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Seroprevalence of Hepatitis (B and C) viruses among apparently healthy Adults in Ekpoma, Edo State, Nigeria

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Abstract

Background: Infections with the hepatitis B virus (HBV) and/or the hepatitis C virus (HCV) are public health problems, which are highly endemic in the sub-Saharan Africa countries where Nigeria is located. Early and accurate diagnosis of co-infections with mono- and/or polymicrobial agents, in resource limited settings remains the key to effective interventions. **Objective:** This study was carried out to determine the seroprevalence of hepatitis B and hepatitis C viruses among apparently healthy individuals in Ekpoma, Edo State, Nigeria. **Materials and Methods:** In this cross-sectional laboratory based study, three hundred blood samples were aseptically collected from apparently healthy individuals randomly selected from Ekpoma community. Participants were screened for hepatitis B surface antigen and anti HCV antibody using standard methods. Ethical clearance and participant's informed consent were sought and obtained from appropriate authorities and concerned participants. All data generated in this investigation were analyzed for statistical relevance using Pearson's Chi square software. **Results:** Of the 300 samples screened, 8.3% were seropositive for hepatitis B surface antigen while 3% was seropositive for anti-HCV antibody. The sex related prevalences of 4.7% in females and 3.6% in males were obtained for HBV while HCV recorded 2.3% for females and 0.7% for males. HBV and HCV infections were not significantly ($p<0.05$) associated with the sex of participants. Age related prevalence for HBsAg were 4%, 3% and 1.3% among the age groups 19-29, 30-39 and 40 and above years respectively while 1%, 1.3% and 0.7% prevalence rates of anti-HCV were observed among the age groups (19-29, 30-39, 40 and above)years respectively. **Conclusion:** The observed sero-prevalence of HBV and HCV among apparently healthy individuals in Ekpoma emphasizes the significance of early detection of disease agents in prevention and effective management of disease outbreaks especially in resource limited settings.

Key words: Hepatitis B virus, Hepatitis C virus, seroprevalence, apparently healthy individuals.

Introduction

Viral hepatitis is the inflammation of the liver caused by infection with the hepatitis viruses. Infections with the Hepatitis B virus (HBV) and/or the Hepatitis C virus (HCV) are public health problems, which are highly endemic in the sub-Saharan Africa (1, 2). Worldwide, chronic hepatitis caused by HBV infection is the tenth leading cause of death (3). The World Health Organization (WHO) estimates, suggest that HBV results in 2 million deaths each year worldwide and 230,000 of these occurring in Africa (4) The prevalence of hepatitis B is four times higher in blacks, 11.4% as compared to whites, 2.6% (5). It is approximately 90% for an infection acquired at the perinatal region and as low as 5% or even lower for adults (6). Perinatal or horizontal infection early in childhood are the main roots of HBV transmission in high endemic regions such as Asia, Africa, Pacific islands and the Artic and the rates of HBsAg positivity ranges from 8-15% (7).

In low and endemic areas such as Western countries, HBV is predominantly a disease of adolescents and adults as a result of high risk sexual behaviour or injection drug use and the rate of positive HBsAg is less than 2% (6). In Nigeria, the carriage rate of hepatitis B surface antigen (HBsAg) is 10-17% in apparently healthy adults (8, 9, 10). In Jos, Plateau state in north central Nigeria, the prevalence of HBsAg among apparently healthy blood donors was found to be 14.3% (9). Although horizontal transmission is widely recognized as the major means of HBV transmission in areas of high endemicity such as Nigeria (11), the vertical transmission rate in a Nigerian population of HBsAg – positive pregnant women was found to be 51.6% (12).

Hepatitis C virus (HCV) accounts for 20% of all acute cases of viral hepatitis C and it is a disease with a significant global

impact (13). According to the WHO, there are 130 to 170 million people infected with hepatitis C virus (HCV) corresponding to 2 to 2.5% of the world's total population. There are considerable regional differences in Hepatitis distribution. In Egypt, the prevalence is as high as 22% (14). Individuals infected with HCV are at risk of developing liver cirrhosis, cancer or both. Infection with HCV is often asymptomatic with about 10% of individuals becoming jaundiced (15).

