ISSN 2349-7823

International Journal of Recent Research in Life Sciences (IJRRLS)
Vol. 11, Issue 2, pp: (1-10), Month: April - June 2024, Available at: www.paperpublications.org

PREVALENCE OF HEPATITIS B AND C CO-INFECTION IN PATIENTS ATTENDING BISHOP MURRAY AND FEDERAL MEDICAL CENTRES, MAKURDI, NIGERIA

*Ademoyegun, J. K[1]., Iheukwumere, C.C[2]., Amali, O[2]

[1]Department of Microbiology, Joseph Sarwuan Tarka University, Makurdi, Benue State Nigeria

[2]Department of Botany, Joseph Sarwuan Tarka University, Makurdi, Benue State Nigeria

[3]Department of Zoology, Joseph Sarwuan Tarka University, Makurdi, Benue State Nigeria

DOI: https://doi.org/10.5281/zenodo.11083047

Published Date: 29-April-2024

Abstract: **Hepatitis B Surface antigen (HBsAg) and hepatitis C infection are major global health problem and causes inflammation or infection of the liver disease and puts people at high risk of death from cirrhosis and liver cancer. This study aimed at assessing the prevalence of hepatitis B and C infections in two major hospitals located in Makurdi, Benue State Nigeria. A cross-sectional study was adopted. Blood specimens were collected from individuals who came to the laboratory for tests and experiencing symptoms of the disease. The study population was made up of four hundred and ninety-six patients (496), (two hundred and forty-eight (248) patients from BMMC and FMC respectively). Samples of blood (about 5ml) were obtained intravenously with the assistance of hospital phlebotomist. Data collected were tabulated and carefully double entered and analyzed using computer statistical package SPSS 20.0. Result on the prevalence of HBsAg was 3.5% in patients who used borehole water, while 7.1% of borehole users tested positive for HCV. 7.3% of the low-income earners tested positive for HBsAg while 93.1% were negative. The difference in the prevalence of HCV by income level in FMC, Makurdi was statistically significant ($p < 0.05$; $p=0.003$). Prevalence of HBsAg and HCV was high in Benue State as compared to WHO criteria for HBV endemicity. Level of awareness of the prevalence, risk factors and treatment options for HBsAg and HCV among the population be increased by both governmental and non-governmental organizations.**

Keywords: **Hepatitis B and C infection, Makurdi, Medical Centre, Nigeria, and Prevalence.**

1. INTRODUCTION

Hepatitis B Surface antigen (HBsAg) infection is a major global health problem and causes inflammation or infection of the liver disease and puts people at high risk of death from cirrhosis and liver cancer [1]. Globally, WHO estimates that, more than 2 billion people are living with HBsAg infection and over 350 million people are believed to be at risk of developing complications of chronic hepatitis such as cirrhosis and primary hepatocellular carcinoma [1], [2]. Although global prevalence rates vary, the tropical region of the world has the highest infection rates [3].

In Africa, mortality risk associated with HBSAg is about (25%), with a chronic infection prevalence of over 50 million people [4]. Hyper endemic infection rates have been reported in the Western part of Africa, indicating over 8% of the population chronically infected with HBV [5]. In Nigeria, a national survey carried out in 2016, reported HBsAg prevalence rate to be (12.2%) [6].Transmission routes of HBsAg included body fluids, contaminated sharp needles and razors,

transmission from mother to child during childbirth, sexual contact, and most commonly, blood transfusion. Blood transfusion is one of the major risk factors for HBV transmission, due to occult HBsAg infection among blood donors [5].

Hepatitis C virus (HCV) infection is a public health concern too and affect more than 170 million people worldwide [7], [8], [9]. Globally, about 130–150 million people are living with chronic HCV infection [10] with about 350,000–500,000 lives lost every year [11]. Infection begins as acute and usually asymptomatic during early stages [12], [13]. In most untreated cases, the infection progresses into chronic infections and gradually develops liver fibrosis which then leads to cirrhosis, liver damage, and hepatocellular carcinoma (HCC) [14]. In Africa, the prevalence of HCV is between (0.1%) and (17.5%). There are many risk factors of acquiring HCV infection. In Sub-Saharan Africa, practices such as dental surgery, therapeutic injection, intravenous drug, and age have been reported as major risk factors associated with HCV infection [15], [16], [17]. This study was therefore aimed to determine the prevalence of hepatitis A and C co-infection in patients attending two selected medical centres in Makurdi, Nigeria.

