Asymptomatic Hepatitis C Infection in Nigerian Adolescents

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Abstract

Background: The advent of novel therapies to hepatitis C infection highlights the importance of better epidemiological data in regions with poor mapping to target the infection. There are few epidemiological data on the prevalence of HCV infection in Nigerian adolescents.

Aim: To determine the prevalence and risk factors of HCV infection in apparently healthy Nigerian adolescents.

Materials and Methods: This cross sectional analytical study was conducted among 744 secondary school adolescents in Calabar, Cross River State, South-south, Nigeria. A validated structured interviewer administered questionnaire was administered to obtain relevant information from participants subject to parental consent. Blood samples were obtained for qualitative detection of Hepatitis C antibody using rapid chromatographic immunoassays with test kits from ABON (China) having sensitivity, specificity and accuracy of 98.6%, 99% and 99.3% respectively.

Results: Seven hundred and forty-four adolescents were screened. Four hundred and seventy four (63.7%) were females and 270 (36.3%) males. The mean age was 14.78 ± 2.10. Two of the 744 adolescents were positive for HCV antibody with overall prevalence of 0.3% (95% Confidence Interval 0.00 - 0.001). In view of the low number of infected adolescents, further statistical analysis could not be done.

Conclusion: The prevalence of HCV infection was low in the study population. The infected participants had a history of unsafe traditional scarification. However, in view of the public health importance of this infection, there is the need to address primary prevention of Hepatitis C in Nigeria including the traditional practice of scarification that could transmit other infections.

***Keywords:** Hepatitis C; Asymptomatic; Adolescents; Nigeria*

Introduction

Hepatitis C virus (HCV) is a worldwide public health problem and a major cause of chronic liver disease (CLD) [1-3]. It is estimated that 130 to 150 million people of the world's population are chronically infected with HCV globally [2]. Africa has the highest prevalence rate of HCV infection with a prevalence of 2.9% while the global prevalence is 2.5% [3]. In West Africa the prevalence is estimated at 2.4% [4]. The prevalence of HCV infection in children and adolescents is between 0.05% to 0.36% in the United states and 1.8% to 5.8% in some developing countries of Europe [5]. In Egypt, the prevalence in children ranges from 2.02% in urban setting [6] to between 3% and 9% in subjects under 19 years of age in two-community based rural studies [7,8].

In Nigeria, the prevalence of HCV infection ranges from 0.9% to 20 % in different parts of the country [9-16].

In developed countries, the predominant source of new HCV infections is injection drug use [17]. In developing countries, the risk factors for HCV infection include poor screening of transfused blood, parenteral exposure, unsafe traditional practice of scarification marks, illicit body piercing, sharing of sharps [9-16]. Studies have also shown that new cases in children may be due to perinatal transmission [18] and up to 70% may be due to unidentified risk factors [19].

The natural history of HCV infection in children is not well-defined [6]. The advent of novel therapies to HCV infection highlights the importance of better epidemiological data in regions with poor mapping [20].

Aim of the Study

The aim of the present study was to determine the prevalence and possible risk factors of asymptomatic HCV infection in adolescents in Secondary schools in Calabar, Cross River State, southern Nigeria.

Material and Methods

Study Area: The study was conducted in Calabar, the capital city of Cross River State, South geopolitical zone, Nigeria. Calabar has two Local Government Areas (LGA); Calabar Municipality and Calabar South. The population of Calabar Municipality is 183,681 while Calabar South is 191,515. There is a total of 20 public secondary schools (14 in Calabar Municipality and 6 in Calabar South) in Calabar. The total student population is 20,993 (12,514 in Calabar Municipality and 8,479 in Calabar South).

Study Design: The study was a cross sectional analytical study to determine the seroprevalence and predictors of viral hepatitis C in Secondary school children aged 10 - 19 years.

Study population: The study population consisted of children aged 10 to 19 years.

Sampling Technique

Multistage sampling technique was used to recruit subjects for this study. This involved five stages. The first stage was by stratified random sampling technique based on location of schools into Calabar Municipality and Calabar South to select participating students proportionately. Second stage was by simple random sampling to select number of participating schools. In the third stage, each of the six selected schools was stratified based on classes. For each school with six classes (JSS 1, 2, 3, SSS 1, 2 and 3), one sixth of the sample size for the school was equally allocated to each class, for those with classes less than these, the sample size was calculated equally among them.

For the fourth stage, each class was stratified based on streams (that is A, B, C, etc) in the class. The number of children recruited from the class was equally allocated among the streams.

The fifth stage was the final recruitment of a child from a stream. Serial numbers of students in the class register was used. From the class register, participants were selected randomly. This ensured that any child in the school could be recruited. Where a subject was to be picked by random selection but was not available in school for any reason or did not satisfy the inclusion criteria, such was dropped and the next was taken.

Data collection: Data were collected using a structured interviewer administered questionnaire. The following information about the participants were obtained; general characteristics (age, sex), family socioeconomic status based on Oyedeji's classification [21] using parents/guardian's occupation and level of education, social history of the students, numbers of persons in the household, history of jaundice in the household, history of scarification marks and sharing of sharps.

