Gut and Gastroenterology

RESEARCH ARTICLE

Community Based Seroprevalence of HBV and HCV Infection in Bauchi State, Nigeria

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Abstract

Epidemiological data on Community-based seroprevalence of HBV and HCV are limited, thus create a information gap on apparaently healthy individual unaware of their status in the community. The study determine the seroprevalence of HBV and HCV and associated risk factors among apparently healthy individuals in three semi -urban communities of Bauchi state, Nigeria. The cross-sectional study was conducted in three communities of Bauchi state between July and August 2017. A well-structured questionnaire and informed consent was administered, and rapid diagnostic kits was employed for sero detection of HBsAg and anti- HCV. Appropriate statistical package employed for data analysis. Of the 637 participants, comprised of 284 (44.6%) males and 353(55.6%) females, overall prevalence of 23.7%, HBsAg was detected in 20.7% (n=354) , Anti-HCV in 3.1%(n=93),and no co-infection. Statistical significant association was observed between socio-demographic variables and seroprevalence ($p<0.05$) except Anti-HCV and marital status. Increased HBsAg prevalence was observed with the age-group, and male participants. Similar prevalence among participants with tertiary and non-formal educational background, married and single, and civil servants. Overall risk factors analysis revealed statistical significant association between the risk factors and seroprevalence with HBV (7 out of the 12) ($p<0.05$), HCV (1 out of the 12) with unknown alcohol consumption ($p<0.05$). The study findings furthered affirmed high prevalence of HBV and HCV in the communities, constituting a serious public health problem. Therefore, there is need for public health education, awareness and knowledge, and mass vaccination of the populace to stem down the tide of high prevalence rate.

Keywords: HBV, HCV, Risk Factors, Community-Based Seroprevalence, Bauchi State.

Introduction

HBV and HCV infections remains a serious public health problem, particularly in endemic region of subsaharan Africa and Asia with low health care expenditure for treatment and management approach. The disease prevalence and burden is furthered compounded by high level of illiteracy, linked to poor public health education, awareness and knowledge of associated risk factors, and high level of poverty in endemic region of subsaharan Africa and Asia [1]. The infection prevalence rate is disproportionately distributed among all age group, gender and geographical location depending on mode of transmission and exposure to the risk factors [2], with HBV and HCV prevalence of 240- 350million and 150-170 million infections reported globally [3, 4].

Both HBV and HCV are major risk factors of chronic liver disease, cirrhosis and hepatocellular carcinoma (HCC) cases, HCC accounts for 70-90% of primary liver cancers and as the third leading cause of cancer- related deaths [6]. In sub-saharan Africa, both shared same commonest mode of transmission via vertical and horizontal means that is contact with contaminated blood/products, sharing of unsteriled sharp objects, local surgical procedures and sexual activitites [7, 8]. For HBV, perinatal is the commonest mode of transmission as a result of high HBeAg positive women in Africa and Asia, responsible mother of child transmission [9]. The HBV infection prevalence and progression depends on the age at infection. Though, majority of infection is acquired at birth, it is also capable of resolving immnologically through tolerance and clearance, and progress from acute to chronic state depending on exposure to the risk factors [10]. Since the WHO introduction of HBV vaccination into Expanded Immunzation programme, globally, the vaccination programme had changed HBV epidemiology resulting reduction in prevalence rate. Example, is the report from Saudi Arabia, with prevalence reduction from 6.7% to 0.3% [11], Malaysia 1.6% to 0.3% [12] and China, from 9.7% to 1.0% [13]. However, data on vaccination programme in African countries are limited, but few studies had reported non-serodetection among vaccinated children in the south eastern Nigeria [14, 15].