There has been an increase in information about viral hepatitis over the past 2 to 3 decades (16), but till date, a big chasm still exist between what is reported in other parts of Africa and the information presently available for healthcare providers in South Southern Nigeria on Hepatitis B and C viruses respectively. There is no regional hepatitis surveillance neither are there any database which connects the sporadic reports to have allowed for prediction of future disease trends. Presently most hepatitis disease management are based on presumptive diagnosis centered largely on classical signs and symptoms of the disease because even the cheap rapid diagnostic screening test kits are mostly affordable and available at regional referral or teaching hospitals and cost prohibitive in private health establishments. Consequently definitive diagnosis and specialized treatment for the general public becomes difficult due to poor resources. Studies which provides information on the potential carriers and potential hepatitis patients from among the apparently healthy individuals will impact on regional competency in diagnosis, management and prevention of disease outbreaks and ultimately reduce morbidity and mortality associated with hepatitis B and C respectively. This study was therefore designed to outline the seroprevalence of HBV and HCV among apparently healthy adults in Ekpoma, Edo State, Nigeria, with the ultimate goal of providing a data on potential carriers and potential patients which may be used to help patients before the disease becomes overt.

Materials and methods

This study was carried out in Ekpoma, the administrative headquarters of Esan West local government Area of Edo State, Nigeria. The area lies between latitudes 6^0 $43'$ and 6^0 $45'$ North of the equator and longitudes 6^0 $5'$ and 6^0 $8'$ East of the Greenwich median. Ekpoma area falls within the rain forest/ savanna transitional zone of the south-south Nigeria. Ekpoma has a population of 89,628 and 127,718 as at 1991 and 2006 population census respectively (17), majority of which are civil servants, traders, teachers, lecturers and students.

Informed consent was sought and obtained from the appropriate authorities and concerned participants anonymity must be maintained, good laboratory practice/ quality control ensured and that every findings and results disclosure would be treated with utmost confidentiality and for the purpose of this research only. All work was performed according to international guidelines for human experimentation in clinical research.

The study design was a descriptive cross-sectional survey. This study was conducted among a total of three hundred apparently healthy individuals of both sexes, in Ekpoma, Edo State between December, 2013 and March, 2014. The participants ; apparently healthy adults without jaundice were interviewed to obtained information on their socio-demographic data such as age, sex, history of previous blood transfusion and jaundice. Confirmed HBsAg positive and were on hepatitis medication or have any apparent ill health were excluded from the study. Written and informed consent was sought and obtained from each participant before sampling. Those who could not read/write were required to thumb-print on a designated section of the form to show their consent and this happened after they were informed about the study, cost, liberty, safety, and confidentiality.

For each participant, about two (2) ml of blood was collected from the antecubital vein into plain bottles under aseptic condition. They were labeled and stood on the bench for at least one hour to allow clot retraction to take place before it was centrifuged. After centrifugation, the sera were harvested for analyses. They were screened for both HBsAg and HCV using Diaspot one step hepatitis B surface antigen test strips and Diaspot one step hepatitis C test strips respectively (Diaspot Diagnostics Inc., U.S.A.). These are qualitative, lateral flow immunoassay test kit devices for the detection of both HBsAg and HCV in plasma with a relative sensitivity of 99.0% and relative specificity of 98.6%. The tests were done according to the manufacturer's instructions. Positive and negative controls were included in each batch of tests to confirm test procedure and also to verify proper test performance. The prevalence of each viral infection (HBV and HCV) was determined from proportion of seropositive individuals in the total population under consideration. Pearson's Chi square software (18) was used to test for the independence of each frequency distribution observed at $\alpha = 0.05$

Results

Table 1 reveals the prevalence of HBsAg and HCV among apparently healthy individuals in Ekpoma 25 representing 8.3% was seropositive for HBsAg. 4% were in the age bracket of 30-39 years followed by 19-29yrs (3%) and 1.3% belonged to the age group of 40 years and above. According to sex, the females were more infected with HBV infection than the males, with a prevalence rates of 4.7% and 3.6% respectively.

Nine representing 3% tested positive for HCV. 1.3% was in the age range of 30-39 years followed by age group 19-29years (1-0%) and 0.7% occurred in the age range of 40 and above. According to sex, the females were also more infected with HCV than the males with prevalence rates of 2.3% and 0.7% respectively.

Table 2 shows the socio-demographic characteristics of HBV/HCV positive subjects in Ekpoma. The subject were divided into two groups: those positive for HBV and those positive for HCV. As shown, there were slightly more females (52.7%) than males (47.3%). 3.6% of males were

HBsAg positive against 4.7% females. Also, 0.7% of the male subjects were positive for anti-HCV against 2.3% of the females. Married men and women constitute the largest proportion of those infected by both viruses. 13.3% of the subjects were smokers and accounted for 20% of HBV infection against 11.1% for HCV. 28% of consumers of alcohol were HBV positive against 11.1% for HCV infection.

About three quarter (73.3%) of the study population engaged in unprotected sex. Risk factors such as unprotected sex accounted for 52.0% and 44.4% of HBV and HCV infections among seropositive individuals in Ekpoma while previous surgery recorded 1.67%. Individuals that had previous surgery were not seropositive for both HBV and HCV.

