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Seroprevalence of hepatitis b and or c viruse (s) among the general population in Jalingo, Taraba State

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Abstract
Hepatitis B and C viruses are two unidentical viruses that infect the liver and causes a disease called viral hepatitis characterized by the presence of inflamed hepatocytes. This disease has since became pandemic and global health challenge. The prevalence of this disease varies geographically hence the need for regional studies so as to guide interventions and policy making. This study was carried out among 900 volunteers within the age range 8-80 of which 383 were males while 517 were females. Demographic information were collected through oral interview while blood samples for the serological tests were collected through venipuncture by specialists. Out of the 900 participants, 121(13.4%) and 109(12.1%) were positive for HBV and HCV respectively while 10(1.1%) were found to be coinfected. 53/383(5.9%) of the male and 68/517(7.6%) of the female population were positive for HBV while 39/383(4.3%) of the male and 70/517(7.8%) of the female population were positive for HCV. Participants that fall between the age of 20-43 were found to be the most infected by both viruses. A total of 10(1.1%) were however reported to be coinfected with this viruses. The findings of this study shows the existence of high prevalence of the disease in the region. Thus, the finding calls for interventions through awareness, education, testing, vaccination and treatments by relevant bodies.

Keywords: hepatitis B and C viruses, liver, coinfection and prevalence

Introduction

HBV infection was defined as the presence of HBsAg or HBV DNA in serum, dried blood spot or saliva sam-ples. For HCV infection, selected biomarkers were anti-HCV or HCV RNA [1]. Viral hepatitis is the inflammation of the liver due to infection by viruses including hepatitis A, B, C, D, and E belonging to the family Hepatoviridae a group of unrelated and hepatotropic viruses [2, 13, 4] asserted that HBV and HCV infections are serious public health problems and very contagious. They are considered responsible for bulk of the morbidity and mortality associated with viral hepatitis [5] and can be easily transmitted through blood contact, from mother to child, by unprotected sexual intercourse, or by sharing of eating utensils and other barber shop and beauty salon equipment [4]. However, HCV is primarily transmitted parenterally in adulthood by intravenous drug use, blood transfusion, or medically related parenteral exposures while HBV is acquired by vertical transmission from an infected mother or via horizontal transmission in childhood. The major routes of transmission are prenatal infection, skin and mucous membrane infections caused by contaminated blood or body fluids, sexual contact, and injection drug abuse. In addition, tattooing, ear piercing, acupuncture, dialysis, surgery and even use of a syringe can be the source of infection [6]. HBV and HCV are considered as pandemic affecting 248 million [7] and 71.1 million [8] people respectively with most of the burden on sub-saharan Africa. Coinfection with HBV and HCV is not uncommon due to the parenteral means of transmission they share and countries with a high prevalence of HBV infection [9]. Chronic HBV and HCV coinfection seems to result in more severe liver disease than either infection alone [10] with an increased risk of liver cancer [9] and probably an increased risk of fulminant hepatitis when superinfection with HCV occurs on the background of chronic HBV [11]. In Nigeria, prevalence for HBV is in the range of 10% – 40% while for HCV, it ranges from 4.7% - 20% [12]. Prevalence of the infection varies geographically due to factors including hygiene, vaccination uptake, knowledge, attitude and practices about the disease, risk factors and at risk populations. Viral hepatitis infections particularly HBV, are preventable through standard protocol of vaccination and other prophylactic measures. However, sub-saharan Africa has been associated with high morbidity and mortality of this disease due to inadequate preventive and control measures, as well as lack of access to appropriate and affordable treatment [13]. Nigeria has been reported to be viral hepatitis endemic country with prevalence varying across the different regions of the country. Unfortunately, Taraba state has been reported to have the highest prevalence of viral hepatitis (B and C) in Nigeria [14]. In the light of this, it has become imperative for continues monitoring of the prevalence of the disease at regional as well as national level as this will help in assessing the impact of sensitization, interventions and campaigns by relevant stake holders. On the other hand, the findings of this study could guide future interventions and policies. Therefore, this study aimed at determining the sero-prevalence of hepatitis B and C viruses amongst the residents of Taraba across gender and age groups.