In Africa, HBV prevalence ranged between 4.6-8.5% [16] with 4-44% prevalence of pooled studies in Nigeria [17]. For HCV, it ranged between 0-5%, [18] and 0.4-5% in Nigeria [19]. Despite, lack of comprehensive national surveillance data on

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Received: Nov 3, 2018; **Accepted:** Nov 6, 2018; **Published:** Nov 8, 2018

HBV and HCV that may be due to cost implication and logistic problems. two national surveillance data had been published, HBV prevalence of 12.2% [20] and HBV and HCV prevalence of 6.7% and 2.5% [21]. While there is relative clarity in the epidemiology and transmission route of HBV, studies had observed that associated risk factors of HCV are only recognizable in 50% of the cases, while remaining 50% non-reconizable which may contribute to possible underestimation of prevalence rate [22, 23]. Futhermore, serological assay, sample preparation and storage, transmission pathway and characterizing of population thus influenced HCV prevalence rate outcome [24]. With emerging trend, some hospital-and community-based studies had reported high prevalence rate, 10% in Calabar [25], 13.2% in Keffi, [26] 10% among children in Maiduguri [27].

Bauchi state, the study area is one of the administrative states in the northeastern region of Nigeria. Socio-cultural and religious practices like polygamy, early marriage for females, use of sharp objects for surgical procures as in vulutomy and circusmion, which are common practices in the communities are known risk factors of viral hepatitis transmission [20]. Few studies conducted on HBV and HCV within the study area on high risk population, includes, blood donors], suspected liver disease patients, pregnant women] and migrant Fulani nomads, with seroprevalence range of 8.0% and -12.5% [28-31].

According to American society of Gastroenterology advocacy of periodical screening in the community with high prevalence rate, local study becomes imperative aimed at early detection of apparently healthy individuals unaware of their status and the need for prompt interventional measures such as mass vaccination taken. Undertaking such study at local level, bridged the information gap on the epidemiology, characteristics of the infection, and complement the national database in evaluating situational report, towards effective and efficient management of the viral infections. To the best of our knowledge, this is the first report of community based study in Bauchi state. Here, we decided to determine the seroprevalence of HBV and HCV infections and associated risk factors in three communities of Bauchi state.

Methodology

The descriptive cross-sectional study was conducted in three communities(one local government per each senatorial zone) of Bauchi state, namely Jamare, Warji and Kirfi. Geographically, Bauchi state, is one of the administrative state in the northeastern Nigeria located on the Latitute.9^0 $3^{'}$ and 12^0 3^N and Longititute 8^0 $50^{'}$ and 11^E within sahel savanna vegetation. According to Nigeria 2006 census, her population was 4,653,066, the breakdown of study area population was, Jamare (117,618), Warji (114,720) and Kirfi (147,618). Mainly agrarian state, involved in cultivation of grains and rearing of livestock and civil servants. The study protocol was approved by Abubakar Tafawa Balewa Institutional review board. A standard questionnaire and informed consent was administered on the participants that consented to participate in the study after verbal briefing on the significance and public health importance. We employed the services of the traditional and religious leader for smooth administrating of the questionnaire and blood specimen was collected by medical laboratory technician involved in the study. Information on the questionnaire includes, socio-demographic variable, age, sex, marital status, occupation, educational background, and risk factors associated with viral hepatitis. Criteria of inclusion, apparently healthy individual without any clinical manifestation of viral hepatitis, while those with clinical history of hospital admission, surgery or blood transfusion were excluded. The age of participants enrolled in the study ranged between 4 to 65years. The sample size was calculated based on the HBV prevalence of 8.0% reported among blood donors [Alkali], at 95% confidence interval, and 2% degree of freedom to give minimum sample size of 637.

Three to Five milliliter of venous blood was collected aseptically from the study participants, dispense into properly labeled plain specimen bottle, allowed to color, retract and centrifuged at 15,000rpm for 15 minutes. The serum was separated into another labeled sample bottle for batch analysis. Sero-detection of viral etiologies was carried out according to the manufacturer's instruction the HBV and HCV screening utilized the Bio test Hamgzhou (Biotech CO Ltd China) kit, control sample was included in each batch analysis to validate the study result.

Data analysis

Demographic variables and laboratory data were entered into the study database and analyzed using SPSS version 20.0. Values were expressed in mean and percentages. Comparison of Categorical variables were determined by the chi-square test, with Significance difference expressed as $p<0.05$.

