World Journal of Medical Sciences 6 (3): 162-167, 2011
ISSN 1817-3055

Hepatitis C Virus (HCV) Antibody Detection among First Year Students of University of Ilorin, Ilorin, Nigeria

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Abstract: This study reports on the occurrence of Hepatitis C Virus (HCV) antibodies among the volunteer who belong to first year students of University of Ilorin, Ilorin, Nigeria. The subjects included in this study were 200 {108 (54.0%) males and 92 (46.0%) females; ages 15 to 40 years). Serum samples from the subjects were tested for the presence of antibodies to HCV using Shantest™ HCV rapid test manufactured by Shantha Biotechnics Limited and Clinotech anti-HCV (Clinotech diagnostics, Richmond, Canada). Analysis of the result showed that 16 (8.0%) of the subjects tested positive for antibodies to HCV. Highest percentage (9.8%) was recorded among the females than the males (6.5%). Age distribution also showed 8.7% among subjects >20 years and 7.4% among subjects ≤20 years. Subjects from monogamous family also had higher prevalence of 8.4% than subjects from polygamous family who had 6.5% prevalence. Analysis of the results according to the risk factors of transmission revealed 9.1% prevalence among subjects who reported blood/blood products transfusion only, 6.1% for subjects who reported only circumcision, 5.9% for subjects who reported medical operation only and 11.0% for subjects who reported a combination of two or more risk factors of transmission. This study however, revealed the existence of this infection among the students population of the University of Ilorin. Attitudes such as good health seeking behavior, avoiding sharing of needles for drugs, tattooing or piercing that will reduce the risk of contacting HCV are therefore recommended.

Key words: HCV · Antibodies · Prevalence · Students

INTRODUCTION

Nigeria belongs to the group of countries highly endemic for viral hepatitis [1]. Hepatitis is the inflammation of the liver produced by autoimmune disease, alcohol or drug abuse, genetic disorder or microbial infection. Three viruses are responsible for most hepatitis [2]. Besides Hepatitis A Virus (HAV) and Hepatitis B Virus (HBV), hepatitis can also be caused by non-A, non-B hepatitis (NANB) virus called Hepatitis C Virus (HCV). Prior to the discovery of Hepatitis C Virus (HCV) in 1989, it was clear that the major cause of acute hepatitis after blood transfusion was neither related to hepatitis A nor hepatitis B-hence, the early name for this disease, non-A, non-B (NANB) hepatitis. Hepatitis C has a worldwide distribution, occurring among persons of all ages, genders, races and regions of the world. While not every nation in the world has had adequate means to survey its population for incidence of the virus, enough statistics has been compiled to demonstrate the enormous threat posed by hepatitis C. Approximately 170 million people world-wide who are about 3-4% of the world population are chronically infected with the virus [3]. Hepatitis C Virus (HCV) infection is a life threatening viral infection of the liver. This infection is often asymptomatic, but an establishment of the virus in the host will result in chronic infection which can progress to fibrosis (scaring of the liver) and cirrhosis (an advanced liver scarring) [4]. Seef [5] described the infection as "SILENT" because people may be infected for over ten years and not exhibit symptoms.

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The most common route of transmission is now believed to be related to intravenous drug use, responsible for perhaps as many as 50.0% of cases due to sharing of syringes by illegal drug users [6]. In the past, a major route of transmission was via blood transfusion, blood products or infected organ transplantation [7]. After implementing the use of Polymerase Chain Reaction (PCR) assays to screen blood donations, the risk of transfusion-associated HCV fell drastically to about 0.001% [6]. The prevalence of the infection in less developed countries where the use of PCR is rarely practiced, however, continues to rise [3]. People can be exposed to HCV through inadequate sterilized medical equipments which include needles and hemodialysis. Contact sports and "slam dancing" that may result in accidental blood-to-blood exposure are potential sources of exposure to HCV [8]. The virus may be sexually transmitted, although this is rare especially in monogamous sex relationship and usually only occurs when a Sexual Transmitted Disease (STD) that causes open sores and bleeding is also present and makes blood contact more likely [9]. Other potential avenues of this infection include sharing of tooth brushes, razors, towels, cuticle scissors, manicuring and pedicuring equipment between infected and non-infected individuals. Tattoos with unclean instruments have also been reported to transmit HCV [6]. Common practices in African countries including Nigeria such as scarification and circumcision had also been reported to transmit HCV [3]. Infected mother-to-child transmission of hepatitis C also occurs only among women who are HCV RNA positive at the time of delivery; the risk of transmission in this setting is approximately 6.0% while among women who are both HCV and HIV positive at the time of delivery, the risk of transmitting HCV is increased to approximately 25.0%. The risk of this route of transmission of HCV (vertical transmission) does not appear to be associated with method of delivery or breast-feeding [10].