Methods

Research Design

The study is a cross-sectional survey conducted among general population attending Federal Medical Center, Jalingo (FMCJ) located in Taraba State-Nigeria.

Study Area and Population

The population of this study included general population who reside in Jalingo and were accessing health services at Federal Medical Center, Jalingo, Taraba State. Taraba State is geopolitically located on the north-east zone of Nigeria. The State is bounded in the west by Nasarawa State and Benue State, the north-west by Plateau State, and the north by Bauchi State and Gombe State. In the north-east, it shares boundaries with Adamawa State and in the east and south by Cameroon. Jalingo is the capital city of Taraba state. Its coordinates are $8^0$54'N and $11^0$22'E and had a total population of 140,318 (National Population Commission [Nigeria], 2006).

Sample Size

Considering the fact that it would be cumbersome to study the entire population in Jalingo, Taraba State due to time, cost and accessibility, a subset of a population known as sample size was determined using Taro Yamani's statistical formular. The formula is given by

$$n = \frac{N}{1 + N(e)^2}$$

Where n = sample size
N = population of the study (140,318)
e = % level of significance or margin of tolerable error (0.035)
Therefore, n = 812
The calculated sample size (812) was increased to 900 which exceeded the required sample to ensure adequate power for the study.

Data collection

Data collection was carried out between the period of December, 2018- May, 2019 at Federal Medical Center, Jalingo -Taraba State. Participants who visited the hospital within the time frame of the study and met the inclusion criteria were enlisted in the study. Basic data were collected and recorded from participants who signed and agreed on the consented form until the target sample size was reached. Oral interview was also used to obtain demographic variables.

Method of Data Analysis

Data was collected and coded into Statistical Package for Social Science (SPSS) version 25. Data was analyzed using both descriptive and inferential statistics. For categorical variables, Pearson Chi-square test of association was used in testing of hypotheses.

Laboratory methods

Blood samples were collected from participants that willingly agreed to participate in the study using the latest World Health Organization (WHO) testing guidelines and standard algorithm. Serum was separated and kept at -20°C prior to testing. All samples were tested for hepatitis B surface antigen (HBsAg) and hepatitis C antibodies. Using Rapid diagnostic test kits (Elecsys®, Roche Diagnostics). All the laboratory tests were performed within the laboratory of the hospital by well-trained and qualified medical laboratory Scientists and technicians.

Ethical Consideration

Ethical approval of this study was obtained from the ethical committee of FMCJ. A letter of permission was submitted to the institution (FMCJ) where the purpose and objectives of the study was elucidated. Participants were issued with consent forms and were given room to voluntarily make their choice in participating. Participants were in addition assured for confidentiality on their data.

Results

Table 1: Sex and Age distributions of Participants

Variables	Categories	No. of participants	Percentage (%)
Gender	Male	383	42.6%
	Female	517	57.4%
Age Categories	8.00 - 19.00	73	8.1%
	20.00 - 31.00	352	39.1%
	32.00 - 43.00	307	34.1%
	44.00 - 55.00	120	13.3%
	56.00 - 67.00	41	4.6%
	68.00+	7	0.8%

Table 2: General Prevalence of hepatitis B, C and Co-infection

Variables	No. of Positive cases	No. of Negative cases	No. of participants	Percentage of Positive cases	HBsAg+HCV
HBsAg	121	779	900	13.4%	25.5%
HCV	109	791	900	12.1%	
Co-infection	10	890	900	1.1%	

