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Article

Seroprevalence and Molecular Characterization of Human Immunodeficiency Virus and Hepatitis C Virus Among School Children in Asokoro Village Abuja, Nigeria

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Abstract: Human immunodeficiency virus (HIV) suppresses host immunity and can therefore predispose to opportunistic and other infections, including HCV infection. HIV and HCV have emerged as one of the most formidable challenges to public health. Children in rural communities are exposed to the risk of these viral infections. This study aimed at determining the seroprevalence of HCV and HIV Co-infection seroprevalence among school pupils in Asokoro village Abuja. A total of one hundred and twenty-four (124) whole blood samples of children aged 1- 17 years were randomly collected across the community. Samples were screened using HIV Determine kit and one time HCV rapid test strip for HIV and HCV respectively. Positive samples for HIV were further analysed using HIV Unigold test kit and HIV 1 and 2 stat pak test kit while HCV seropositivity was confirmed using PCR. Results were computed statistically by percentage. Result shows that the seroprevalence of HIV among the children studied is 5% (6/124), while that of HCV is 14% (18/124) among the study population. Co-infection of HIV/HCV was not observed among participants in the study population. The molecular characterization of HIVs4 sample revealed that it is closely related to AF069943.1 HIV-1 isolate with 2,538 bp genomic DNA obtained in 1995 from a hospitalized individual from Maiduguri, Borno state, Nigeria. The molecular analysis revealed the presence of HCV C, genotype 1b. Children in the study area displayed a higher prevalence of HCV than HIV. This is a threat to public health as there are scientific proofs that HCV can be transmitted through contact with infected body sweat. HIV positive children are likely to be co-infected with HCV. There is urgent need to prevent

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the risk of transmission to the non-infected individual by teaching HIV and HCV as part of health education in the schools around the vicinity and also by creating awareness of the impact of these diseases in the community.

Keywords: HIV; Hepatitis C; prevalence; Children

1. Introduction

HIV (human immunodeficiency virus) is a virus that attacks cells that help the body fight infection, thereby increasing the risk and impact of other infections and diseases. The strains of HIV-1 can be classified into four groups. The M is the 'major' group and is responsible for the majority of the global HIV epidemic. The other three groups - N, O and P - are quite uncommon. Hepatitis C infection is an infection of the liver caused by the hepatitis C virus (HCV). HCV is one of several viruses that can cause hepatitis which basically cause the inflammation of the liver. HIV accelerates the progression of liver injury due to HCV, including liver cirrhosis [1]. The increasing health burden and mortality from hepatitis C and HIV has been as a result of co-infection [2].

Infection with HIV starts without symptoms or ill-feeling and is accompanied by slight changes in the immune system. This stage spans up to three months after infection until seroconversion where HIV-specific antibodies can be detected in individuals following recent exposure. The outcome of infection and duration for disease progression with clinical symptoms may vary greatly between individuals, but often it progresses fairly slowly. Many years are required for HIV to progress from the primary infection to the development of symptoms of advanced HIV diseases and immunosuppression. During primary infection, although individuals may look healthy, the virus is actively replicating in the lymph nodes and blood stream of infected individuals. As a result, the immune system may get slowly damaged by the burst of viral load in their bodies [3].

HCV is a viral, blood-borne infection that damages the liver, one of the body's most important organs. While many people do not have any symptoms, the hepatitis C virus can cause fatigue, loss of appetite, muscle and joint pain, mild cognitive problems and depression. It can range in severity, from a mild illness lasting a few weeks to a serious, lifelong illness (4). Each year, around 1.75 million people newly acquire the hepatitis C virus. Between 15 and 45% of those infected will spontaneously clear the virus within six months without any treatment. HCV infection can also be classified as high, intermediate or low when the occurrence is >3.5, 1.5–3.5 % and <1.5 % respectively [5]. HCV is more prevalent in some nations in sub-Saharan Africa and Asia. Egypt observed the maximum seroprevalence of 13.9% in healthy general population and this is lower than that reported in western nations [6]. The remaining 60 to 80% will develop chronic hepatitis C. This advanced stage of the disease can cause severe scarring of the liver (cirrhosis), liver cancer (hepatocellular carcinoma) and liver failure. In 2019, WHO estimated approximately 290,000 deaths from HCV and about 3.2 million adolescent and children with chronic infection with HCV [4].

