 7 (58%) were 26-30 and 1 (8%) were ≥31 above. Also, out of the 2988 number of negative samples, 0 (0%) were 16-20, 1452 (49%) were 21-25, 1317 (44%) were 26-30 and 219 (7%) were ≥31 above. In the present study, the result indicated that 26-30 age group has a high prevalence of HCV in the study area. This study is in agreement with the work of Abiodun et al., (2014) [1] who observed that age-groups 21-30 years had the highest prevalence of anti-HCV (0.50%), followed by age groups ≤ 20 years with 0.30% prevalence and none of the subjects aged 31 years and above tested positive. This observed disparity may not be the true reflection of the prevalence of HCV in the different age groups in the general populace since comparatively few subjects of older age groups were involved in the study. Also, the prevalence of hepatitis c virus surface antigen in relation to marital status of the study participants revealed that out of the 12 number of positive samples, 11 (92%) were single and 1 (8%) were married. Also, out of the 2988 number of negative samples, 2537 (85%) were single and 451 (15%) were married. From the present study, there is a high prevalence of HCV among the singles participants. This result agrees with the work of Pennap *et al.,* (2016) [23] who reported a prevalence of 27.2% for the singles and 21.3% among the married ones. According to them, the singles are more at risk of having the infection because of their loose lifestyle. The prevalence of hepatitis c virus surface antigen in relation to respondents status of the study participants revealed that out of the 12 number of positive samples, 11 (92%) were students and 1 (8%) were staff. Also, out of the 2988 number of negative samples, 2847 (95%) were students and 141 (5%) were staff**.** From the present study, there is a high prevalence of HCV among the students of Federal College of Education, Pankshin. This disagrees with the work of Seyi *et al.,* (2019) [25] who concluded that there was no record of HCV, as well as HBV/HCV co-infection among the study population. However, the present study is in agreement with the work Abiodun *et al.,* (2014) [1] who concluded that there is a prevalence of HCV among the young adult population of south-western Nigeria.

From the data obtained in table 3, risk factors associated with the occurrence of hepatitis B and C virus infection among the study population include sharing of sharp objects, history of blood transfusion and tattooing/ear piercing among others. This is consistent with the earlier report by Uleanya and Obidike (2015) [34]. On the other hand, history of organ transplant/dialysis, sharing of toothbrush, smoking, intravenous drug use and sexual intercourse appear to be unconnected with the 1.5% HBV prevalence recorded in this study. Furthermore, while 71% of the participants in this study indicated to have knowledge and awareness of hepatitis B and C infection. This is similar to the reported by Ghouri *et al.,* (2015) [6] and Mahore *et al.,* (2015) [14] respectively.

Liver function tests are useful in diagnosis, evaluating severity, monitoring therapy and assessing the prognosis of liver disease and dysfunction. The table 4 shows the biochemical parameters of hepatitis b and c virus surface antigen of the study participants. In HbsAg, the number of positive samples of AST was 260 compared to the ALT which was 0. The number of negative samples of AST was 0 compared to the ALT which was 2740. Similarly, In HCV, the number of positive samples of AST was 12 compared to the ALT which was 0. The number of negative samples of AST was 0 compared to the ALT which was 2988. Increases in the level AST of both HbsAg and HCV strongly suggest hepatocellular injury. AST is released from the damaged

muscle tissues, red blood cells, and hepatocytes and ALT is "released by hepatocytes during liver injury, usually reflecting the degree of liver damage. The ALT level is commonly used to assess the liver disease activity and to identify patients who require treatment. However, ALT may be influenced by various factors, making it an imperfect surrogate marker (Ormeci *et al.*, 2016) [21]. In our study, the AST levels in patients who have to envelop antigens were higher than those who not have such antigens and controls, similar to a previous study (Ahmed, 2013) [2]. The previous study also demonstrated that the "AST and ALT levels in HBeAg-positive, CHB patients were higher than in HBeAg-negative CHB patients." Such increased enzyme activity may be the result of liver cell destruction and the subsequent release of enzymes (Suljevic *et al.*, 2016) [29]. In hepatitis, ALT and AST levels become elevated as the liver disease progresses, likely as a result of direct hepatocellular damage and membrane leakage (Wang *et al.*, 2016)

The blood plasma protein (Albumin) of hepatitis b and c virus surface antigen of the study participants revealed that HbsAg, the number of positive samples of Albumin was 260 compared to the negative samples which was 0. Similarly, In HCV, the number of positive samples of Albumin was 12 compared to the negative samples which was 0. The significant effect of serum proteins profiles on both HbsAg and HCV positive samples will become apparent in severe or long-standing hepatic disease (Otter, 2013) [22]. On other hand albumin is synthesized exclusively by the liver, in some inflammatory condition the release of tumor necrosis factor inhibits albumin synthesis, but induce the synthesis of acute phase response, hypoalbuminemia is multifactorial but in liver disease the hepatic synthesis of albumin is decreased (Lívero & Acco, 2016) [13].

Conclusion

The outcome of this study shows that hepatitis b and c infection is present among staff and students of Federal College of Education, Pankshin with a low prevalence rate of 1.5%, whereas there was no record of HBV/HCV co-infection among the study population.

Recommendations

From the findings of this study, the researcher put forward the following recommendations below.

- Public health awareness with regard to HBV and HCV infection should be intensified and sustained by relevant stake holders.
- HBV and HCV Vaccination should also be ensured and carried among students of higher institution, and (7) Positive individuals should visit the hospital for appropriate treatment.
- Detection of HBV / HCV-DNA and determination of Viral Load should be attempted by future Researchers
- Where grants / funding is available, sensitive methods such as Enzyme Immuno Assay, Recombinant immunoblot assay (RIBA) and polymerase chain reaction (PCR) should be used to screen and confirm the HBV and HCV status of the study population.

Acknowledgement

Special appreciation to Tertiary Trust Fund (TETFUND) for sponsoring the research. Worthy of acknowledgement are individuals and institutions without whose assistance this research would not have been possible, the Provost FCE Pankshin, the Area Director Central Zone, Plateau State Ministry of Education, Research Assistance, our families who provided various forms of assistance. To God be the glory.

Consent

All authors declare that 'written' informed consent was obtained from the participants with assurance of anonymity and confidentiality before the commencement of the study.

Ethical approval

Ethical approval for the study was obtained from the Federal College of Education Health Centre, Pankshin.

Conflict of interest

The authors have all declared no conflict of interest.

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