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EPIDEMIOLOGY OF HEPATITIS B AND HEPATITIS C VIRUS INFECTIONS AMONG HIV COUNSELING AND TESTING CLIENTS IN JOS, NORTH CENTRAL NIGERIA

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ABSTRACT

Hepatitis B and hepatitis C virus infection are common in Nigeria; where they are a major cause of both acute and chronic liver disease, as well as hepatocellular cancer. Persons at risk of acquisition of Human Immunodeficiency Virus (HIV) infection are also at risk of acquisition of infection with Hepatitis B virus (HBV) and Hepatitis C virus (HCV). We set out to determine the epidemiology of HBV and HCV infection among HIV Counseling and Testing (HCT) clients at the Jos University Teaching Hospital (JUTH), Nigeria.

This was a cross-sectional study conducted at the HCT unit of the AIDS Prevention Initiative in Nigeria (APIN) Jos University Teaching Hospital (JUTH), Jos, Nigeria between November, 2012 and April 2013.

Subjects were recruited consecutively at the HCT unit of APIN JUTH. Included were subjects 18 years of age and above, antiretroviral (ARV) drug naive, who accepted and signed the consent form.Clients who declined to sign the consent form were excluded. The study involved collecting demographic data, exposure to risk factors and laboratory determination of HBV and HCV sero-prevalence in the subjects using Enzyme Linked Immunoassay (ELISA) and Polymerase chain reaction (PCR) assay methods.

Chi-squared test was used to determine significance of association between categorical variables.

One hundred and thirty two (56.9%) were females, 100 (43.1%) were males. Thirty six (15.5%) tested positive for HBsAg by ELISA, 31 (13.4%) were confirmed positive by DNA PCR. Nine (3.9%) tested positive by ELISA to HCV antibody, 7 (3.0%) were confirmed positive by RNA PCR. Co-infection rate of HIV / HBV was 5.2%. Infection was more common among those younger than 36 years in the case of HBV and those older than 36 years in the case of HCV.We concluded the prevalence of HBV infection was high. Study was limited by the cross sectional design.

L'EPIDEMIOLOGIE DES INFECTIONS PAR LE VIRUS DE L'HEPATITE B ET HEPATITE C PARMI LES CLIENTS DE VIH EN CONSULATATION ET AU DEPISTAGE A JOS, AU NORD – CENTRAL DU NIGERIA.

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RESUME

Les infections de virus de l'hépatite B et C sont communs au Nigeria ; où ils sont une cause majeure de la maladie de foie aiguë et chronique ainsi que le cancer hépatocellulaire. Les personnes à risque d'acquisition d'infection de virus d'immunodéficience humaine (VIH) sont aussi à risque d'acquisition de l'infection par le virus de l'hépatite B(VHB) et hépatite C(VHC). Nous avons cherché a déterminer l'épidémiologie de l'infection par VHB et VHC parmi les clients de VIH en consultation et au dépistage (HCT) a l'université hôpital d'enseignement de Jos(JUTH), Nigeria.

C'était une étude transversale menée a l'unité de HCT de l'Initiative de la prévention du SIDA au Nigeria (APIN) a l''Universite hôpital d'enseignement de Jos (JUTH) , Jos, Nigeria entre novembre 2012 et avril 2013.

Les sujets ont été recrutés consécutivement a l'unité de HCT de APIN JUTH. Inclus étaient des sujets de dix – huit ans au – dessus, antirétroviral naïve (ARV), qui ont acceptée et signé le formulaire de consentement. Les clients qui ont refusé a signer le formulaire de consentement ont été exclus. L'étude a impliqué recueillir de données démographiques, l'exposition aux facteurs de risques et la détermination en laboratoire du VHB et VHC en utilisant dosage immuno – enzymatique lie (ELISA) et les méthodes d'essai de réaction en chaine de la Polymérase (PCR). Chi – squared test a été utilisé pour déterminer l'importance de l'association ente les variables catégoriques. Cent trente – deux (56,9%) étaient femelles, 100(43,1%), étaient males. Trente – six(15,5%) ont été testés positifs pour HBsAg par ELISA, 31 (13,4%) ont été confirmés positifs par DNA PCR. Neuf (3,9%) ont été testés positifs par ELISA pour l'anticorps du VHC, 7 (3,0%) ont été confirmés positifs par RNA PCR. Le taux de co – infection du VIH/VHB a été 5,2%. L'infection aa été plus commun parmi les moins de 36 dans le cas de VHB et ceux âgés de plus de 36 dans le cas de VHC. Nous avons conclu que la prévalence de l'infection de VHB était élevée. L'étude était limitée par la conception transversale.