HIV spread through certain body fluid that attacks the body immune system specifically the CD4 cells, often call T cells. Hepatitis C virus is a viral infection that causes liver inflammation sometimes leading to serious liver damage. Hepatitis C easily spread through contaminated blood. In areas of high endemicity where at least 8% of the population are chronic HIV and Hepatitis C is mainly contracted at birth and early childhood. Perinatal transmission from an infected mother to her baby is common. About 90% of those infected during the prenatal period, 30% of those infected in early childhood, and 6% of those infected after 5 years of age develop chronic infection.

A genotype is a way to put the hepatitis C virus (HCV) into categories based on similar genes. It is important to know and understand HCV genotypes because different genotypes respond differently to medicines that treat and cure HCV. HCV has six genotypes, labelled 1 through 6.

There are also subtypes labelled with letters, for example, genotypes 1a and 1b. Most people are infected by a single, dominant genotype, but it is possible to have more than one at the same time (called a mixed infection). The different HCV genotypes and subtypes have different distributions throughout the world. Genotypes 1, 2, and 3 are found worldwide. Genotype 5 is present almost exclusively in South Africa. Genotype 6 is seen in Southeast Asia. Genotype 1 is the most common HCV genotype in the United States. It is found in nearly 75 percent of all HCV infections in the country. Most of the remaining people in the United States with HCV infection carry genotypes 2 or 3. The HCV genotype is not absolutely related to the rate of liver damage, or the likelihood of eventually developing cirrhosis. However, it can help predict the outcome of treatment. Hepatitis C genotype 2 is less common worldwide. It responded best to interferon-based treatment, but is susceptible to fewer DAAs than genotype 1. Genotype 3 is the most common type in the Indian sub-continent and south-east Asia, but it is also found in the UK. Genotype 3 has been the hardest to treat with DAAs, but newer pangenotypic drugs are highly effective against it. Genotype 4 is the most common type of hepatitis C in the Middle East and North Africa, but it has also been seen in hepatitis C outbreaks in the UK and Europe. Genotype 4 generally responds to the same DAAs as genotype 1. Genotype 5 and 6 are less common and less well studied [7]. The genotype can help predict the outcome of anti-HCV therapy with interferon-based treatment regimens. Genotype has also helped to determine treatment.

In 2016, 240,000 adolescents (between the ages of 10-19) were living with HIV and hepatitis C, making up 7% of the total number of people in Nigeria [8]. 39% prevalence of HIV and Hepatitis C among this age group varies regionally, with 4.3% of 15–19-year-olds living with the infection in south, compared to 1.3% in the South-Eastern Nigeria [9]. There are a number of factors that increase HIV and Hepatitis C vulnerability among young people, including a lack of knowledge and appropriate sexual reproductive health services. Early sexual debut is common in Nigeria, with 15% of girls and 4% of boys having sex before they are 15 years old. Inter-generational relationships are also common in Nigeria. Irrespective of HIV elevated risk, reports show that few adolescents test for HIV regularly [10]. In 2017 only 2% of males between 15 and 19 and 4% of females had tested for HIV in the last 12 months [11].

Hepatitis C and HIV are serious conditions with increased morbidity and mortality rates globally [12]. Thus, WHO is calling for enhancement in interventions for the inhibition, maintenance, and control of viral hepatitis and HIV which may result in hepatic diseases worldwide [4]. Viral hepatitis is endemic in sub-Saharan Africa including Nigeria. There is limited literature on children infected with Hepatitis C and HIV viral infections in rural communities in North-Central. It is therefore necessary to undertake this study to increase awareness of these viruses which would inform better alternatives for diagnosis and management of viral diseases.

2. Materials and Methodology

2.1. Study Area

The research population was drawn from out-patients in Asokoro District Hospital and analysed in Gilead-Balm Medical Laboratory and Diagnostic/research centre Abuja, the Medical Laboratory in Asokoro district hospital, Ralpha Biomedical Laboratory and Diagnostics Ltd Gwagwalada, Abuja and Prof. Tatfeng Molecular Laboratory, Niger Delta University Bayelsa. Abuja is the capital of Nigeria. It is located in the centre of Nigeria within the federal capital territory (FCT). It is a planned city and was built in the 1980s. It has a population of 776,298 as of 2006 census and as of 2012, the population rose to 978,876. It occupies a land area of 7,753.9 sq km [13].