2. MATERIALS AND METHODS

2.1 Study Area

The hospitals are located in Makurdi Benue State which is in the mid-belt region of Nigeria with a population of about 4,253,641 in 2006 census [18]. Makurdi lies within the lower river Benue through in the middle belt region of Nigeria which lies at Longitude 7^0 47' and 10^0 0' East and Latitude 6^0 25' and 8^0 8' North. The wet season which runs from April to October, has well distributed rainfall with a monthly mean of 155.53 mm, an annual mean of 1 244.30 mm, and a peak in July/August and the dry season which runs from November to March with very little rainfall. Mean monthly relative humidity at 12.00 GMT range from 66%-68% in the rainy season and 15%-40% in the dry season, with an annual mean value of 60% [18]. Mean daily temperature varies from 15.6°C in December/January to 38°C in February/March with an annual mean value of 27.5°C [19].

2.2 Ethical Clearance

Ethical clearance was sought and obtained from BMMC and FMC, Makurdi respectively. Consenting individuals were recruited for the study during the daily clinic. Semi-structured questionnaires were administered after explaining the details of the study and procedure.

2.3 Inclusion/ Exclusion Criteria

Consented individuals with febrile illness were used for the study and they included patients who were sent to the laboratory for test. Those included are patients who do not have any symptoms of febrile illness.

2.4 Sample Size

Sample size was determined using this formula; $n=Z^2 P q/d^2$

Where n=desired sample size

Z=standard and normal deviation usually set at 1.96 or approximately 2.0 which correspond to 95% (0.05) confidence level. P=proportion in the target population estimated to have the particular characteristics.

q=1.0-p

d =degree of accuracy usually set at 0.05 (source: Research Methodology, Prof. (Mrs). Araoye)

The sample size was determined in view of the prevalence rate of 25.5% for malaria and hepatitis from previous studies carried out in Kano, Nigeria [20]. Number of subjects who were studied in each group was calculated to be 200. An attrition rate of 10% was added to the number to arrive at the sample size.

The calculation was based on fisher's sample size formula [21].

$$N = \frac{Z^2 P(1-P)}{d^2}$$

N = minimum sample size,

Z = (1.96) constant mean deviate,

1= constant

P= local prevalence of similar previous study = 25.5% [19].

d = Degree of precision adopted for the study = 0.05

$N = (1.96)^2 \text{ X } 0.25 \text{ X } 0.83/(005)^2 \quad = 0.535$

N= 0.535/0.0025

N= 224

Using attrition rate of 10%, we have 224/0.9 = 248

2.5 Sample Collection

Blood specimens were collected from individuals who came to the laboratory for tests and experiencing symptoms of the disease. The study population was made up of four hundred and ninety-six patients (496), (two hundred and forty-eight (248) patients from BMMC and FMC respectively). These included patients who were at the laboratory for test, (male, female, adult and children). Four hundred and ninety-six questionnaires were administered to adults who came to the laboratory for tests. The aim was to determine the prevalence rates of the disease, the associated risk factors of the diseases and the socio-demographic information of the patients.

2.6 Laboratory Procedures for Hepatitis B

Two drops of blood were added to the "specimen pad" of the hepatitis B surface antigen and HCV rapid test strips (Abon Biopharm [Hangzhou] Co. Ltd., P. R., China). Then, a drop of buffer solution was added. The result was read at 15 min according to the manufacturer's instructions. A strip with two distinct coloured lines was read as positive while with a single-coloured line appearing at the control region was read as negative. The test was invalid if the Control band did not appear. The rapid test strips have sensitivity of 99.0% (98.1%–99.6%) and specificity of 99.1% (98.5%–99.5%).

2.7 Laboratory Procedures for Hepatitis C

The strip from the sealed foil punch was removed and sample number was written on the strip. Two (2) drops of whole blood was added into the "sample pad'' of the test strip and 1 drop of buffer was added thereafter. The result was read after 10 minutes when the red line appeared. The presence of two colour band (One band in the control and another band in the test indicated a positive result). The presence of only one band in the control area indicated a negative result.

The test was invalid if the Control band did not appear.

2.8 Data Collection via Questionnaires

Semi structured questionnaire which contained demographic information like age, sex, address, family size, marital status, ethnic group, source of water, educational status and occupation were administered to all the subjects. Other medical information contained in the questionnaire includes prophylaxis, use of insecticides, tribal mark/tattoo, drug abuse, alcohol consumption blood transfusion, previous hospitalization, previous surgery, clinical details and if any prophylaxis is given.

2.9 Data Analysis

Data collected were tabulated and carefully double entered and analyzed using computer statistical package SPSS 20.0. Chi square test was used to determine associations between variables; correlation coefficients were used to determine relationships between variables. Descriptive statistics (frequency and percentages) were used in data analyses. In all the analyses the confidence level was held at 95% and significance was held at 0.05 level.