Table 3: Gender and Age Crosstabulations of Hepatitis B Status of Participants

Variables		HBsAg		Total	P-Value
		Positive	Negative		
Gender	Male	53(5.9%)	330(36.7%)	383	0.766
	Female	68(7.6%)	449(49.9%)	517	
Age Categories	8.00- 19.00	10(1.1%)	63(7%)	73	0.024
	20.00 - 31.00	60(6.7%)	292(32.4%)	352	
	32.00 - 43.00	41(4.6%)	266(29.6%)	307	
	44.00 - 55.00	8(0.9%)	112(12.4%)	120	
	56.00 - 67.00	1(0.1%)	40(4.4%)	41	
	68.00+	1(0.1%)	6(0.7%)	7	

Key: P-Value: Probability value

Table 4: Gender and Age Crosstabulations of Hepatitis C Status of Participants

Variables		HCV		Total	P-Value
		Positive	Negative		
Gender	Male	39(4.3%)	344(38.2%)	383	0.127
	Female	70(7.8%)	447(49.7%)	517	
Age Categories	8.00 - 19.00	4(0.4%)	69(7.7%)	73	0.005
	20.00 - 31.00	32(3.6%)	320(35.6%)	352	
	32.00 - 43.00	49(5.4%)	258(28.7%)	307	
	44.00 - 55.00	15(1.7%)	105(11.7%)	120	
	56.00 - 67.00	6(0.7%)	35(3.9%)	41	
	68.00+	3(0.3%)	4(0.4%)	7	

Result Description

The study enlisted 900 participants of which 383(42.6%) were

Males and 517(57.4%) were females. Age-groups 8–19 years accounted for 73(8.1%), 20-31 years accounted for 352(39.1%), 32-43 years had 307(34.1%), 32-43 years had 307(34.1%), 44-55 years had 120(13.3%), 56-67 years had 41(4.6%) and those who had 68 years and above were 7(0.8%) respectively. Table 3 summarizes the sex and age distribution of participants. Thirteen participants (13.4%) reacted to HBsAg, 109 (12.1%) tested positive to anti-HCV, whereas 10 (1.1%) were co-infected with HBsAg and HCV [Table 2]. gender-based prevalence for Hepatitis B virus gave 53(5.9%) males reactive to HBsAg and 68(7.6%) females were positive to HBsAg respectively. Age-based prevalence of Hepatitis B virus gave 1% for those within 8–19 years, 6.7% was observed to be the highest among those within 20-31 years, 4.6% for those within 32-43, 0.9% for those within 44-55 years, 0.1% for those within 56-67 years and 0.1% for those from 68 years and above (Table 3). Analysis for test of association between gender and HBsAg prevalence gave 5.9% to 7.6% in favour of female with a *P-value* = 0.766 indicating no association between gender and HBV infection [Table 3]. HBsAg prevalence in relation to age gave a *P-value* = 0.024 which shows a strong statistically significant association between the variables [Table 3]. Age-based prevalence of Hepatitis C virus gave 0.4% for those within 8–19 years, 3.6% among those within 20-31 years, 5.4% was observed to be the highest among those within 32-43, 1.7% for those within 44-55 years, 0.7% for those within 56-67 years and 0.3% for those from 68 years and above (Table 4). HCV incidence to age relation gave a $P = 0.005$ indicating a very strong association between HCV acquisition and age [Table 4]. Females had an HCV prevalence of 7.8% (70 out of 517), whereas males had an HCV prevalence of 4.3% (39 out of 383). Test of association between gender and HCV incidence lack statistical association as $P = 0.127$ [Table 4].