2.2 Study population and subject sampling

One hundred and twenty-four (124) blood samples were randomly drawn from different primary and secondary school children who visited Asokoro District Hospital Abuja, North-Central part of Nigeria. Students aged 6-17 years were recruited after obtaining their informed consent from their parents or guardians. Eligible students drawn from the sample frame were asked to take part in an administered questionnaire and to provide biological specimens (blood) for HIV and HCV test after pre-test counselling.

2.3 Issuing of informed consent form and Questionnaire.

Unstructured survey was conducted using a multiple-choice option questionnaire interview, informed consent form which were designed to be self-completed by participants. The questionnaire was developed based on a modification of a previously used design in another study. Sex was defined as vaginal or anal heterosexual intercourse. For those students who had one lifetime sex partner, additional questions were asked on age of first sexual encounter.

2.4 Inclusion and Exclusion Criteria

All students consented by their parents or guardian who visited the hospital whether sick or not between the ages of 6-17 years were recruited for the study. All students who declined their consent, students outside 6-17 years.

2.5 Ethical Consideration

Study was approved by the Federal Capital Territory Health Research Ethics Committee, Abuja with reference number FHREC/2014/01/77/16-12. Another ethical clearance was obtained from the Chairman, medical ethics Committee of Asokoro District Hospital.

2.6 Explanation of Test

HIV and HCV are in vitro, visually read, qualitative immunoassay for the detection of antibodies to HIV and HCV from infected individual. It is characterized by the change in the population of the T-cell lymphocyte. In an infected individual, the virus causes depletion of helper T-cell, which leaves the person susceptible to opportunistic infection and some malignancies. The presence of the virus in the body elicits the production of specific antibody.

2.7 Collection of blood sample

Blood samples were collected using a five (5) ml sterile syringe after disinfecting with alcohol-soaked cotton wool. The sample was collected into an EDTA (ethylenediaminetetraacetic acid) container and was centrifuged. Samples were then centrifuged at 10,000 rpm for 10 min, and serum was separated from the whole blood sample. Immunochromatogaphic test for the detection of antibodies was carried out with HIV Determine kit. Sero-positivity of HCV infection was detected using the one-time rapid Cassette and was performed and interpreted in accordance with the manufacturer's instruction. The confirmatory test for HIV was carried out using a one-step anti-HIV Determined, Stat pak and Uni Gold test kit. Polymerase chain reaction methods was used for further confirmatory analysis of HIV and HCV.

2.8 HIV test

This test kit is a rapid immunoassay based on the immune chromatographic sandwich principle. The chemical causes the antibodies in the blood to flow along the test stick. The sample collected was added to the sample pad. As the HIV sample migrate through the conjugate pad, it reconstitutes and mixes with the selenium colloid antigen coagulate. The mixture continues to migrate through the solid phase the immobilized recombinant antigen and synthetic peptides at the patient window site. If antibodies are present in the sample, the antibody binds to the antigen-selenium colloid and to the antigen at the patience window, forming a red line at the patience window site. If antibodies are absent in the sample, the antigen selenium colloid flows past the patient window, and no red line is formed at the patience window site.

2.9 HCV Test

The HCV Rapid Test Cassette (Serum/Plasma) is a qualitative, membrane-based immunoassay for the detection of antibody to HCV in serum or plasma. The membrane is

pre-coated with recombinant HCV antigen on the test line region of the cassette. During testing, the serum or plasma specimen reacts with recombinant HCV antigen conjugated colloid gold. The mixture migrates upward on the membrane chromatographically by capillary action to react with recombinant HCV antigen on the membrane and generate a coloured line. Presence of red coloured line indicates a positive result, while its absence indicates a negative result. To serve as a procedural control, a coloured line will always appear at the control line region indicating that proper volume of specimen has been added and membrane wicking has occurred.

2.10 Interpretation for whole blood, serum and plasma.

2.10.1 Reactive test result

Two pink or red lines of any intensity in the device window, the first adjacent "T" (test) and the second adjacent to "C" (control). This indicate a reactive result that is interpreted as preliminary positive for antibody to HIV or HCV.