Factors that have been reported to influence the rate of HCV disease progression include age (increasing age associated with more rapid progression), gender (males have more rapid disease progression than females), alcohol consumption (associated with an increased rate of disease progression) [2]. HIV co infection (associated with a markedly increased rate of disease progression), fatty liver (the presence of fat in liver cells has been associated with an increased rate of disease progression) [8] and diabetes [11]. Other well-known risk factors, such as long-term hemodialysis and health care work involving frequent exposure to blood generally account for fewer than 10.0% of infections [12]. However, a non-negligible proportion of HCV infections have an "undefined" route of transmission [13]. The natural targets of HCV are hepatocytes and, possibly B lymphocytes [14]. HCV replicates rapidly and it is estimated that more than 10 trillion particles are produced per day, even in the chronic phase of the infection [15]. Anti-HCV antibodies can be detected in 50-70% of patients at onset of symptoms, whereas in others antibodies appearance is delayed 3-6 weeks. The immune response is slow to develop and relatively weak, reflecting the fact that HCV has particularly effective immune evasion mechanisms.

Between 60.0% and 70.0% of people infected develop no symptoms during the acute phase. In the minority of patients who experience acute phase, symptoms are generally mild and non-specific [16]. Persistent infections are common and most patients develop chronic hepatitis C infection but fulminant disease rarely occur [17]. Chronic hepatitis C virus is often asymptomatic and it is mostly discovered accidentally. Once chronic hepatitis C has progressed to cirrhosis, signs and symptoms may appear that are generally caused by either decreased liver function or increased pressure in the liver circulation, a condition known as portal hypertension [18]. About 70-90% of people with chronic HCV infection may be at risk of progressing to chronic active hepatitis and cirrhosis [19]. Complications from chronic (long-term) infection are serious and life threatening, including permanent liver damage, liver failure or liver cancer [2]. Chronic hepatitis C infection is considered to be a causative factor in hepatocellular carcinoma.

Data from epidemiological studies in different regions of the world show wide variance in HCV prevalence patterns. Lowest prevalence was reported from the United Kingdom and Scandinavia [20] while highest prevalence has been reported from the African and the Eastern Mediterranean region [21,22]. In Nigeria, relatively much has been done in the area of studying the dynamics of the infection in different subpopulations. According to Inyama *et al.* [1], about 75.0% of the Nigerian population is likely to have been exposed to the hepatitis viruses at one time or the other in their lives and about 7.0% of these will die from its complications. Available data showed that the prevalence of hepatitis C virus among blood donors in Nigeria ranged from 12.3-14.0% [23]. Other groups that have been studied include; HIV patients [1], diabetes patients [11], sickle cell anemia patients [24] and even in pregnant women [25]. However, very little have been done in the area of establishing the dynamics of the infection among students of tertiary institutions in the country who

form the bulk of voluntary and unpaid blood donors in our hospitals. It is however desirable that studies on this subpopulation be done so that current status of this subpopulation is known. This study was carried out to achieve this aim.

MATERIALS AND METHODS

Study Population: After obtaining due permission from the Hospital management and informed consent was obtained from participants. In all 200 blood samples were collected from apparently healthy first year students of the University of Ilorin who are undergoing medical examination at the university health services center. The subjects comprise of 108 males and 92 females (age range: 15-35 years). The collected subjects' variables include; sex, age and family-status, history of blood transfusion, circumcision and medical operation.