Result

Of the 637 participants enrolled in the study, comprised 284(44.6%) males and 353(55.4) female, with the mean age of 24.4+10.5 years, ranged between 4 to 65years. The overall seroprevalence of HBsAg and anti-HCV was 23.5%, HBsAg detected in 20.4% (n=354) and Anti-HCV in 3.1% (n=93) and no co-infection. The study area wise prevalence of HBV vs HCV, Warji (11.0% vs 1.7%) Jamaare (4.8% vs 0.5%) and Kirfi (4.6% vs 0.6%) respectively. Statistical significant association was observed between the seroprevalence and socio-demographic variables of HBV ($p<0.05$), except Anti-HCV with marital status ($p>0.05$) (Table 1).

The HBsAg prevalence increased with age-group of the participants, while increased Anti-HCV prevalence was observed among participants within age-group 13-20(0.7%) and 21-35(0.6%) years. The sex pattern showed a three - and two- fold difference between male and female in HBV and HCV. .High prevalence rate was recorded among participants with tertiary (6.3% vs 0.8%) and non-formal (6.0%vs 1.4%) educational background. Similar high rate was observed among married (13.8% vs 2.2%) and among civil servant (6.3% vs 0.8%). The overall analysis of seroprevalence and participant public health education, awareness and knowledge

LGA	Total	HBV			HCV		
		Positive (%)	Negative	p-value	Positive (%)	Negative	p-value
Jama'are	248	31(4.8)	218	0.001	5(0.7)	243	0.014
Kirfi	124	29(4.6)	95		4(0.6)	121	
Warji	265	70(11.0)	194		11(1.7)	254	
Age-group							
<12years	110	20(3.1)	90	0	2(0.3)	108	0.001
13-20	121	31(4.9)	90		5(0.7)	115	
21-35	130	34(5.3)	95		4(0.6)	126	
36-50	112	9(1.4)	92		7(1.0)	94	
>51	166	34(5.4)	131		2(0.3)	164	
Gender							
Male	284	97(15.2)	256	0.002	13(2.0)	340	0.034
Female	353	32(5.0)	252		7(1.0)	277	
Educational status							
Non-formal	209	38(6.0)	171	0	9(1.4)	200	0.003
Primary	140	31(4.0)	110		5(0.7)	135	
Secondary	119	22(3.5)	97		0(0)	119	
Tertiary	169	40(6.3)	130		5(0.8)	164	
Marital status							
Divorced	25	4(0.6)	22	0.026	4(0.6)	22	0.063
Married	441	88(13.8)	353		14(2.2)	427	
Single	137	34(5.3)	103		2(0.3)	135	
Widow	34	4(0.6)	31		0(0)	34	
Occupation							
Business	166	27(4.2)	139	0	4(0.6)	162	0.003
Civil servant	184	40(6.3)	144		5(0.8)	178	
Farmer	72	27(4.2)	45		4(0.6)	68	
Housewife	79	7(1.1)	72		4(0.6)	76	
Student	104	22(3.5)	83		2(0.3)	102	
Others	32	5(0.8)	7		0(0)	13	

Table 1: Socio-demographic variables of subjects.

of HBV and HCV risk factors, showed statistically significant association between the variables and HBV($p<0.05$),except alcohol consumption with HCV infection($p<0.05$)

Discussion

Community-based seroprevalence study provides an overview of infection prevalence associated risk factors and baseline information towards stemming down infection rate. The study assessed seroprvalence of HBV and HCV among apparently healthy individual unaware of their status, and the findings revealed high seroprevalence level that is of public health concern.

The overall seropositivity of HBsAg and anti-HCV detected in this study was 23.2% which is comparable to 21.7% reported in a retrospective study that analyzed the serological screening of HBV and HCV among suspected liver diseases cases admitted at tertiary hospital in Bauchi [29] .But, higher than 8.0% reported among blood donors in the same study area [28]. This observed difference highlight the role of apparently healthy individuals unaware of their status acting as reservoir of the viral aetiologies and facilitating increasing prevalence. Lack of voluntary counseling/testing and their poor health seeking behavior of the populace contribute to clinical manifestation responsble for hospital admission.