2.10.2 Non-Reactive Test Result

A pink or red of any intensity adjacent to the letter "C" (control), but no pink or red line adjacent to "T" (test). This indicate a non-reactive result that is interpreted as negative for the reacting antibody.

2.10.3 Invalid result

No pink or red lines appear in the device window adjacent to the letter "C" (control) irrespective of whether or not a pink or red line appears in the device window adjacent to "T" (test). This is an invalid result that cannot be interpreted.

2.10.4 Broken line

Where a specimen produces a broken line with the cassette or strip used for a test, it is deemed initially reactive but the sample must be retested in duplicate. When the duplicate results are either a broken line or complete line in one or both duplicates are then interpreted as preliminary positive. If both gives no lines at "T" (test) then the result is referred to as negative.

2.11. RNA Extraction from Plasma Specimens

RNA extraction was performed using Zymo extraction kit manufactured by Larry Jia (South Africa). The extraction was done according to the guidelines of the manufacturer. RNA was extracted from HIV and HCV negative/positive samples of both HIV positive and negative subjects and then PCR was used for detection of HCV RNA and HIV RNA. The RNA extraction protocol is as follows: Three hundred micro liters (300 µl) of viral RNA buffer was added to 100 µl of plasma sample and mixed briefly by vortexing. The samples were transferred to the Zymo-spin IC Column in a collection tube and centrifuged at 10000 g for 2 minutes. The flow through was discarded. Five hundred micro liter (500 µl) of Viral Wash

buffer was added to the column and then centrifuged for 2 minutes at 10000g. The column was carefully transferred into DNase/RNase-free tube. Fifteen (15) ul of DNase/RNase free water directly to the column matrix and centrifuge for 30 seconds to elute. The eluted RNA can be used immediately or stored at -70^{o}C for HIV/HCV detection.

2.12 Amplification of HIV V3 Region (nested pcr)

Primary amplification

A portion of the extracted RNA was amplified by polymerase chain reaction using primers that flank the HIV sequence (Forward Primer used: →5^{I}-GGCATCAAACAGCTCCAGGCAAG-3^{I} and Reverse Primer used: 5^{I}-AGCAAAGCCCTTTCTAAGCCCTGTCT-3^{I}←). The PCR components used are; the master mix supplied by Inqaba South Africa (taq polymerase, DNTPs, MgCl) at 1X concentration and volume of 10ul. The forward and reverse primers at concentration of 0.2uM and 0.16ul volume. Template at 1ul volume and water at 8.68ul volume. The final volume was 20ul. Each PCR amplicon was done in 25cycles as follows; Initial denaturation 95^{o}C at 5minutes, denaturation 95 at 30 seconds; Annealing 55^{o}C at 30 seconds; extension 72^{o}C at 30 seconds, final extension 72^{o}C at 2minutes.

Secondary amplification

A portion of the HIV primary amplicon was amplified by polymerase chain reaction using primers that flank the HIV sequence (Forward Primer used: → 5^{I}-TCCTGGCTGTGGAAAGATACCTA-3^{I} and Reverse Primer used: 5^{I}-GTCCCCTCGGGGCTGGGAGG-3^{I}←). The PCR components used are; the master mix supplied by Inqaba South Africa (taq polymerase, DNTPs, MgCl) at 1X concentration and volume of 10µl. The forward and reverse primers at concentration of 0.2µM and 0.16µl volume. Template at 0.5µl volume and water at 9.18µl volume. The final volume was 20µl. Each PCR amplicon was done in 35cycles as follows; Initial denaturation 95^{o}C at 5minutes, denaturation 95^{o}C at 30 seconds; annealing 58^{o}C at 30 seconds; extension 72^{o}C at 30 seconds, final extension 72^{o}C at 2minutes.