Sample Collection and Processing: Five milliliters of venous blood was aseptically collected from each of the subjects into sterile bottles and allowed to clot. The serum was then pipetted into sterile ependorf tubes and stored at -20°C for further analysis. The test and interpretation of the results were done according to the guidelines of the kits' manufacturers.

Anti-HCV antibody Detection: Parallel tests were carried out to detect anti-HCV antibodies in the serum using Shantest™ HCV rapid test manufactured by Shantha Biotechnics Limited and Clinotech anti-HCV (Clinotech diagnostics, Richmond, Canada). Shantest™ HCV rapid test is a third generation qualitative ELISA that uses recombinant proteins and synthesized peptides derived from core and structural regions of HCV to detect the presence of anti-HCV in serum. Clinotech test kit is based on the principle of double antigen sandwich immunoassay, in which purified recombinant antigens are employed sufficiently to identify anti-HCV with high specificity and sensitivity. Discordant results from the tests were considered invalid.

Statistical Analysis: Differences between proportions were evaluated by the chi-square test, using contingency table. Statistical significance was achieved if P is≤ 0.05.

RESULTS

Of the 200 subjects tested, 16(8.0%) had antibodies to HCV. Analysis of the results by gender showed that 6.5% of the 108 males had antibodies to HCV while 9.8% of the 92 females had antibodies to HCV as shown in Table 1. Statistical analysis shows no significant difference in the trend. (X_2 =0.736, df =1, P = 0.39).

Table 1: Distribution of anti-HCV antibodies by gender

Sex	Number Examined	Number (%) Positive	P value
Male	108	7 (6.5)	0.39
Female	92	9 (9.8)	
Total	200	16 (8.0)	

Table 2: Distribution of anti-HCV antibodies by age groups

Age range (Years)	Number examined	Number (%) positive	P value
≤ 20	108	8 (7.4)	0.74
> 20	92	8 (8.7)	
Total	200	16 (8.0)	

Table 3: Distribution of anti-HCV antibodies according to family status

Family	Number Examined	Number (%) Positive	P value
Monogamous	154	13 (8.4)	0.67
Polygamous	46	3 (6.5)	
Total	200	16 (8.0)	

Table 4: Distribution of anti-HCV antibodies according to the risk factors of infection

Risk Factors	Number Tested	Number (%) Positive
Blood Transfusion only	11	1 (9.1)
Circumcision only	99	6 (6.1)
Medical Operation only	17	1 (5.9)
Combination of factors	73	8 (11.0)
Total	200	16 (8.0)

Table 2 shows the distribution of anti-HCV antibodies by age groups. For age groups 20 years and less, samples from a total of 108 subjects were tested, 8 tested positive giving a prevalence of 7.4%. For age groups above 20 years, a total of 92 samples were tested, 8 tested positive for anti-HCV antibodies giving a prevalence of 8.7%. Statistically however, there was no association between age and prevalence of HCV antibodies. (X_2 =0.112, df =1, P = 0.74).

Thirteen (13) out of 154 subjects from monogamous family tested positive to anti-HCV antibody giving a prevalence of 8.4%. Out of 46 subjects from polygamous family, 3 tested positive to anti-HCV antibody giving a prevalence of 6.5% as shown in Table 3. Statistical analysis showed no significant difference in the trend. (X_2 =0.177, df = 1, P = 0.67).

Analysis of the result by risk factors of the infection showed that 9.1% of the subjects who reported history of blood/blood products transfusion only were positive for anti-HCV antibody. Out of 99 subjects who reported circumcision only, 6 tested positive giving a prevalence of 6.1% while 1 out of 17 subjects who reported history of

medical operation only tested positive for HCV antibody giving a prevalence of 5.9% while prevalence of 11.0% was recorded among subjects who reported a combination of two or more risk factors of transmission as shown in Table 4.