The seroprevalance breakdown revealed HBsAg prevalence of 20.4% and anti-HCV prevalence of 3.1%, while statistical significance association was observed between the prevalence and socio-demographic variables. The study area wise prevalence revealed, 11% prevalence rate at Warji, 4.8% and 4.6% at Jamaare, Kirfi respectively indicative of high and intermediate level according to WHO classification [32]. The overall HBV prevalence rate of 20.7% is lower than the level documented in similar community-based studies, 22.0% in Jos [33], and 30.9% in Abdjan [34] But higher than the level recorded in studies conducted in Bauchi state with seroprevalence ranged of 8.0% -14.6% [28-31]. Geographical location, study design and exposure to the risk factors are known variables that influenced the prevalence outcome. But, HBV diagnosis and treatment depends on comprehensive diagnosis approach, as serologic tests is ideal in population screening and identification of infected individual. Treatment and management of infected individual requires HBV biomarkers and viral load.

Comparing seroprevalence with socio-demographic variables of study participants, we observed increased HBV prevalence with the age-group, a pattern consistent with the findings other studies [20, 34]. The HBV prevalence is geographically diverse, within population, age, gender and mode of transmission [10].

While the commonest route of infection is the acquisition at birth/or childhood capable of progressing from acute to chronic stages, and further exposure to the risk factors [10, 11]. We decided to include children in the study, aimed at assessing the protective effect of HBV vaccination in the 3 communities. The HBV prevalence level of children aged less than 12years was 3.1%, comparable to 3.1% and 3.4% recorded in studies conducted among children in southeastern Nigerian [14, 15]. But lower than 12% in southwestern Nigeria [35] and 44% in Biu, northwestern Nigeria [36]. The prevalence level raises the question on the immunzation covergae in the state. According to WHO and UNICEF Immunization coverage 2017 report on Nigeria ranged between 30% and 42%, which is relatively low. [37].

This coverage might be a bit lower in the northern part of Nigeria, because of poor information dissemination, socio-cultural and religious perception by the parents/guardian towards immunzation and associated logistic problems. To stem down the relatively high seroprevalance level among children as observed in this study would depend on improvement on public health education, and logistic problem associated with immunzation. In contrast, high prevalence was observed among study participants with non-formal and tertiary educational backgound. The high level recorded among participant with tertiary educational background is similar to the level recorded in a study conducted among university students [38]. Despite, the educational background of the study participants, socio-cultural and religious practice of polygamy, early marriage and unprotected sexual activities among single and married students can be alluded to the level. Majority of HBV and HCV documented studies had reported male predominance as observed in our study [24, 25, 28, 33]. The male predominance in our study can be attributed to environmental, occupational and behavioral activities, such as polygamy, use of unsterile sharp instrument for local surgical procedure, and shaving /barbing and sexual activities [19].

The overall Anti-HCV prevalence of 3.1%, still falls within the national prevalence range of 0.4-4.0%, [19], but comparable to 3.0% among pregnant women in Ekpoma, southern Nigeria, Biu, northeastern Nigeria [39]. In comparison to other studies conducted within the study area, it is lower than 4.4% reported among suspected liver diseases cases [28] but higher than 0.7% among blood donors in the same study area [27]. Available data had shown emerging trend of high prevalence level of HCV in similar community based studies, 10% in Calabar [24],12.45 in Jos[33], 13.2% in Keffi [25] and 5.3% in Abidjan [34].

