SEROPREVALENCE OF HEPATITIS C VIRUS (HCV) AMONG STUDENTS OF A NIGERIAN TERTIARY INSTITUTION

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ABSTRACT

Hepatitis C virus (HCV) infection is a leading cause of irreversible liver disease and responsible for most cases of liver transplant. It has a heterogeneous prevalence in different parts of Nigeria. The study was aimed at determining the seroprevalence of HCV among the students of Ebonyi State University. A cross sectional study involving 1120 participants of both gender, randomly selected from the four campuses of the University. Blood samples were collected and tested for the presence of HCV antibody by chromatographic immunoassay method. Out of the 1120 participants made up of 594 (53.0%) males and 526 (47.0%) females, 58 participants (27 (4.5%) males and 31 (5.9%) females) were anti-HCV seropositive making a prevalence of 5.2%. Participants within the ages of 21-25 years had the highest seroprevalence (6.0%) followed by those in the age group 26-30 years and those within the ages of 31-35 years (5.8%). Those in the age group 16-20 years had the least seroprevalence (3.1%). Married participants were found to be more exposed to HCV infection with a prevalence of 6.0% when compared to the singles (5.1%). In all the variables, the association between anti-HCV seropositivity and the variables were not statistically significant ($p > 0.05$). The 5.2% prevalence reported in this study adds to the knowledge of HCV epidemiology in the country. The infection and its associated complications can be averted or reduced to the barest minimum by intensive public awareness.

KEYWORDS: Hepatitis C virus (HCV), Seroprevalence, Students, Ebonyi State University.

INTRODUCTION

Hepatitis C virus (HCV) was formally referred to as non-A, non-B hepatitis (NANBH) after the invention of serological test for viral hepatitis A and B in 1965 and 1973 respectively,[1] until in 1989 when the agent was named by Choo and his co-worker.[2] It is a viral pandemic disease of public health concern, affecting both humans and animals especially chimpanzees and a leading cause of chronic liver disease in the world.[3] It is a RNA virus in the family of flaviviridae, whose route of transmission is parenteral, vertical and sexual,[4] as well as transfusion of unscreened or improperly screened blood or blood products. Other means of transmission may include the sharing of skin piercing objects such as needles, clippers, razor blades, toothbrushes and inadequate sterilization of medical equipment.[5]

Hepatitis C viral infection affects people of all ages, races and gender causing both acute and chronic inflammation of the liver. It is responsible for most cases of liver transplantation in US and Britain.[6,7] HCV infection may be self-limiting or progress to fulminant hepatitis. Although 80% of hepatitis C virus patients may remain asymptomatic and about 15-35% of the infected cases resolve spontaneously in a self-limiting manner within 6 months of infection without treatment, while the remaining 65-85% progresses to chronic irreversible liver damage, which brings to the limelight, the clinical importance of this infection.[8,9] While 20% of the infected patients may develop liver cirrhosis and fibrosis, 20% also may progress to hepatocellular carcinoma.[8] The risk of cirrhosis of the liver is 15-30% within the age of 20 years.[10]

An estimate of 130 to 150 million people worldwide are HCV infected with an infection rate of 3.4 million yearly[11] and Africa has the most prevalence rate of infection; 2.9% compared to the 2.5% global prevalence.[12] In Africa, prevalence ranges from 1.8% in Ghana, 4.3% in Ethiopia to 16.0% in Rwanda.[13-15] In Nigeria, the infection rate is seen to be heterogeneous; increased in some states and localities while declining in others. A 0.3% was reported in Lagos, 4.7-5.0% in Ilorin, 5.3-6.6% in Enugu, 11% in Ibadan and 20% in Benin.[16-20] There are 7 HCV genotypes and 67 subtypes identified so far.[21] Studies have confirmed that the predominant HCV genotypes in Nigeria are genotype 1, 2, 4 and 5. [21-23] Genotype 3 is found in South Asia, genotype 4 in central Africa and the Middle East, genotype 5 and 6 are predominant in South-East Asia and the Northern region of South Africa.[24]

Adolescents who exhibit rapid physical and emotional development as well as sexual maturation are more exposed to HCV infection and other sexually transmitted disease due to their increasing sexual adventure, risky behavioral practice, amongst others.[25] HCV infection still poses a challenge of public health concern in developing and underdeveloped countries where poor standard of living, poor awareness campaign and ignorance, as well as superstitious beliefs, have beclouded the people's perception of the disease. In addition to these challenges, is the unavailability of vaccines due to the mutability of the virus genome.