3. RESULTS

Table 1 shows the prevalence of HBsAg and HCV according to source of water. It showed that prevalence of HBsAg was 3.5% in patients who used borehole water, 1.9% in patients who used water from hawkers and 11.5% in patients who used well water. The difference in prevalence rate was not statistically significant ($p>0.05$; $p=0.106$). Result for HCV, showed that 7.1% of borehole users tested positive for HCV, water hawkers had 1.9% and well water had none (0.0%). The difference in prevalence rate was not statistically significant ($p>0.05$; $p=0.156$).

ISSN 2349-7823

International Journal of Recent Research in Life Sciences (IJRRLS)
Vol. 11, Issue 2, pp: (1-10), Month: April - June 2024, Available at: www.paperpublications.org

Table 1: Prevalence of HBsAg and HCV in relation to Source of Water in BMMC, Makurdi

Source of water	Number examined (%)	HBsAg		HCV	
		Number positive (%)	Number negative (%)	Number positive (%)	Number negative (%)
Borehole	170 (100)	6 (3.5)	164 (96.5)	12 (7.1)	158 (92.9)
Water hawkers	52 (100)	1 (1.9)	51 (98.1)	1 (1.9)	51 (98.1)
Well water	26 (100)	3 (11.5)	23 (88.5)	0 (0.0)	26 (100)
Total	248 (100)	10 (4.0)	238 (96.0)	13 (5.2)	235 (94.8)
		X^2 = 4.495, df=2; p>0.05 (p=0.106)		X^2 = 3.721, df=2; p>0.05 (p=0.156)	

Table 2 shows the prevalence of HBsAg and HCV according to income level, 7.3% of the low-income earners tested positive for HBsAg while 93.1% were negative. None (0.0) of the middle-income earners tested positive for HBsAg while 5.6% were negative. The difference in the prevalence of HBsAg by income level at FMC, Makurdi was not statistically significant (p>0.05; p=0.296). It was equally showed that 3.8% of the low-income earners were positive for HCV while 96.2% tested negative for HCV, as high as 21.4% of the middle-income earners were positive for HCV while 78.6% were negative for the virus. The difference in the prevalence of HCV by income level in FMC, Makurdi was statistically significant (p < 0.05; p=0.003) as shown in (Table 3).

Table 2: Prevalence of HBsAg and HCV in relation to marital status in Federal Medical Centre, Makurdi

Marital status	HBsAg			HCV	
	Number examined (%)	Number positive (%)	Number negative (%)	Number positive (%)	Number negative (%)
Single	121 (100)	9 (7.4)	112 (92.6)	4 (3.3)	117 (96.7)
Married	127 (100)	8 (6.3)	119 (93.7)	8 (6.3)	119 (93.7)
Total	248 (100)	17 (6.9)	231 (93.1)	12 (4.8)	236 (95.2)
	Chi square	X^2=0.126, df=1; p>0.05 (p=0.723)		X^2=1.206, df=1; p>0.05(p=0.272)	

Table 3: Prevalence of HBsAg and HCV by Income Level in Federal Medical Centre, Makurdi

Income level	HBsAg			HCV	
	Number examined (%)	Number positive (%)	Number negative (%)	Number positive (%)	Number negative (%)
Low	234 (100)	17 (7.3)	217 (93.1)	9 (3.8)	225 (96.2)
Middle	14 (100)	0 (0.0)	14 (5.6)	3 (21.4)	11 (78.6)
High	0 (0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Total	248 (100)	17 (52.4)	231 (47.6)	12 (4.8)	236 (95.2)
Chi square		X^2=1.092,df=2;p>0.05 (p=0.296)		X^2=8.869,df=2;p>0.05 (p=0.003)	

Table 4 below shows the prevalence of HBsAg according to Medical Records in BMMC, Makurdi. Prevalence of HBsAg was 5.0% among patients on prophylaxis. The difference in prevalence among patients on prophylaxis was not statistically significant (X^2=2.350, df=1; p>0.05, p=0.125)-Table 18. Prevalence of HBsAg was 5.9% among patients with tattoo or tribal marks. The difference in prevalence among patients with tattoo was not statistically significant. (X^2=0.053, df=1; p>0.05, p=0.818). Prevalence of HBsAg was 5.6% among patients who were transfused with blood. The difference in prevalence among patients who were transfused with blood and those no transfused was not statistically significant (X^2=0.004, df=1; p>0.05, p=0.95). Prevalence of HBsAg was 4.8% among those who were previously hospitalized. The difference in prevalence among patients who were previously hospitalized were not statistically significant (X^2=0.039, df=1; p>0.05, p=0.843). As high as 13.3% prevalence of HBsAg was observed in patients who had surgery. The difference in prevalence among patients who had surgery was not statistically significant (X^2=2.104, df=1; p>0.05, p=0.147). Prevalence was 0.0% in patients who consume alcohol and 0.0% in patients who abuse drugs. The difference in prevalence among them was not statistically significant (X^2=1.676, df=1; p>0.05, p=0.195) and (X^2=0.168, df=1; p>0.05, p=0.682).