2.13 Amplification of HCV

A portion of the extracted RNA was amplified by polymerase chain reaction using primers that flank the HCV sequence (Forward Primer used: →5^{I}-ACTGTCTTCACGCAGAAAGCGTCTAGCCAT-3^{I} and Reverse Primer used: 5^{I}-CGAGACCTCCCGG GGCACTCGCAAGCACCC-3^{I}←). The PCR components used are; the master mix supplied by Inqaba South Africa (taq polymerase, DNTPs, MgCl) at 1X concentration and volume of 10 ul. The forward and reverse primers at concentration of 0.2 uM and 0.16 ul volume. Template at 1ul volume and water at 8.68ul volume. The final volume was 20 ul. Each PCR replicon was done in 35 cycles as follows; Initial denaturation 95^{o}C at 5minutes, denaturation 95^{o} C at 30 seconds; annealing 50^{o} C at 30 seconds; extension 72^{o}C at 30 seconds, final extension 72^{o}C at 2minutes.

2.14 Agarose Gel Electrophoresis

In preparing 300 ml of 1.5 % agarose gel, the following was done; 4.5 g of the agarose powder was dissolved in 300 ml of Trisboris EDTA (TBE)-running buffer in a conical flask, the conical flask containing the gel was heated for 5minutes in a microwave to dissolve the powder, it was allowed to cool to 50^{o} C, 2 µl of ethidium bromide was added and the gel solution was cast in the gel electrophoretic cast in which the gel comb has been appropriately inserted. It was allowed to polymerize.
The HCV amplicons were resolved using the prepared gel and were visualized using the Ultraviolet Transilluminator. The sizes of the RNA were determined using a quick load molecular ladder.

2.15 Sequencing

Sequencing was done for HBV, HCV and HIV templates using the BigDye Terminator kit on a 3510 ABI sequencer by Inqaba Biotechnological, Pretoria South Africa.

2.16 Phylogenetic Analysis

Obtained sequences were edited using the bioinformatics algorithm Trace edit, similar sequences were downloaded from the National Center for Biotechnology Information (NCBI) data base using BLASTN. These sequences were aligned using Clustal X. The evolutionary history was inferred using the Neighbor-Joining method in MEGA 6.0 (Saitou and Nei, 1987). The bootstrap consensus tree inferred from 500 replicates [15] is taken to represent the evolutionary history of the taxa analyzed. The evolutionary distances were computed using the Jukes-Cantor method [16].

2.17 Data analysis

The data was analyzed using Statistical Package. The confidence level was set at 95 % and 5 % significance difference. Strength of association between HIV-1 infection and various behavioral risk factors was estimated by calculating the odds ratios with 95 % confidence intervals. The prevalence of the infection was calculated using a simple mathematical expression;
Formular for calculating prevalence rate

$$\text{Prevalence rate} = \frac{\text{number of population at risk}}{\text{number of cases within a population at specific time}} \times 100$$

2.18 Precautions Observed During Data Collection and Analysis;

- Pair of latex gloves were used during the sample collection.
- Mouth pipetting was avoided.
- Spill of the specimen was gently cleaned and disinfected with alcohol.
- Specimen, reagent and other potentially contaminated material were disposed in accordance with local regulation.
- Damaged and perforated kit was avoided to ensure a précised result.
- Each kit was used only once during the analysis.

- The date of expiration was confirmed before using the kit
- The result was read in an open place with light for confirmation of the reaction.
- Needle and lancet used was placed in puncture resistance container prior to disposal.
- The sample pad was brought to room temperature before it was used.

3. Results

Out of the 124 student's samples examined in the study area, 7.26% (n= 9) had evidence of HCV while a total number of 4.83% (n=6) had HIV. The sample size was limited to 124 because collecting blood samples from children is not an easy task. In table 1, the prevalence of HIV and HCV infection among male and female students shows that female students were significantly affected. This current study shows the prevalence of HCV and HIV among male and female students were 2.42%:1.61% and 4.84%: 3.22% respectively. The females had higher seroprevalence for both HCV and HIV infections when compared to males. No Co-infection was observed among the study population. Table 2 shows that the prevalence of both infections was higher among participants between the ages of 14-17 years. In table 3, children attending schools in rural region are more infected than children attending schools in semi-urban region.