Considering the absence of a vaccine for passive prophylaxis and high financial involvement in the treatment of HCV infection,[9] which patients in developing or underdeveloped countries like Nigeria may not afford, it becomes imperative to prevent or reduce the rate of infection by intensifying awareness through health education on the various route of transmission and preventive measures.

A positive linear correlation has been reported between HCV infection and liver cirrhosis as well as hepatocellular carcinoma (HCC)[26,27]. The epidemiology of hepatitis C viral infection in Nigeria has been reported[28,29]. However, there is a dearth of information on its prevalence in Ebonyi State. Therefore, the aim of the study was to determine the seroprevalence of HCV among students of Ebonyi State University, Abakaliki, Nigeria, thereby providing accurate data for public health intervention programmes to forestall the spread of the infection.

MATERIALS AND METHODS
Study design
The study was a cross-sectional seroprevalence study among students of Ebonyi State University, Abakaliki, carried out between March and November 2019.
Study setting
The study was carried out at Ebonyi State University Ultramodern Diagnostic Laboratory and Research Center, offering services in all specialties of laboratory medicine. The laboratory also serves as a counseling and screening center for about 4000-5000 students admitted annually by the University.
Study Population
The study population was made up of students of Ebonyi State University at different levels of study and departments. The University is made up of four campuses, all within the state capital with an estimated population of 20,000 students and over 80% of the students are indigenes of Ebonyi State. All the subjects were in the age range of 16 - 35 years.
Determination of sample size
The sample size for the study was calculated using the formula below described by Araoye.[30]

$$n = \frac{Z^2 pq}{d^2}$$

where n is the desired sample size when the population is more than 10,000, z is the standard variation, usually set at 1.96 (which corresponds to 95% confidence interval), p is the proportion in the target population estimated to have a particular characteristic (a prevalence of 20% (0.2) which is the highest reported among all authors)[20] q is 1.0 – p, d is the degree of accuracy desired, which was set at 0.05.

Therefore, the minimum sample size is

$$N = \frac{(1.96)^2 (0.2) (0.8)}{(0.05)^2}$$

With the uncertainty about the true prevalence of HCV, a 10% attrition rate was anticipated, therefore adjusting the minimum sample size to 271.
Sampling technique, sample collection and analysis
Students recruited for this study were selected from the four campuses by simple random sampling. Venous blood (2mL) was collected from the participants under aseptic procedure into a well-labeled plain sample container after obtaining their consent and the blood samples were allowed to clot after which the serum were separated and tested for the presence of antibody to HCV (anti-HCV) by chromatographic immunoassay using test kits manufactured by Skytec Inc., USA according to manufacturer's instruction.
Data analysis
The data generated in this study were analyzed using Statistical Package for Social Sciences, version 20.0 (SPSS Inc. Chicago Illinois). Results were presented in percentages. Categorical variables were compared with Pearson's chi-square. Significant p-value was taken as <0.05
Ethical Approval
This study was approved by the Ethical Research Committee of the Faculty of Health Sciences and Technology and all the participants gave their consent before being recruited in the study.

RESULTS
`A seroprevalence of 5.2% was observed among the students of Ebonyi State University (Table 1). Out of 1120 students recruited for the study, 594 were males of which 27 (4.5%) were anti-HCV positive and 31 (5.9%) of the 526 females who participated were positive. The association between gender and anti-HCV seropositivity was statistically not significant (p > 0.05) (Table 1).

Table 2 shows the age group distribution of participants and the prevalence of anti-HCV positivity. Out of the 1120 participants, 25.5% (n = 286) were between 16 and 20 years and the seropositivity within this age group was 9 (3.1%). Participants in the age group 21-25 years who made up a percentage of 37.3% (n = 418) had 25 (6.0%) seropositivity. Those in the age group 26-30 years who made up a percentage of 32.5% (n = 364) had 21 (5.8%) seropositivity. Only 3 (5.8%) participants among those in the age group 31-35 (n =52) were seropositive. A nonsignificant association was observed between age difference and anti-HCV positivity ($p >0.05$).

Assessment of marital status-related anti HCV positivity showed that 5 (6.0%) of those who were married (n = 83) were seropositive and 53 (5.1%) of those who were single (n = 1037) were seropositive (Table 3). A non statistical significant association was observed between marital status and anti-HCV seropositivity ($p > 0.05$).