ISSN 2349-7823

International Journal of Recent Research in Life Sciences (IJRRLS)
Vol. 11, Issue 2, pp: (1-10), Month: April - June 2024, Available at: www.paperpublications.org

Table 4: Prevalence of HBsAg according to Medical Records in BMMC, Makurdi

Medical information	Number examined (%)	Number positive (%)	Number negative (%)	Chi square value
Prophylaxis				
Yes	140 (100)	7 (5.0)	133 (95.0)	
No	108 (100)	6 (5.6)	102 (94.1)	
Total	248 (100)	13 (5.2)	232 (94.8)	X^2=0.038, df=1; p>0.05 (p=0.846)
Tattoo/Tribal Marks				
Yes	51 (100)	3 (5.9)	48 (94.1)	
No	197 (100)	10 (5.1)	187 (94.9)	
Total	248 (100)	13 (5.2)	232 (94.8)	X^2=0.053, df=1; p>0.05 (p=0.818)
Blood Transfusion				
Yes	18 (100)	1 (5.6)	17 (94.4)	
No	230 (100)	12 (5.2)	218 (94.8)	
Total	248 (100)	13 (5.2)	235 (94.8)	X^2=0.004, df=1; p>0.05 (p=0.95)
Previous Hospitalization				
Yes	63 (100)	3 (4.8)	60 (95.2)	
No	185 (100)	10 (5.4)	175 (94.6)	
Total	248 (100)	13 (5.2)	235 (94.8)	X^2=0.039, df=1; p>0.05 (p=0.843)
Previous surgery				
Yes	15 (100)	2 (13.3)	13 (86.7)	
No	233 (100)	11 (4.7)	222 (95.3)	
Total	248 (100)	13 (5.3)	235 (94.8)	X^2=2.104, df=1; p>0.05 (p=0.147)
Drug abuse				
Yes	3 (100)	0 (0.0)	3 (100)	
No	245 (100)	13 (5.3)	232 (98.7)	
Total	248 (100)	13 (5.2)	235 (94.8)	X^2=0.168, df=1; p>0.05 (p=0.682)
Alcohol consumption				
Yes	27 (100)	0 (0.0)	27 (100)	
No	221 (100)	13 (5.9)	208 (94.1)	
Total	248 (100)	13 (5.2)	235 (94.1)	X^2=1.676, df=1; p>0.05 (p=0.195)

In (Table 5), exactly 5.7% of patients on prophylaxis tested positive for HCV while patients who were not on prophylaxis had 1.9% positive. The difference in prevalence was not statistically significant (X^2=2.350, df=1; p>0.05 (p=0.125). Only 2.0% of those who had tattoo or tribal marks tested positive for HCV while those without tattoo or tribal marks were 4.6%. This difference in prevalence was not statistically significant (X^2=0.712, df=1; p>0.05, p=0.399). Only 5.6% of the patients who had been transfused tested positive for HCV while 3.9% of those who had not been transfused tested positive. The differences in prevalence were not statistically significant (X^2=1.16, df=1; p>0.05, p=0.733). Patients who had been hospitalized had only 3.2% prevalence of HCV while those who had never been hospitalized had 4.3% prevalence. The differences in prevalence were not statistically significant (X^2=0.161, df=1; p>0.05, p=0.689). Those who had undergone surgery had 6.7% while 3.9% of those who had never had surgery tested positive for HCV. The differences in prevalence were not statistically significant (X^2=0.128, df=1; p>0.05, p=0.593). For those who indulge in drug abuse, none (0.0%) tested positive for HCV while as high as 29.8% of those who don't indulge in drug abuse were positive. (X^2=0.128, df=1;

ISSN 2349-7823

International Journal of Recent Research in Life Sciences (IJRRLS)
Vol. 11, Issue 2, pp: (1-10), Month: April - June 2024, Available at: www.paperpublications.org

p>0.05, p=0.721). The differences in prevalence were not statistically significant. Those who consume alcohol had 18.5% while those who do not drink alcohol had 30.8% prevalence of HCV. The difference in prevalence was not statistically significant (X^2=0.008 df=1; p>0.05, p=0.927).