Table 1. Sex Based Demographical study of the Prevalence of HIV and HCV

Sex	No. of students examined	No. of students infected with HIV	No. of students infected with HCV	No. of students with co-infections
Male	54	2/124(1.61%)	3/124(2.42%)	0/124(0.0%)
Female	70	4/124(3.22%)	6/124(4.84%)	0/124(0.0%)
Total	124	6/124(4.83%)	9/124(7.26%)	0/124(0.0%)

Table 2. Age Based Demographical Study of the Prevalence of HIV and HCV

Age	No. of students examined	No. of students infected with HIV	No. of students infected with HCV
6-9	46	1/124(0.81%)	2/124(1.61%)
10-13	49	2/124(1.61%)	3/124(2.41%)
14-17	29	3/124(2.41%)	3/124(2.41%)
Total	124	6/124(4.84%)	8/124(6.45%)

Table 3. Demographical Study of the Prevalence of HIV and HCV Based the Schools in The Schools in the Community

Schools	No. of student examine	No. of student infected with HIV	No. of student infected with HCV
Schools in Rural region			
School 1.	15	1	2
School 2.	20	2	1
School 3	7	0	1
School 4	8	1	1
School 5.	9	1	0
Schools in semi urban region			
School 6.	10	0	1
School 7	20	1	2
School 8	15	0	0
School 9.	10	0	1
School 10.	10	0	0
Total	124	6/124(4.84%)	9/124(7.25%)

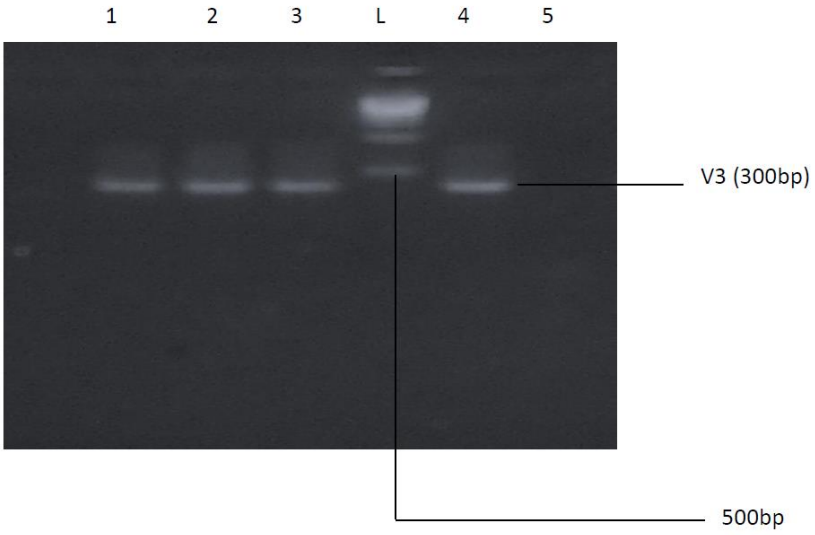

Figure 1. Agarose gel electrophoresis showing the amplified HIV V3 gene bands Lanes 1-4 represents the V3 bands Lane L represent the 1kb ladder while lane 5 shows no band.

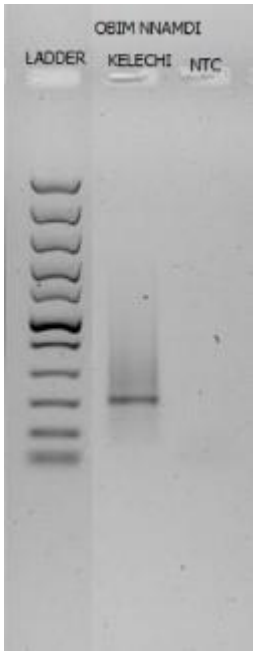

Figure 2. Agarose gel electrophoresis showing the amplified HCV

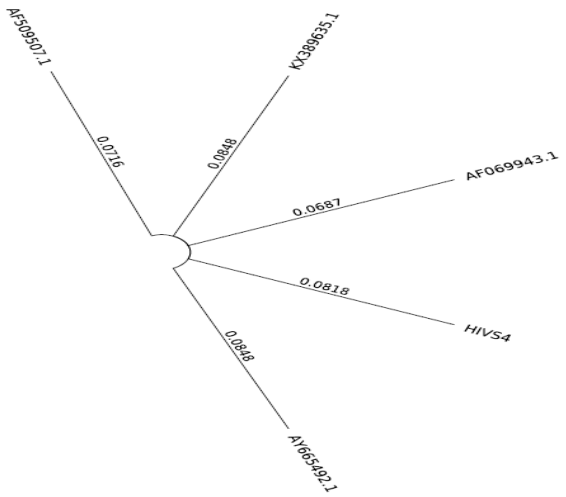

Figure 3. Phylogenetic tree showing evolutionary relationship between HIVS4 and other HIV viruses (HIV PHYLOGENETIC TREE)