Table 1: Prevalence of HBsAg and HCV among apparently healthy individuals in Ekpoma (%)

Description	**No of HBV exam**	**No of HVV exam**	**HBV Positive**	**HCV Positive**	**HBV Negative**	**HCV Negative**
Total	300	300	25(8.3)	9(3.0)	275(91.7)	291(97)
Age group						
19-29	109(36.3)	88(29.3)	9(3)	3(1.0)	100(33.3)	85(28.3)
30-39	152(50.7)	134(44.7)	12(4)	4(1.3)	140(46.7)	130(43.4)
≥40	39(13)	78(26.0)	4(1.3)	2(0.7)	35(11.7)	76(25.3)
Sex						
Male	142(47.3)	142(47.3)	11(3.6)	2(0.7)	131(43.7)	140(46.7)
Female	158(52.7)	158(52.7)	14(4.7)	7(2.3)	144(48.0)	151(50.3)

HBsAg= Hepatitis B surface antigen, HBV=Hepatitis B virus, HCV=Hepatitis C virus

Table 2: Socio-demographic characteristics of HBV/HCV positive subjects in Ekpoma

Characteristics	Number examined n=300(%)	HBV Positive n=25 (%)	HCV Positive n=9(%)
Sex			
Male	142(47.3)	11(3.6)	2(0.7)
Female	158(52.7)	14(4.7)	7(2.3)
Marital status			
Married	150(50)	15(60.0)	5(55.5)
Single	130(43.3)	5(20.0)	2(22.2)
Widow/ widower	20(6.7)	5(20.0)	2(22.2)
Social habits			
Smokers	40(13.3)	5(20.0)	1(11.1)
Alcoholics	150(50.0)	7(28.0)	1(11.1)
Risk factors			
Unprotected sex	220(73.3)	13(52)	4(44.4)
Previous blood transfusion	30(10.0)	5(20.0)	2(22.2)
Scarification marks	20(6.7)	1(4.0)	0 (0.0)
Previous surgery	5(1.7)	0 (0.0)	0 (0.0)
Intravenous drug users	0 (0.0)	0 (0.0)	0 (0.0)
Unsafe injection	7(2.33)	2(8.0)	1(11.1)
No identified risk factor	18(6.0)	4(16.0)	2(22.2)

n=number, %=percentage

Discussion

As the dynamics of disease management and intervention gets more complex over the past three decades, research attention and questions have also shifted to preventive medicine from both curative and diagnostic medicine. Screening asymptomatic people for underlying diseases is an important approach in disease detection, prompt prevention and intervention especially when silent killing disease agents like HBV and HCV infections (19) are involved or suspected. This approach will assist healthcare providers, planners, policy makers and other stakeholders to predict possible future outbreaks and plan for it and at the same time, make necessary laws to ensure effective implementation of interventions. Therefore harnessing the skills and resources which can allow for effective interventions to be in place long before the disease becomes overt is promising in eventual reduction of the incidences of disease outbreaks to barest minimum.

The result obtained in the present study (Table 1) showed a sero-prevalence rate of 8.3% for HBsAg among apparently healthy individuals in Ekpoma. This finding is comparable with some earlier reports for instance, the prevalence rates of 8.9% and 10.3% have been reported among women of child-bearing age in Lagos, Nigeria and in the general population of Uganda in a national sero-survey by Aganga *et al*, (20) and Bwogi *et al*. (21) respectively. Our finding also supports the WHO report (22) which classifies Nigeria as a highly endemic country. Endemicity may be defined as HBsAg burden greater than 7% in an adult population. The 8.3% seroprevalence rate recorded in Ekpoma may be explained partly by the sub-urban nature of Ekpoma where disease prevalence practices which favour transmission (23) include poor adherence to vaccination schedules, relatively low vaccination coverage, sharing of drinking cups, and unprotected sex,

However, the 8.3% prevalence of HBV carriage reported in this study was higher than the seroprevalence rates of 3.2% by Odusanya *et al*. (24), 4.98% by Ejele and Ojule (25) and 6.0% by Adoga *et al* (23). The population sampled by Odusanya, Ejele and Ojulu and Adoga *et al*. (24, 25, 23), included apparently healthy pre-vaccination urban population, prospective blood donors and medical students respectively which are different from our own general population sampled. The reason for the lower prevalence rate of HBsAg in these areas as compared to ours and other Nigerian cities is not clear. It would have been expected that, the prevalence rate of HBsAg would have been higher in areas like Port Harcourt, Nigeria as compared to these other less industrializes and less cosmopolitan cities (25). The factors responsible for this discrepancy in expected prevalence rates need further study. These differences might also not be unconnected with the fact that some of the studies were carried out among the low risk group and another possible reason may be the low sensitivity of the latex agglutination method as compared to the enzyme linked immunosorbent assay (ELIZA) method (25-26)