Laboratory Investigations

Blood samples were obtained from all eligible subjects for serological test for HCV antibody. Two millitres (2 mL) of venous blood was obtained from each participant under aseptic procedure into a properly labeled serial number-tagged clean plain bottle and allowed to clot. Serum was separated and used for the analysis.

HCV antibody was detected using commercially-available rapid chromatographic immunoassays for the qualitative detection of HCV antibody manufactured by ABON™ (Abon Biopharm (Hangzhou) Co., Ltd #19812th Street East, Hangzhou Economic and Technological Development Area, Hangzhou, 310018, P.R. China). The qualitative assays were performed using one-step test strips for detection of HCV antibody in serum samples. Test was performed within one hour of specimen collection and separation. The immunochromatographic reaction took place within a few minutes and the result read at exactly 15 minutes after.

Only clear, non-haemolyzed serum samples were used. The HCV antibody assay has diagnostic specificity, sensitivity and accuracy of 98.6.0%, 99 % and 99.3% respectively. The results of the test were reported as positive, negative or invalid accordingly. For each invalid test, the test procedure was reviewed and the test repeated with a new strip. In this study, there was no invalid test result.

Ethical Approval: Ethical approval for the conduct of this study was obtained from the Cross-River State Health Research Ethics Committee. Clearance was also obtained from Cross River State Ministry of Education and Ministry of Health. Informed consent was obtained from each parent/legal guardian of eligible participants prior to enrolment.

Statistical Analysis

The data obtained was analyzed using statistical package for social sciences (SPSS) version 20.2 Inc. Chicago, Illinois -USA. Categorical and continuous variables were analyzed using Chi-square and Student's t-test respectively. A p-value of ≤ ¬0.05 was considered statistically significant.

Results

Seven hundred and forty-four adolescents aged 10 - 19 years participated in the study. The age group 14 - 16 years was the highest represented with a total number of 386 (51.9%). The mean age ± SD of the study population was 14.78 ± 2.10. Four hundred and seventy four 474 (63.7%) were females and 270 (36.3%)were males. This is shown in table 1.

Age (years)	Female n (%)	Male n (%)
10 - 13	149	55
14 - 16	243	143
17 - 19	82	72
Total	474	270

***Table 1:** Socio-demographic distribution of study population.*

Two of the 744 students screened were positive for HCV antibody with overall prevalence of 0.3% (95% Confidence Interval 0.00 - 0.01). Table 2 shows the binary logistic regression of the study population.

Variables	Odds ratio	95% CI	p-value
Age	1.143	0.58 - 2.24	0.70
Gender	0.00	0.00	1.0
History of jaundice in the household	-	0.00	-
Number of persons in the household	0.22	0.02	0.26
Traditional practices	0.00	0.00	1.0
Parents socioeconomic status	0.88	0.00	1.00

***Table 2**: Binary logistic regression model of factors that influence seroprevalence of HCV infection.*

The positive adolescents were females, had unsafe traditional practice of scarification marks and were from the low socio-economic class. Further statistical analysis could not be done with such low prevalence rate.

Discussion

The seroprevalence of HCV antibody in this present study was 0.2%. This prevalence is in keeping with prevalence in some developed countries [3] but not with prevalence in developing countries [9-16].

The low prevalence in the current study which is similar to the prevalence in some Western countries may be due to the well-known fact that the Calabar area of Southern Nigeria is highly westernized with a high level of literacy [22]. In addition intravenous drug use does not appear to be a major problem in the area. In eastern Nigeria, Eke., *et al*. [10] had a prevalence of 1.0% in same age bracket of children in Enugu and Okonko., *et al*. [9] had a prevalence of 0.9%. The study of Eke., *et al*. [10] had only 420 participants compared to the 744 students in the present study. The study also was carried out in different cultural/geo-political zone. Most other studies carried out in Nigeria on prevalence of HCV infection in children have high prevalence rate. These studies were hospital based and carried out on children who were co-infected with HIV, Sickle Cell Anaemia or Hepatitis B [11-16].

The two positive subjects in this study were in the age bracket of 14 - 16 years. In the study carried in Enugu [10] and also in Uganda [23], the positive subjects were in the age bracket of 10 - 13 years.

The positive subjects were both females. This is also in keeping with the study by Eke., *et al*. [10] where the female subjects had a higher prevalence than male subjects. These positive female participants had traditional scarification marks which is a known risk factor for transmission of viral hepatitis B and C [24-26]. Both subjects were from the low socio-economic background and had greater than five persons in the household. Low-socio economic class has been associated with prevalence of HCV infection in children [27].

With such a low prevalence of hepatitis C infection in this study, it is not surprising that a clear predictor of infection could not be identified. Up to 70% of HCV infections have no known cause [19].

Conclusion

The prevalence of hepatitis C infection among adolescents in Calabar, southern Nigeria, is low and is similar to what obtains in the Western world. This is probably due to the highly westernized lifestyle and high level of literacy in this part of southern Nigeria coupled with low prevalence of risk behaviours. However, because there is no vaccine and post -exposure prophylaxis for HCV, the emphasis of primary prevention cannot be over-emphasized.

In addition, the traditional practice of scarification, which can transmit other infections, should be discouraged.

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