Table 5: Prevalence of HCV according to Medical Records/History in BMMC, Makurdi

Medical information	Number examined (%)	Number positive (%)	Number negative (%)	Chi square value
Prophylaxis				
Yes	140 (100)	8 (5.7)	132 (94.3)	
No	108 (100)	2 (1.9)	106 (98.1)	
Total	248 (100)	10 (4.0)	238 (96.0)	X^2=2.350, df=1; p>0.05 (p=0.125)
Tattoo/Tribal Marks				
Yes	51 (100)	1 (2.0)	50 (98.0)	
No	197 (100)	9 (4.6)	188 (95.4)	
Total	248 (100)	10 (4.0)	238 (96.0)	X^2=0.712, df=1; p>0.05 (p=0.399)
Blood Transfusion				
Yes	18 (100)	1 (5.6)	17 (94.4)	
No	230 (100)	9 (3.9)	221 (96.1)	
Total	248 (100)	10 (4.0)	238 (96.0)	X^2=1.16, df=1; p>0.05 (p=0.733)
Previous Hospitalization				
Yes	63 (100)	2 (3.2)	61 (96.8)	
No	185 (100)	8 (4.3)	177 (95.7)	
Total	248 (100)	10 (4.0)	238 (96.0)	X^2=0.161, df=1; p>0.05 (p=0.689)
Previous surgery				
Yes	15 (100)	1 (6.7)	14 (93.3)	
No	233 (100)	9 (3.9)	224 (96.1)	
Total	248 (100)	10 (4.0)	238 (96.0)	X^2=0.128, df=1; p>0.05 (p=0.593)
Drug abuse				
Yes	3 (100)	0 (0.0)	3 (100)	
No	245 (100)	10 (4.1)	235 (95.9)	
Total	248 (100)	10 (4.0)	238 (96.0)	X^2=0.128, df=1; p>0.05 (p=0.721)
Alcohol consumption				
Yes	27 (100)	1 (3.7)	26 (96.3)	
No	221 (100)	9 (4.1)	212 (95.9)	
Total	248 (100)	10 (4.0)	238 (96.0)	X^2=0.008 df=1; p>0.05 (p=0.927)

4. DISCUSSION

Chronic hepatitis B infection encompasses a spectrum of diseases that is defined as persistent HBV infection in the presence of detectable hepatitis B surface antigen (HBsAg) in the blood or serum for longer than six months, with or without associated active viral replication and evidence of hepatocellular injury and inflammation. This study determined the prevalence rate of Hepatitis B, Hepatitis C and Malaria in patients attending Bishop Murray Medical Centre (BMMC), and Federal Medical Centre (FMC), Makurdi. High prevalence of HBsAg was observed in this study BMMC (5.2%) and FMC (6.9%), other studies had reported higher prevalence of HBsAg (12.2%) [6]. Similarly, Foulifack *et al.* [22] and Nuobiap *et*

al. [23] had also reported high prevalence rates of (10.1%) and (12%) among blood donors in Cameroon. In contrast, Kam *et al.* [24] reported a low prevalence of (4.3%) from Port Harcourt while Agbede *et al.* (2007) reported a prevalence of (5.7%) from Ilorin.

Prevalence of HBsAg in Bishop Murray Medical Centre, Makurdi was (5.2%) in males and (5.4%) in females. Prevalence of HBsAg in Federal Medical Centre, Makurdi was (5.7%) in males and (8.0%) in females. This finding supported reports from other studies in Nigeria, where (11.6%) HBsAg prevalence was reported from Maiduguri among pregnant women [25]. Frambo *et al.* [26] had previously reported higher prevalence rate of (9.7%) among pregnant women in Beau. Work done by Forbi *et al.* [27] had also reported very high prevalence rate of (17.1%) from female sex workers in Nassarawa State. In contrast, others studies had reported prevalence of HBsAg to be higher in males than females, studies from Uganda and other sub-Saharan African countries, reported chronic HBV infections to be more common in males [28]. This might be that male subjects were more exposed to the risk factor that predisposed them to this infection or the females clear it easily.

These reports showed a high prevalence of HCV in Benue State. Prevalence of HCV in Bishop Murray Medical Centre, Makurdi was (4.0%), prevalence in males was 3.0% and females (4.7%). Prevalence of HCV in Federal medical Centre, Makurdi was (4.8%), prevalence in males was 4.9% while the females had 4.8%. Similarly, high prevalence of between (3.4%) to (8.4%) had been reported by Lanini *et al.* [29] in Nigeria. Apata *et al.* [16] had reported prevalence of HCV to be between (0.1%) and (17.5%). He stressed that intravenous drug use and surgery are major risks factors. Countries with high prevalence of HCV are Mongolia (9.6%) to (10.8%), Georgia (6.7%), Gabon (4.9%) to (11.2%), and Cameroon (4.9%) to (13.8%) and Nigeria had a prevalence of (3.1%) to (8.4%) [29]. This agrees with the reports of this study. In Africa, the prevalence of HCV is between (0.1%) and (17.5%). In Rwanda, prevalence of HCV infection has been reported in specific groups of the populations such as in pregnant women and patients infected with tuberculosis and HIV [30, 31, 32]. A prevalence of (4.9%) was estimated in a 2011 study (Lavanchy, 2011), but a recent review by Karoney and Siiki indicates that this figure could be an underestimation [33]. Prevalence of HCV seems to be increasing over the years, this is because of challenges such as barriers to screening, cost-related factors, and inadequate knowledge and awareness of hepatitis C [34].