INTRODUCTION

Hepatitis B virus (HBV), Hepatitis C virus (HCV) and Human Immune Deficiency Virus (HIV) are among the top 10 leading causes of infectious disease deaths worldwide (1,2,3). Hepatitis B and C virus infections are frequent causes of chronic hepatitis worldwide and they create a significant burden to healthcare systems due to the high morbidity and mortality, and costs of treatment (4,5,6,7).

Hepatitis B and C virus infections can cause chronic hepatitis, liver cirrhosis and hepatocellular carcinoma - all of which are of serious public health concern (4,6). Infection by HBV and HCV cause serious mortality, morbidity and place financial burden on patients and governments and are thus a major global health problem (8). Nigeria is a hyperendemic area of infection with both HBV and HCV which are major causes of both acute and chronic liver disease associated with the development of hepatocellular cancer.[9]These viruses share common routes of transmission, but they differ in efficiency by which certain types of exposures transmit them and in their prevalence by geographic region (10,11).

The overall prevalence rate using the spot (rapid) test in a rural Ghana for HBV was highest in 2006 (13.8%), but decreased in 2008 to 6.9%.[12] However, the overall prevalence of HCV was highest in 2007 (11.1%) but decreased to 7.0% in 2008 in the same rural community (12).
Determining and monitoring the prevalence of viral hepatitis and its distribution in any community is useful for policy makers in order to formulate effective healthcare policies for patients with HBV, HCV and HIV infections(13).
Based on anecdotal evidence there are few reports on the prevalence or co-infections of HBV and HCV in Jos metropolis. This study therefore is aimed at documenting the prevalence of these infections in subjects accessing HIV counseling and testing (HCT) at JUTH.

The aim and specific objectives of this study was to determine the sero-prevalence of HBV and HCV infection among HCT subjects at JUTH using the ELISA method of assay. Also to determine the serum viral load of HBV, HCV and confirm identified seropositive samples using the PCR method.

MATERIALS

The study subjects were recruited from the HCT clients coming to JUTH, Jos for services. The JUTH HCT clinic attends to clients who voluntarily come for HIV counseling and testing on a daily basis.
Subjects 18 years and above were recruited consecutively at the HCT unit of APIN JUTH. The HCT unit offers a continuing enrolment for volunteer clients who are 18 years or older into the ARV treatment programme. The HIV status of each subject was obtained from the clinic register.
The total number of subjects enrolled was obtained by using the standard statistical formula for calculating sample size.[14,15] Blood samples obtained from 232 HCT subjects were used for this study.

All subjects starting from 18 years of age and above were included, these subjects were Antiretroviral drug (ARV) naive subjects. Only subjects who satisfied these criteria and accepted to join by signing the study consent form were included.

METHODS

About 5mls of blood was collected from each study subject into sterile plastic vacutainer with EDTA(16). Plasma was obtained from the whole blood by centrifugation at 1,500 RPM for 10 minutes. This was separated into 2 vials and kept in a -20˚C refrigerator until use. The laboratory evaluation on blood sample obtained from each of the 232 subjects as well as kit reagent positive and negative controls supplied by the kit manufacturer was performed.The Hepatitis B Surface Antigen (HBsAg),antibody to HCV (antiHCV) as well as Viral load (PCR)resultswas recorded on each individual's report form.

The Epi Info 3.5.1 (CDC Atlanta, USA) statistical software was used for data analysis. Continuous variables with normal distribution were expressed as means with standard deviations. For continuous and skewed variables, median value with ranges was stated. The chi-squared test was used to determine significance of association between categorical variables. Where the cell frequency is <5, Fisher's exact test was applied. Where more than two groups are being compared, ANOVA was used. P values of <0.05 was considered statistically significant.

Ethical clearance for this study was obtained from the Jos University Teaching Hospital Ethics Committee.
A consent form was signed by each subject who accepted to participate in the study. It was made clear to each subject that he/she was free to opt out from the study at any time without any prejudice to their care.
All subjects benefited from this study by having their results disclosed to them in confidence. Those found to be infected with HBV or HCV were referred to a Consultant Physician for specialist management.

RESULTS

Of the 36 (15.5%) who tested positive for HBsAg by ELISA, 31 (86.1%) samples were confirmed positive by DNA PCR giving a concordance rate of 86.1%.Among the 9 (3.9%) who tested HCV antibody positive by ELISA, 7 (77.8%) were

confirmed positive by RNA PCR giving a concordance rate of 77.8%).(Figure 1)

The median HBV viral load count was 282 with a range of 0 to 413x10^6 counts per millilitre. The median HCV viral load count was 12.68x10^4 with a range of 0 to 1142x10^4(Table 1).