AF509507.1 HIV-1 isolate 00CMNYU1261 from Cameroon

AF069943.1 HIV-1 isolate NG1929 from Nigeria

KX389635.1 HIV-1 isolate 09NG010105 from Nigeria

Table 4. Molecular Identification of HCV

Identity	Percentage Identity	Accession Number
Hepatitis C virus subtype 1b isolate	97.49%	EU482886.1

Viral hepatitis is a major infectious disease of global concern. In Sub-west Africa, viral hepatitis due to HCV infection is highly prevalent but the extent of the disease burden may be underreported. Prevalence of HCV infection varies across different regions and populations likewise primary and secondary school students. In Africa, prevalence of HCV and HIV infection reported so far has focused on a specific group of the population mostly relying on the error-prone antibody testing method. In this study, participants were first screened against the presence of HCV and HIV antibodies using rapid diagnostic strips. Seropositive cases were then subjected to further confirmatory testing thereby eliminating false positive results.

The females had higher seroprevalence compared to males. This is in contrast to a similar Nigerian study by [17] where more males were found to have higher positivity. This study reveals the prevalence of HIV and HCV among school children in the study area to be 4.83 % (n = 6) and 7.26 % (n = 9) respectively. This shows that the percentage of the children infected with HCV are greater than those infected with HIV. This calls for public Health attention. Previous studies in different population subgroups in Nigeria, some African and Middle - Eastern countries have recorded varying prevalence rates of HCV and HIV. Abdurahaman *et al*. [18], revealed the seroprevalence of HCV in Northeast Ethiopia as is 0.6 %, in Brazil a study conducted revealed that the prevalence of HCV as 0.5 %. In the contrary, the prevalence of HCV in this study is higher indicating an endemicity of HCV infection. In agreement with this current study, a higher prevalence of HCV (5.2 %) and (10.6 %) respectively were reported in a study that conducted in Libya and in Burkina Faso. In another similar study that has been conducted in Nigeria, a higher rate of HBV was indicated [18]. This variation in seroprevalence of HCV among different research groups might be as a result of ecological difference, population difference, parental back ground, religious belief, study period, pattern of risky sexual behavior of the index cases, socioeconomic status, and cultural variations.

As the prevalence obtained in this study (table 1) shows low rate of seroprevalence among male than the female students, low HCV prevalence rates were recorded in some studies conducted among blood donors in Kano, Nigeria (0.40 %), Namibia (0.90%), Sudan (1.90 %), Senegal (0.80 %), and Ghana (0.90 %), [19]. A low prevalence rate was also seen in a study conducted by Kasew et al., (2022) which revealed a seropositivity of 2 (0.6 %) for HCV. However, prevalence rates which corresponds to that found in this study were found in studies previously conducted in Nigeria; 4.50%, among sickle cell disease patients with regular blood transfusion in Benin, 5.70 %, among HIV patients in Jos, 8% and 5% among university undergraduates in Ilorin [20, 21]. Studies conducted among Sickle Cell Anaemia Children (SCA) in some other parts of Nigeria which also corresponds to results obtained in this study reported prevalence range of 5 %-6.6 %. These include Lagos 5%, Ilorin 5%, and Enugu 6.6% (Baba et al., 2014). On the contrary, high prevalence of 12.30%, in Port-Harcourt and Benin respectively [21]. Baba et al., [21] reported high prevalence of anti-HCV for HCV infection in both Sickle Cell Anaemia (SCA) children (12.7 %) and control (10.3 %) in this study. Another study conducted in Benin and Ibadan, reported a prevalence of 20%, and 19.4% respectively among sickle cell disease patients and 21.1% in the controls. Local

factors causing inter-center variation such as use of blood especially if sources of blood transfusion were from rural, private, or general hospital, where standard screening facilities for HCV is not guaranteed may be associated with this high prevalence of HCV. It may also be attributed to some cultural or behavioral risk factors which may include traditional circumcision or the use of sharp contaminated material such as razor blade in the treatment of convulsion in children by way of scarification marks and may be as a result of sexual assaults in children that are not reported or identified.