Prevalence of HBsAg and HCV was also observed to be higher among the singles than the married (HBsAg -singles (6.5%), married 4.5% and HCV-singles (4.3%), married (3.8%) in BMMC, Makurdi while (HBsAg -singles (7.4%), married (6.3%) and HCV-singles (3.3%), married (6.3%) in FMC, Makurdi. There are many risk factors of acquiring HCV infection [35].

Prevalence of malaria was (46.8%) in patients who use insecticide treated net and 70.7% in patients who did not. The difference in the prevalence rate between them was statistically significant ($p<0.05$; $p=0.01$). Insecticide treated nets are a form of personal protection from mosquito bite and it has been shown to reduce malaria [36]. In several African settings, insecticide treated nets were shown to reduce the death of children under 5 years from malaria by about 20% [37].

It was observed in this study that (4.7%) of the low-income earners tested positive for HBsAg, (12.2%) of middle-income earners. Prevalence of HCV was (3.9%) in low income-level and 6.3% in middle-income level. Of particular interest from our findings is the difference in the prevalence of HBsAg among the low-income earners and the middle-income earners. It was observed that HBsAg is most prevalent among the middle-income earners, and may have been intensified by the lack of awareness about the implications of HBV infection, under-developed shared care pathways for HBV management, and high-risk lifestyles, inability to receive treatment due to inadequate funds among others [36]. To reduce HBV prevalence in Nigeria, a dedicated focus on socio-economic, cultural and population health factors are required, for example, equity of access of health care across rural and urban regions.

Prevalence of HCV was (2.0%) in those with tattoo or tribal marks, (5.6%) in the patients who had blood transfusion. Patients who had been hospitalized had only (3.2%) prevalence of HCV, those who had undergone surgery had (6.7%), those who indulged in drug abuse, had none (0.0%), while those who consume alcohol had (18.5%) prevalence of HCV. Studies has reported that in Sub-Saharan Africa, practices such as dental surgery, therapeutic injection, intravenous drug, and age have been reported as major risk factors associated with HCV infection [16, 17]. The high prevalence rate of HCV infection in this study could be as a result of high risk behavior or life style common among patients such as intravenous drug use, being single or divorced, practicing risky sexual behavior, and having reduced awareness about the potential modes of transmission of infectious diseases or youthfulness which is associated with adventure and quest for recreation

which manifest in substance abuse and greatest sexual activities thus supporting the role of sexual transmission of the virus [38].

HCV and drug abuse were highly positively correlated. High prevalence rate of HCV infection in this study could be as a result of high-risk behaviors or life style such as intravenous drug use and blood transfusion and also having reduced awareness about the potential modes of transmission of HCV [38]. An HBV/HCV co-infection rate of 0.0% was obtained in this study. The no co-infection rate could be due to the presence of occult HBV infection which this study did not determine or as a result of suppression of HBV DNA multiplication by HCV (Chi-Jen and Chou-Dong 2008) leading to reduction in serum HBsAg titre. The no co-infection rate could also be due to global infant childhood vaccination, post exposure prophylaxis and antiviral therapy to HBV. The rate however disagrees with the (8.8%) prevalence found by Pourhassan *et al*. [39] among people of a local community Keffi, Nassarawa State.

5. CONCLUSION

Prevalence of HBsAg and HCV was high in Benue State. The World Health Organizations' criteria for HBV endemicity was (≥ 8%; high, 2–7%; moderate and < 2%; low). Prevalence was higher in females than in the males. It was equally higher in the singles than the married and also higher among the age group 26 – 40 years. Factors such hospitalization, blood transfusion and drug abuse were strongly associated with HCV. Factors such as source of water, hospitalization and surgery, were implicated in the prevalence of HBsAg. Findings from this study provide a critical data to assess the impact of current prevention and control strategies in Nigeria, and serve as a reference for designing and implementing effective public health management programmes towards the 2030 elimination goal of the diseases. The study therefore, recommends that, the level of awareness of the prevalence, risk factors and treatment options for HBsAg and HCV among the population be increased by both governmental and non-governmental organizations

DISCLOSURE OF STATEMENT

There is no conflict of interest by the author(s)