Risk Factors	Response	Total number	HBV		P	HCV	
			Positive	Negative		Positive	Negative
Symptoms of Hepatitis	Yes	378 (60.48%)	70	128	0	7	191
	No	247 (39.52%)	58	358		13	403
Married in polygamous setting	Yes	391 (62.56%)	36	214	0.083	13	238
	No	234 (37.44%)	38	144		2	180
Jaundice	Yes	201 (32.16%)	25	142	0.08	9	158
	No	424 (67.84%)	99	347		11	436
Treated for STD	Yes	50.4 (8.064%)	5	45	0.044	2	50
	No	575 (92%)	113	445		18	540
Long Term Hemodialysis	Yes	11 (1.76%)	2	4	0.076	2	4
	No	613.8 (98.208%)	122	491		16	598
Exposure to Blood	Yes	130 (20.8%)	22	95	0.036	2	115
	No	495 (79.2%)	97	398		16	479
Exposure to sharps	Yes	448.2 (71.712%)	90	358	0.102	13	436
	No	177 (28.32%)	38	133		5	166
Contact with person who had hepatitis	Yes	185.4 (29.664%)	45	140	0.046	4	182
	No	440 (70.4%)	83	335		16	401
Unknown alcohol consumption	Yes	20 (3.2%)	2	13	0.002	2	13
	No	605 (96.8%)	65	283		11	337
Screen for hepatitis in the past	Yes	209 (33.44%)	70	128	0.048	7	187
	No	415.8 (66.52%)	58	358		13	403
Outcome	Yes	513 (82.08%)	54	59	0.057	4	110
	No	112 (17.92%)	9	59		4	65
Ever take an injection not prescribe by a doctor	Yes	171 (27.36%)	43	113	0.05	7	149
	No	453 (72.576%)	83	371		13	432

Table 2: Association of Risk factors and seropositivity of HBV and HCV, using multivariate analysis.

Variation in the prevalence shed light on the epidemiology of HCV, with reference to method of testing, transmission route and study population [24].

In this study, Anti-HCV prevalence level of 0.3% recorded among participants aged <12years,is lower than 10% reported among pediatric patients attending tertiary hospital in Maiduguri [27] and 5.4% among Ghanaian children [40, 41].The HCV prevalence is less in children compared to adults which peak at 55-65years and 15-19years [24]. However, a study conducted in Egypt among children identified blood transfusion as HCV risk factor [24]. While we observed similar in seropositivity pattern of HBsAg and Anti-HCV with socio demographic variables, the low prevalence with HCV raise pertinent epidemiological question on the risk factors, transmission route and serological tests [24]. Further studies is needed for better understanding of HCV epidemiology as preventive measures.

The overall analysis of study participants public health education, awareness and knowledge and risk factors of HBV and HCV as presented (Table 2) showed a statistical significant association between 7 of the 12 variables and HBV, which includes symptoms of hepatitis, treated with STD, exposure to blood, contact with family member with hepatitis, unknown alcohol consumption, screened for hepatitis and injection by untrained health personnel, Overview of study participants response to study questionnaire and seropositivity, showed high numbers of participant had poor knowledge of associated risk factors, similar to the findings of other studies [42, 43].

The poor knowledge can be linked to high level of illiteracy and poverty among populace residing in the communities which limit their health seeking behaviour and contribute to the increasing trend. The association of unknown alcohol consumption and HCV infection can be explained by the hepatoxicity effect and involvement in liver cirrhosis.

Despite, the public health significance of this study, there are limitations, first, the study population and duration is small and short, which might not be a good epidemiological representation of HBV and HCV infection in the state, Secondly, HBV biomarker and ELISA method was not included in diagnostic methodology, necessary in assessment of infection states, particularly vaccination programme. Method employed is limited in sensitivity and specificity, incapable of assessing the different stage of infection and vaccination.

In conclusion, the study findings revealed high prevalence of HBV and HCV among asymptomatic individuals in the communities, which portray a public health concern considering clinical implication and clinical sequalae. As the infection progress from acute to chronic state, in cases of chronic liver and cirrhosis, impact negatively on the patient and health care burden of the government. More periodic surveillance is needed for comprehensive information for preventive measures.

Acknowledgement

We acknowledge the assistance and support of staff in the internal medicine, and medical laboratory services for the review, sample collection and analysis, leading to the success for the study.

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Citation: Alkali M, Okon KO, Jibrin YB, Umar S, Toyin A (2018) Community Based Seroprevalence of HBV and HCV Infection in Bauchi State, Nigeria. Gut Gastroenterol 1: 001-006.