A low prevalence of HIV (4.83 %) was observed in this study, this is higher than the 1.4 % prevalence in Federal Capital Territory reported by [22]. On the contrary, the result obtained in this study is lower than the high prevalence of 27 (7.5 %) reported by Kasew et al., [23] among children in Gondar, Ethiopia. This shows that the prevalence of HIV in this part of Africa is lower than some other parts of Africa.

In table 2, the positive subjects were aged between 14 and 17years. Similar studies in eastern Nigeria also revealed higher positivity in younger age [24]. The seroprevalence of HIV in this current study was 4.83% (n = 6) which is comparable to findings in a similar study in Nigeria with a reported prevalence of 3.9 % [25]. On the contrary, it is low when compared with other reports in some parts of sub-Sahara Africa. It is pertinent to state that several recent studies on the seroprevalence of hepatitis C and HIV reported in Nigeria were with other co-morbidities including sickle cell anemia and hepatitis B virus co-infections [26]. HIV and HCV infections are serious public health problems which affect approximately 2 billion and 130 - 170 million people across the globe respectively. Data on the prevalence of hepatitis viruses among patients presenting with coinfection disease in Asokoro is very limited. No evidence of co-infection of HIV and HCV was seen among the children studied. Community based awareness should be enhanced to eradicate these diseases so that transmission of the infection will be stop drastically. HIV and HCV has emerged as the most formidable challenge to the public health and School children of today are exposed to the risk of the viral infection. The sexual behavior of young people plays a major role in the trajectory of AIDS epidemic, for young people make up a large and growing population in developing countries. Studies by Baba et al., [21] reported the high prevalence obtained in this present study

Research was carried out among both primary and secondary school student and the result showed that the majority of the primary school student (85 %) are free from HIV and HCV. It was observed from our study that age-groups 21–24 years had the highest prevalence of anti-HCV (1.16 %), followed by age groups ≤ 20 years with 0.78 % prevalence (Table 2).

The results in table 3 were rated using school differences. This is simply because a healthy environment contributes in the reduction of HCV and HIV viral infections. This is similar to a research work reflection of the worldwide regional variation in the prevalence of HCV as a result of the prevailing unwholesome health practices in such regions [27] or because of the high risk of exposure in the particular population subgroup studied. The study also shows that most of the student got the information from television, radio, newspaper, and social media. Regarding the transmission of this viral infection to the students, the research made it clear that most of the primary school children tested with HCV and HIV seropositive got it from there mother during birth or breast feeding while most of the secondary school tested

with HIV and HCV seropositive got it sexual activities or contact with infected object or body fluid.

The HIV Phylogenetic tree revealed AY665492.1 HIV-1 strain 31149 from Democratic Republic of Congo. The template HIVs4 is closely related to AF069943.1 HIV-1 isolate with 2,538 bp genomic DNA obtained in 1995 from a hospitalized individual from Maiduguri, Borno state, Nigeria. The HCV strain isolated was molecularly characterized as HCV

4. Conclusion

The current study shows a low prevalence of HCV and HIV infection in Asokoro village Abuja. Infection was more likely to occur in older persons than younger ones. Unsafe injections by traditional practitioners were of significant exposure risk of contracting HCV infection. The results further indicate that a person's place of birth and residence could determine their HCV and HIV status. Moreover, the primary and secondary school health worker should come forward and create awareness and also take care of the student by assuring and providing the necessary health equipment for proper health care. The health care workers should subsequently check on the students' health status to prevent the infection on time if any. Primary health care facilities should be provided for rural and semi-Urban communities in Nigeria to enhance community-based screening for early detection of these infections. Parent should always watch their children and report them to the nearest healthcare facility if any unusual symptom is observed. Secondary school students must be educated on how to handle sharp object to avoid been infected with a contaminated object. Sex education should be re-emphasized in all the school within the community most especially secondary school in order to curtail the spread of STDs especially HIV and HCV. Awareness must also be created for the villagers to avoid transmission from parents to children.

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