TABLE 1: Gender related seroprevalence of HCV among students of Ebonyi State University

Gender	Number of participants	Number (%) positive	Number (%) negative	X^2 value	p-value
Male	594	27 (4.5)	567 (95.5)	1.032	0.310
Female	526	31 (5.9)	495 (94.1)		
Total	1120	58 (5.2)	1062 (94.8)		

TABLE 2: Age related seroprevalence of HCV among students of Ebonyi State University

Age (years)	Number of participants	Number (%) positive	Number (%) negative	X^2 value	p-value
16 – 20	286	9 (3.1)	277 (96.9)	3.248	.355
21 – 25	418	25 (6.0)	393 (94.0)		
26 – 30	364	21 (5.8)	343 (94.2)		
31 – 35	52	3 (5.8)	49 (94.2)		

TABLE 3: Seroprevalence of HCV among students of Ebonyi State University by marital status

Marital status	Number of participants	Number (%) positive	Number (%) negative	X^2 value	p-value
Married	83	5 (6.0)	78 (94.0)	.131	.718
Single	1037	53 (5.1)	984 (94.9)		

DISCUSSION

The findings of the study indicates an overall 5.2% seroprevalence of anti-HCV among students of Ebonyi State University. This finding is comparable to the result of similar studies in different parts of the country; Ejiofor et al.[19] in Enugu reported a finding of 6.0% and Chukwurah et al.[31] in the same state who reported a finding of 7.6%. In Ilorin, 5.0% was reported by Adewuji.[17] However, our finding was higher when compared to more recent studies.[20,32-35] Although, the two most recent studies were carried out among adolescents in secondary schools. On the other hand, our finding was lower than the reports of Inyama et al.[36] in Benin and Ejiofor et al.[19] in Enugu. The difference between our findings and others could be due to variation in the age of subjects recruited and also due to the predominant cultural or traditional practices in different regions that pose a risk of exposure to HCV. These traditional practices include the nose, ear, nipple, genital piercing as well as circumcision and traditional tattooing as practiced in the western part of Nigeria and mostly done in childhood and by untrained personnel.

The anti-HCV positivity between the different genders observed in this study was not statistically significant even though more females were observed to be positive than the males. In support of this findings are the report of Udeze et al.[37] Adewuyi,[17] Abiodun et al.[35] Joanah et al.[20] and Eke et al.[34] However, the finding does not agree with the study of Okonko et al.[38] which reported a higher prevalence among the female folks. It is difficult to arrogate the higher prevalence in females to any specific risk factors as both genders are assumed to be equally exposed to awareness campaign and Ebonyians do not practice female traditional scarifications as may be practiced in other parts of the country.

Based on age, the study reported a higher prevalence of anti-HCV among participants within the age group 21 - 25 years, followed by those in the age group 26 - 30 years and 31 - 35 years. Those within 16 - 20 years had the least prevalence. Similarly, Abiodun et al.[32] reported a higher

prevalence of HCV infection amongst individuals within the ages of 21-30 years and the least prevalence in those greater than 30 years. Also, in support of this finding, is the report of Amadi et al.[39] who reported a higher prevalence among those within the ages of 20 years and 30 years. Our findings varied with a research carried out in Enugu where those below 20 years were found to have the highest prevalence[19]. Our study also revealed a not statistically significant association between age and anti-HCV positivity. This depicts an equal rate of exposure of adolescents in a tertiary institution to juvenile social activities culminating in an increased risk of exposure to HCV infection.

The prevalence of HCV infection among the studied population was influenced by their marital status. Although not statistically significant, married participants were observed to be more exposed to HCV infection than the unmarried ones. Unfortunately, no research works could be cited in this area as there appear scanty or not available.

CONCLUSION

The study showed HCV seroprevalence of 5.2% among students of Ebonyi State University, with seemly equal prevalence within the studied groups. This is to say that students in higher institutions may have an equal rate of exposure to HCV infection. This study provides additional data on the burden of the disease in Nigeria. In view of the unavailability of vaccines in addition to the high cost of treatment, a holistic awareness campaign and in-depth knowledge with emphasis on preventive measures is recommended to forestall the transmission of the infection and its consequent complications of hepatitis among the leaders of tomorrow in our society.

Limitation of the study

Determination of circulating hepatitis C viral RNA to differentiate previously infected individuals from active replicating viral infected individuals and the determination of genotype of the virus could not be done due to unavailability of PCR/RT-PCR machine in this part

of the country and the high cost of the test where available in other parts.

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