REFERENCES

[1] A.T.; Olayinka, A.; Oyemakinde, M.S.; Balogun, A.; Ajudua, P.; Nguku, M.; Aderinola, A.; Egwuenu-Oladejo, S.W.; Ajisegiri, S.; Sha'aibu, B.O.; Musa, S.; Gidado, S. Seroprevalence of hepatitis B infection in Nigeria: a national survey. *American Journal of Tropical Medical Hygiene*, **2016:** 95(4):902-904

[2] R.M.; Merrill, B.D.; Hunter. Sero-prevalence of markers for hepatitis B viral infection. International Journal of Infectious Disease, **2011**:15(2): 78-121

[3] N. Ul-Haq, M. Azmi, A.; Akmal, F. Saleem, M.; Farooqui, A.; Haseeb, H. and Aljadhey, A cross-sectional assessment of knowledge, attitude and practice among hepatitis B patients in Quetta, Pakistan. *BMC Public Health*, **2013:** 13: 448.

[4] B.B. Eustace, A.R. Adenike, M.A. Bala, B.B. Shukurat, M. Aishatu, O.R. Musili, O.M. Banke, and L. Abdullateef, Prevalence of hepatitis B virus in Nigeria: review update. Annual Public Health Epidemiology, **2019:** (1):1-7

[5] L.A.O. Ingasia, E.G. Kostaki, D. Paraskevis, and A.; Kramvis. Global and regional dispersal patterns of hepatitis B virus genotype E from and in Africa: a full-genome molecular analysis. *PLoS One*, **2020:** 15 (10) Article e024037

[6] G.U. Eleje, I.I. Mbachu, S.O. Ogwaluonye, C.U. Kalu, S.I. Onubogu, C.E. Nweje, C.H. Uzochukwu, P.O. Nwankwo, O.M. Fiebai, and G.O. Loto, Akaba Prevalence, seroconversion and mother-to-child transmission of dual and triplex infections of HIV, hepatitis B and C viruses among pregnant women in Nigeria: *Study Protocol Reproductive Health*, **2020**: 17 (1):1-9

[7] G.R. Foster, R.D. Goldin, and H.C. Thomas, Chronic hepatitis C virus infection causes a significant reduction in quality of life in the absence of cirrhosis. *Hepatology*, **1998**: 27:209–12.

[8] J.H. Shinn, and K.C.Liang (Chronic hepatitis C and Diabetes Mellitus. Chinese Journal of Medical Association, **2006**: 69(4):143–5.

[9] T. Vescovo, G. Refolo, G. Vitagliano, G.M Fimia, and M. Piacentini, Molecular mechanisms of hepatitis C virus–induced hepatocellular carcinoma. Clinical Microbiological Infections, **2016**: 22(10):853–61

[10] World Health Organization. WHO-Hepatitis C, World Health Organization, **2015,** Geneva, Switzerland

[11] C.S. Graham, and T. Swan, T. "A path to eradication of hepatitis C in low- and middle-income countries," *Antiviral Research*, **2015**: (119): 89–96.

[12] R.T. Chung, "Acute hepatitis C virus infection," *Clinical Infectious Diseases*, **2015**; 41 (1): 14–17

[13] J. T. Blackard, M.T, Shata, N.J. Shire, and K.E. Sherman, "Acute hepatitis C virus infection: a chronic problem," *Hepatology*, **2008**: 47 (1): 321–331,

[14] B. Hajarizadeh, J. Grebely, and G.J. Dore, "Epidemiology and natural history of HCV infection," Nature Reviews Gastroenterology and *Hepatology*, **2013:** 10(9):553–562

[15] V. Ramarokoto, F. Rakotomanana, and M. Ratsitorahina,"Seroprevalence of hepatitis C and associated risk factors in urban areas of Antananarivo, Madagascar," *BMC Infectious Diseases*, **2008**: 8 (25)

[16] W. Apata, F. Averhoff, and J. Pitman, "Progress toward prevention of transfusion-transmitted hepatitis B and hepatitis C infection—Sub-Saharan Africa, 2000–2011," Morbidity and Mortality Weekly Report, **2016:** 63 (29), 613–619.

[17] J.C, Eze, and N. S. Ibeziako, A. N. Ikefuna, I. C. Nwokoye, N. D. Uleanya, and G. C. Ilechukwu, "Prevalence and risk factors for hepatitis c and human immunodeficiency virus coinfection among children in Enugu Nigeria," African Journal of Infectious Diseases, **2014**: 8 (1): 5–8

[18] Encyclopedia Britannica. Makurdi, Nigeria. Retrieved 19 April, **2019**

[19] E.T Agisui, and J.A. Ogbu, Benue State: The making of the food basket of the nation. Makurdi: Benue State Ministry of Information & Culture, **2015**, 40.