A total of 36 (15.5%) subjects were found to HBV positive, 13 (5.6%) were male and 23 (9.9%) were females. A total of 9 (3.9%) were found to be HCV positive, 4 (1.7%) were males and 5 (2.2%) were female. Among the female subjects 23 (17.4%) and among the male subjects 13 (13.0%) tested positive for HBV.

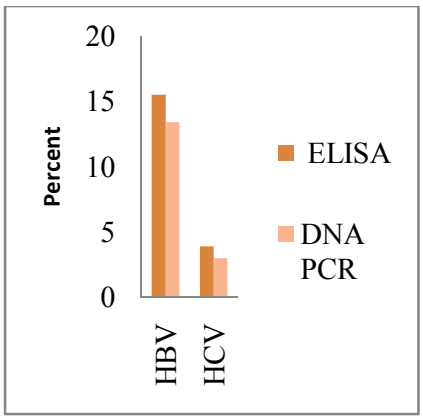

FIGURE 1: SERO-PREVALENCE OF HBV AND HCV BY BOTH ELISA AND DNA PCR AMONG ALL THE SUBJECTS STUDIED.

TABLE 1: HCV (ELISA AND RNA PCR) RESULTS FOR SUBJECTS STUDIED.

Serial Number	ELISA result	IU/ml	log /ml
1	Positive*	Not Detected*	-
2	Positive	49140.9	5.5
3	Positive	1962199.3	7.1
4	Positive	21786.9	5.1
5	Positive	11821.3	4.8
6	Positive	3333.3	4.3
7	Positive	324054.9	6.3
8	Positive	250171.8	6.2
9	Positive*	Not Detected*	-

Positive ELISA, Positive HCV RNA = Acute or Chronic HCV depending on clinical context. *Positive ELISA, Negative HCV RNA = Resolution of HCV; Acute HCV during period of low viraemia.

DISCUSSION

The prevalence of HBV infection among the HCT subjects studied was 15.5% by ELISA and 13.4% by DNA PCR. This difference of 2.1% in favour of virologic result, seem to indicate the virologic end point of HBV infection (i.e., a log10 reduction in the HBV DNA level or suppression of HBV DNA to an undetectable level [<10 to 100 IU per milliliter] (17).

From our study, HBV prevalence from this high risk group for HBV and HCV infections is much higher than the findings in Ogbomosho(18) among pre degree science students of a higher institution and in Nassarawa state (19) in two rural communities in 2010. The result of the present study is similar to the findings in 2007,[8] among male seminary student subjects of Jos and in 2011,[20] among blood donors in Jos. This study involved both sexes as subjects, but gave a similar HBsAg prevalence rate as other studies from Jos that were male dominated (20,21).

The diagnosis of chronic HCV infection generally requires testing of serum for both antibody to HCV (anti-HCV) and for HCV RNA. (22). These two markers of HCV infection may be present in varying permutations in patients, requiring careful analysis for interpretation (22). In this study, the prevalence of HCV is 3.0% by PCR RNA, our concordance rate (77.8%), compares well with the concordance of studies from other parts of the world (23,24) and is consistent with the WHO estimated HCV prevalence of 2.2% - 3.0%.[26,27] This HCV prevalence however, is low compared with previous findings reported from Jos by Egesie et al[28] in 2011 and Egah et al (29) in 2004 both studies were done among blood donors. HCV prevalence findings from other parts of the country (30,31) including report on blood donors from three hospitals in Kaduna state (32) in 2012; and report on blood donors from Lagos state (33) in 2006 were all higher than our findings.

Conclusion

The prevalence of HBV and HCV infection by ELISA and by DNA PCR among HCT clients in JUTH was determined to be high. The infection was substantial among the study population especially in those younger than 37 years in the case of HBV and those older than 36 years in the case of HCV.

Recommendations

Hospital authorities should invest more in the training of Physicians in the use of molecular diagnostic methods fora more effective monitoring of infectious diseases. It is only the use of PCR in screening that would identify infected subjects in their window period; this has implications for blood transfusion and tissue transplant services.Viral load should be used to monitor

patients in the management of HBV, HCV and HIV infected patients. Promotion of HBV screening and of the expanded programme on immunization should be encouraged.

This study was limited by the cross sectional design - a direct observation of the sero-prevalence of HBsAg and HCV only; the implication of the effect of one virus over the other was not deduced.

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