DISCUSSION

Hepatitis C virus is an important cause of morbidity and mortality. Detection of antibodies to various hepatitis C viral antigens indicates infection with the virus and in most cases portrays a chronic infection [26]. The prevalence of 8.0% obtained in this study confirms the existence of this infection among the apparently healthy students of the University of Ilorin. This prevalence is higher than 3% worldwide seroprevalence reported by the World Health Organization in 1999 [27]. The 8.0% prevalence in this study is also higher than the 5.3% reported for the whole African region by World Health Organization [27]. Oni and Harrison [28] earlier reported a lower prevalence of 2.0% among the general population in Nigeria. Similarly, a lower prevalence of 1.2% was recorded among general population in Tanzania [29]. The higher prevalence (8.0%) obtained in this study may be as a result of the study population which is subjects in their youthful age (age range: 15-35 years). However, in a similar study carried out among freshmen enrolled in the Pre-degree Science (PDS) programme of Ladoke Akintola University of Technology (LAUTECH), Ogbomosho, Oyo State, prevalence of 4.8% was obtained. This relatively high prevalence (8.0%) therefore is a course for worry in view of the fact that this group of people forms the bulk of voluntary and unpaid blood donors in our hospitals. This group represents the sexually active population where the risk of sexual transmission of the infection is high. Another factor that may contribute to the higher prevalence is poor health seeking behavior [3]. The 8.0% obtained in this study is however lower than the prevalence of 9.0% reported by Regina *et al.* [30] amongst Brazilian street youth and 11.0% reported by Olubuyide *et al.* [31] amongst the apparently healthy doctors and dentists in University College Hospital, Ibadan, Nigeria. It is also lower when compared to reported very high prevalences: 36.0%; amongst young injection drug users in Seattle, Washington [32], 34.0%; amongst prison inmates in California [33], 36.2%; amongst HIV patients in Brazil [34] and 35.0% in USA/Europe [35].

The populations used in these studies are mostly at risk populations. The higher prevalences recorded are therefore not unexpected.

Gender distribution showed a higher prevalence (9.8%) among the females than the males (6.5%). This result agrees with the finding of Ndako *et al.* [11] who reported higher prevalence in diabetic female patients in Jos, Nigeria and also Ejele *et al.* [36] who reported that females had higher HCV antibodies prevalence than males in Niger Delta, Nigeria. The results disagreed with the report of Baba *et al.* [37] who revealed high prevalence of viral hepatitis among the males in Nigeria.

Osmond [38] reported that age is a co-factor for disease susceptibility and progression. In this study, slightly higher prevalence (8.7%) was observed among subjects >20 years old than subjects ≤20 years old. The difference is not statistically significant (p=0.74). Analysis of the results by family status showed higher prevalence (8.4%) among students from monogamous family than the students from polygamous family with 6.5% prevalence. Statistical analysis however showed no significant difference (p=0.67) between the two groups. The reason for higher prevalence amongst students from monogamous family is not immediately known to this study however, statistically the difference is not significant (p=0.67).

Among young adults (such as students), blood transfusion probably accounted for a relatively smaller proportion of HCV infections. This trend reflects public health interventions during the 1980s and 1990s that led to a progressive reduction in the risk for post-transfusion HCV infection [39]. Our finding did not however corroborate this as relatively high proportion (9.1%) of those infected in this study is people who had history of blood/blood products transfusion. This finding therefore is an indication that HCV transmission through contaminated blood/blood products might still be a problem in our society.

Also in this study, 6.1% of those who reported history of circumcision only tested positive to antibodies to HCV underscoring the importance of this mode of transmission as earlier highlighted by Egah *et al.* [40]. Similarly, antibodies to HCV were detected in 5.9% of subjects with history of medical operation. This finding therefore underscores the need for proper sterilization of surgical instruments before use on patients. On the other hand, relatively high prevalence (11.0%) was recorded among subjects who reported multiple risk factors of HCV transmission. This however is an indication that there is increased rate of transmission with multiple risk factors of transmission of the infection.

This study has further confirmed the presence of hepatitis C virus infection in Ilorin, Nigeria and particularly among students. Seroprevalence of 8.0% obtained in this study is a course for concern. Measures such as risk-reduction counseling and services, implementation and maintenance of infection control practices, health education, surveillance, research and above all behavioral attitudes that will lessen the risk of contacting HCV are recommended for the general population.

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