[20] G. Debo, and D, Kassa, Prevalence of malaria and associated factors in Benna Tsemay district of pastoralist community, Southern Ethiopia. *Tropical Diseases Travel Medicine and Vaccines*, **2016,** 2(1):16-27

[21] M.O. Araoye, Subject selection. In: Research methodology with statistics for health and social sciences. Ilorin: *Nathadex*, **2014**: 117–118.

[22] Y.F. Fouelifack, B. Keugoung, J.H. Fouedjio, N. Kouama, S. Mendibi, and M.J. Dongta, High rate of hepatitis B and C among blood donors in Cameroon: a proposed blood screening algorithm for blood donor in resources-limited setting. *Journal of Blood Transfusion*, **2012**: 2012; Article ID 458372: 7

[23] J.J. Noubiap, J.R. Nansseu, S.T. Ndoula, J.J. Bigna, A.M. Jingi, and J. Fokom-Domgue, Prevalence, infectivity and correlates of hepatitis B virus infection among pregnant women in a rural district of the Far North Region of Cameroon. *BMC Public Health*, **2015**: 15: 454

[24] M.J. Karoney, and A.M. Siika, "Hepatitis C virus (HCV) infection in Africa: a review," The Pan *African Medical Journal*, **2013**: 14 (44):22-30

[25] T.O. Harry, M.D. Bajani, and A.E. Moses, Hepatitis B virus infection among blood donors and pregnant women in Maiduguri, Nigeria. *East African Medical Journal*, **1994**: 70:596–597

[26] A.A.B. Frambo, J. Atashili PN. Fon P.M. Ndumbe, Prevalence of HBsAg and knowledge about hepatitis B in pregnancy in the Buea health district, Cameroon: a cross-sectional study. *BMC Res Notes*, **2014;** 7: 394.

[27] J.C. Forbi, N. Onyemauwa, S.D. Gyar, A.O. Oyeleye, P. Entonu, and S.M. Agwale, High prevalence of hepatitis B virus among female sex workers in Nigeria. *Review Inst Medical Tropical Sao Paulo*, **2008**: 50:219–221

[28] J. Bwogi, F. Braka, I. Makumbi, V. Mishra, B. Bakamutumaho, M. Nanyunja, A. Opio, R. Downing, B. Biryahwaho, and R.F. Lewis, Hepatitis B infection is highly endemic in Uganda: findings from a national serosurvey. *African Health Science*, **2009**: 9:98–108.

[29] S. Lanini, P.J. Easterbrook A. Zumla, and G. Ippolito, Hepatitis C: global epidemiology and strategies for control. *Clinical Microbiology Infections*, **2016**: 22: 833–8

[30] S.C. Nsanzimana, M. Kirk, J.P. Uwizihiwe, and B.H. Bucher, "Increasing access to hepatitis C treatment in Rwanda: the promise of Rwanda's existing HIV infrastructure," *Journal of Infectious Diseases & Therapy*, **2015**: 3(5):245-250

[31] M. Pirillo, E.F. Bassani, and A.P. Germinario, "Seroprevalence of hepatitis B and C viruses among HIV-infected pregnant women in Uganda and Rwanda," *Journal of Medical Virology*, **2017**, 79(12): 1797–1801

[32] J. Rusine, P. Ondoa, and B. Asiimwe-Kateera "High seroprevalence of HBV and HCV infection in HIV-infected adults in Kigali, Rwanda," *PLoS ONE*, **2013**: (8): 5, Article ID e63303

[33] F.M. Averhoff, N. Glass, and D. Holtzman, "Global burden of hepatitis C: considerations for healthcare providers in the United States," Clinical Infectious Diseases, **2012**: 55, supplement 1

[34] V. Ramarokoto, F. Rakotomanana, and M. Ratsitorahina, "Seroprevalence of hepatitis C and associated risk factors in urban areas of Antananarivo, Madagascar," *BMC Infectious Diseases*, 2008: 8(25).

[35] World Health Organization. Hepatitis C. **2022**: Available from: https://www.who.int/news-room/fact-sheets/detail/hepatitis-c

[36] Centers for Disease Control and Prevention. Malaria - Diagnosis & Treatment (United States) - Treatment (U.S.) - Artesunate dose 400 mg oral". Retrieved 2022-04-25. https://www.cdc.gov/malaria/about/faqs.html

[37] S.S. Dawaki, and A.H. Kawo, A.H. Seroprevalence of Hepatitis B surface antigen (HBsAg) in pregnant women attending an urban maternity hospital in Kano, Nigeria. *Nigerian Journal of Microbiology*, **2006**: 20: 705-709.

[38] B.J. McMahon, Epidemiology and natural history of hepatitis B. Semin Liver Disease. **2005;** 25(1): 3-8

[39] A. Pourhassan, Association between ABO blood/Rhesus grouping and hepatitis B and C: a case-control study Pakistan Journal Biological Science, **2014**: 17:8686-8871