Discussion

The findings of this study revealed that there is a prevalence of 13.4% for HBV, 12.1% for HCV and 1.1% for coinfection with both viruses out of the entire population of study. [15] grouped the prevalence of HBV as <2% low, 2-8% intermediate and >8% as high prevalence in endemic regions, while [16] grouped HCV prevalence as high (prevalence ≥3%) moderate (prevalence 2–2.9%), low (prevalence 1.0–1.9%), and very low (prevalence < 1.0%) in endemic regions. Using these as yard stick, it can be confidently said that there are high prevalence of both viruses in the region under consideration. Previous studies as it is on [14] have reported Taraba state where the population of this study was drawn to have the highest prevalence of both HBV and HCV infection in Nigeria. Also, in a similar study carried out by [3] in the same region, there was a similar trend in the prevalence of the viruses although the percentages were relatively higher with 13.60%, 16.60% and 1.0% prevalence for HBV, HCV and coinfection respectively. The prevalence of HBV reported in this study agrees with that of [3] and also agrees with the average prevalence for Nigeria (10%–15%). Prevalence of HCV recorded in this study gave an alarming 12.1% though lower than16.6% reported by [3] in the same region but far higher than several other reports of HCV prevalence for Nigeria. [17] Reported 0.4% in Kano, [18] reported 2.0% for Anambra, [19] gave 5.0% for Port-Harcourt, and 12.0% was reported by [20] for blood donors in Benin City Edo state all in Nigeria. There is a relatively lower incidence of the HBV and HCV in the present studies which can be attributed to increasing awareness, uptake of vaccine and effectiveness of interventions by relevant stake holders, clearance of the parasite through treatments among others. The higher prevalence of HBV compared to HCV reported in this study is a recurring findings in previous studies carried out in Nigeria, Ghana as well as other west African countries [21].

When the prevalence is considered gender wise, it will be observed that the female population has relatively higher prevalence 7. 6%(68/517) when compared with the male proportion 5.9%(53/383) for HBV with no statistically significant association P= 0.766 gender wise. This means that the prevalence of HBV is not dependent on gender in this finding which agrees with the findings of [3], [22] and [23], but disagrees with the findings of [24] and [25] Similar trend was also observed for HCV with the female having 7.8%(70/517) and males 4.3%(39/383) having no statistically significant association P = 0.127 which can be restated as the prevalence of HCV doesn't depend on gender. The relatively higher percentages of positivity to both viruses observed among the female population might be due to their higher exposure to hospitals where nosocomial transmission occurs as they patronize hospitals most, lifestyle and or cultural practices in the region.

Among age groups, age group of 20-31 recorded the highest prevalence of HBV positivity followed by 32-43 having a prevalence of 4.6 %. The finding of this study agrees with that of [3] in a similar population carried out in the same region. It also concur with the findings of [22, 26], but in contrast with the findings of [23]. The prevalence may be attributed to the sexual active nature of this group, illicit drug uses (injections), tattooing, body piercing, etc., which are risk factors associated with HBV transmission and are common with this age group. Age group of 56 and above had the lowest prevalence (0.2%) of HBV infection. This may be explained by the fact that most HBV complications occur within this age group and bulk of them most have died or the ability of HBV carriers to clear HBV through treatment. A statistically significant association P = 0.024 was observed between the age groups and HBV prevalence. This can be interpreted as the prevalence of HBV depends on age group of the population under consideration.

The prevalence of HCV was found to be highest in the age group of 32-43 (5.4%) which was closely followed by the age group of 20-31 with the percentage of 3.6%. This tells us that the prevalence rises with age but dropped down from the age group of 44 and above. The higher prevalence between the ages of 20-31 and 32-43 may be due to Increasing exposure to risk factors of HCV (hemodialysis, ocular and dental procedures, and other invasive techniques) while the decrease at older ages might be due to the ability of carries to clear the virus or die due to complications associated with the infection. The low percentage (0.4%) recorded amongst the 8-19 age group may be due to lower exposure to risk factors as HCV is mostly horizontally transmitted.

A total of 10(900) which constitute 1.1% of the respondents were found to be coinfected with HBV and HCV. This finding agrees with the finding of [3] who reported 1.0% in the same region and same population, 1.1% obtained by [27] among HIV patients in Kampala Uganda. A 0.0% prevalence was reported in a study carried out by [21] in Ghana also among HIV populations. The co-infection reported in this and other studies can be related to parenteral mode of transmission they share and the endemicity of

the diseases in the regions. Coinfection increases the severity of the liver disease, increase the risk of liver cancer andincreased risk of fulminant hepatitis when superinfection with HCV occurs on the background of chronic HBV [28].

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Conflict of interest
No conflict of interest.

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