In contrast, higher seroprevalence rates of 11.0% in Makurdi by Agwale *et al*. (27); 12.6% in Lagos by Fasola *et al*, (28), 12.8% in Minna by Egah *et al,* (29); 13.2% in a rural settlement in northern Nigeria by Jombo *et al,* (30) 15.1% in Maiduguri by Baba *et al*, (31), and 26.0% in Benin by Halim *et al*, (32) have been reported in Nigeria. Factors like difference in sample size, the sensitivity and reliability of viral assay reagents, the category of people studied, geographical location of the study population and their socio-cultural practices might have contributed to the differences reported for HBV viral infection prevalence in these areas (33-34)

The sero-prevalence of 3.0% was reported for hepatitis C virus among apparently healthy individuals in Ekpoma. The report of this finding is lower when compared with studies from Enugu, Jos and Kaduna with sero-prevalent rates of 14.9%, 5.2% and 11.9% respectively (35-36). Also factors like the differences in the sample size, the sensitivity and reliability of viral assay reagents, the category of people, geographical location of the study population and their socio-cultural practices might have contributed to the differences reported for HCV viral infection prevalence. However, the prevalence of HCV infection was found to be higher when compared to the reports of 0.1- 1.0%(37) for United Kingdom and Scandinavia and 1.0-1.9% (38) for countries like United States of America, Australia, Turkey, Spain, Italy and Japan, but lower when compared to 15-20%reported in Egypt by (39). Prevalence of hepatitis B and hepatitis C vary from country to country and depends upon a complex interplay of behavioral, environmental and host factors. In general, it is lowest in countries or areas with high standards of living and highest in countries or areas where socio-economic level is lower (26).

It was observed that the prevalence of HBsAg and HCV were highest among 30-39 years old. This agrees with a previous report by Baba *et al,* (31) who observed a higher prevalence of some viral infections among this particular age group (30-39 years). Previous authors have also found significant association with age (21, 24). Adewole *et al*, (40) also reported that individuals less than 40 years of age have the highest rate of getting infected with HCV and the age group of 30-39 years encompasses individuals with high sexual activities. Considering the age group most affected in this study, one can infer that the major transmission mode in this population may be sexual intercourse because at age 30 to 39 years, is associated with high sexual activity during marriage, premarital sexual activity, sex as a widow/widower, sex due to customs and tradition, sex for debt settlement, or sex as trade (41).

In the present study, the prevalence of HBV according to gender was higher (4.7%) among the females than males (3.6%). Furthermore, sex prevalence of HCV was 2.3% for females and 0.7% for males. Socio-economic, cultural and biological factors might be responsible for the female gender's vulnerability to both HBV and HCV infections. Royce *et al,* (42) reported that during unprotected vaginal intercourse, a woman's risk of becoming infected with both

HBV and HCV may go up to 4 times higher than the risk of man. However, there was no significant difference ($p>0.05$) between sex and HBV and HCV infections in Ekpoma. Statistical significance is at variance with the report of Pennap *et al,* (43) who reported the males to be more prevalent to HBV infections than the females. No concrete explanation can be given for a higher vulnerability of males to the infection than females.

The conspicuous absence of co-infection/comorbidities of both viruses despite the existence of factors (Table 2) that could have warranted such observation is a unique characteristic of this study. It is hard to imagine that there was no intravenous drug abusers among our selected 300 participants in the present Nigeria society with no specific drug prescription law in place and crime rates among adults remain on the increase. Although information retrieval from participants in research is also a problem in social and public health research, poor disclosure or personal health challenges and social habits may explain our observation on no drug abuser in (Table 2). The use of poor diagnostic facility which only screened and named the serotype of the viral pathogens but could not outline the viral genotypes using molecular tools which could have allowed for provision of more answers to deep epidemiologic, questions deserves attention for its implications in future studies.

Conclusion

The sero-prevalence of HBV and HCV in Ekpoma shows their endemicity and potential rising profile in apparently healthy individuals with the consequent risk of transmission of this virus to a potential susceptible host. The observed sero-prevalence of HBV and HCV among apparently healthy individuals in Ekpoma emphasizes the significance of early detection of disease agents in prevention and effective management of disease outbreaks especially in resource limited settings.

Conflict of interest: The authors hereby declares that there is no conflicts of interest.

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