



Studies on Hepatitis C Virus Prevalence Rate among HIV Positive and HIV Negative Patients of Tertiary Health Facility

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Hepatitis C virus (HCV) is a hepatotropic virus which is one of the major causes of liver disease and a potential cause of substantial morbidity and mortality worldwide. The virus, estimated to infect about 3% of the world population, is primarily transmitted through the parenteral route which includes injection drug use, blood transfusion, unsafe injection practices, and other healthcare related procedures. HCV causes acute hepatitis which is mostly subclinical, but which gradually evolves into chronic hepatitis in about 80% of those infected. HCV infected people are at risk for developing chronic liver disease (CLD), cirrhosis, and primary hepatocellular carcinoma (HCC). It has been estimated that HCV accounts for 27% of cirrhosis and 25% of HCC worldwide. This work evaluated the prevalence rate of hepatitis C virus among patients of Chukwuemeka Odumegwu Ojukwu University Teaching Hospital (COOUTH), Awka in Anambra state Nigeria. For the purpose of this study, two hundred (200) venous blood samples were drawn from patients (80 males and 120 females) in the ART and GOPD phlebotomy units and screened with in vitro anti HCV strip for qualitative diagnosis. 100 out the 200 samples were HIV positive samples whereas 100 remaining

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samples weren't. At the end, results showed 11 positive samples out of the 200 patients screened. That is, 5.5% of the study population were infected with hepatitis C virus. 5 out of the 11 positive samples (2.5%) were HIV positive while 6(3%) of the total positive were not. Of the 6 age groups (200 samples) tested for HCV, age groups (25-34) and (45-54) had the highest number of infection i.e. 3 (4.9%) and 3(11.1%) respectively. Age groups 15-24 and 55-64 had 2(5.4%) and 2(11.1%) each. While in (35-44) age group, only 1(2.3%) person was infected and none was infected in those 65 years and above. Then, while 7 (63.6%) of the HCV positive population were male, 4 (36.4%) were female. Of the 11 persons infected with hepatitis C, 72% had multiple sex partners,45% had HIV,18% had tattoos, and 9% had been transfused in the past. Howbeit, HCV has no preventive vaccines; hence the call for greater awareness, public education and encouragement of early diagnosis to curb the prevalence rate of HCV.

Keywords: *Hepatitis C virus; HIV; chronic liver disease; cirrhosis; multiple sex partners.*

1. INTRODUCTION

Hepatitis C virus is a chronic lifelong infection in the majority of patients who are infected with the virus [1]. Hepatitis C is caused by hepatitis C virus(HCV), which has a 50nm enveloped virion that contains a single strand of linear RNA. HCV is a member of the family Flaviviridae and is classified into multiple genotypes [2]. Hepatitis C is a liver infection caused by the hepatitis C virus (HCV). Worldwide, up to 8% of pregnant women are infected with this virus. Information on the epidemiology of this virus in Nigeria is limited. Nevertheless, it has long been suspected that it may be endemic. Hepatitis C virus (HCV) is spread mainly through contact with the blood of a person who has HCV. Most people become infected with HCV by sharing needles or other equipment to inject drugs.

According to the Centers for Disease Control and Prevention (CDC), approximately 25% of people with HIV in the United States also have HCV. Infection with both HIV and HCV is called HIV/HCV coinfection. People with both HIV and HCV may be treated for both infections. Health care providers prescribe HIV and HCV medicines carefully to avoid drug-drug interactions and closely monitor those taking the medicines for any side effects. Information on the epidemiology of this virus in Nigeria is limited. Nevertheless, it has long been suspected that it may be endemic.

HCV is transmitted parenterally. The most common risk factor for HCV infection in developing countries like Nigeria is transfusion of untested blood or plasma derived products [3]. Other potential risk factors include re-usage of syringes and needles, intranasal cocaine use, tattooing, body piercing, accidental needle-stick injury [4,5] and sharing of household items such as nail clippers, razor blades and tooth brushes.

Needle-stick injury: Accidental needle stick injury in healthcare workers may lead to transmission of the virus. The estimated risk of transmission of HCV as a result of needle stick injury is 1.8% [6]. Perinatal transmission: Perinatal transmission of HCV infection occurs in approximately 3-5% of infants born to women infected with HCV [7]. The risk of transmission is increased when the mother is HIV positive or when there is a high HCV viral load. Sexual transmission: sexual transmission of HCV infection is common during sexual relations with infected persons. Risk factors for sexual transmission include multiple sex partners, prostitution and rectal intercourse.

Studies reported that the rates of coinfection of HIV with either HCV or HBV vary from region to region and based on study population and risk factors for virus acquisition [8]. Viral hepatitis is today a thing of worry to the general public, hence the ongoing efforts and researches to know the extent of damage and ways to combat its menace within the country and the world at large.

1.1 Statement of Problem

- The control of wound infections in diabetic patients has become more challenging due to widespread antibiotics resistance microorganisms and to a greater incidence of infections caused by methicillin-resistant *Staphylococcus aureus*, polymicrobial flora and by fungi.
- Therefore, there is need for research on herbs with wound healing and antimicrobial capability to help heal diabetic wounds while the individual is still diabetic.

The major objective is to estimate the seroprevalence of HCV among HIV positive and negative persons in COOUTH Amaku Awka.

1.2 Significance of Study

The prevalence of antimicrobial resistance is increasing among the microorganisms that causes wound infections in diabetic patients and this delays healing of wounds. Since plant products are potential agents for wound healing, and largely preferred because of their widespread availability and effectiveness as crude preparations. The findings of this study encourage the development in the use of plants which possess the power to heal chronic wounds.

The specific objectives are:

- To screen for Hepatitis C among HIV positive and negative patients.
- To determine the prevalence of Hepatitis C among HIV positive and negative patients.
- To determine the prevalence of HCV with respect to age groups and few risk factors.
- To estimate the proportion of the study population co-infected with HCV/HIV.
- To evaluate/compare the effect of HIV mono-infection and HIV/ HCV co-infection on the CD4 count of the study population.
- To evaluate the effect of HIV/HCV on the liver enzymes (AST and ALT) of the study population.
- To evaluate the overall prevalence of HCV among the study population.

2. MATERIALS AND METHODS

2.1 Study Area

The study was carried out at Chukwuemeka Odumegwu Ojukwu University Teaching Hospital Amaku Awka, which is the only tertiary hospital in Awka. Awka is the capital city of Anambra state, South East Nigeria. Anambra state was created on 27th of August 1991 with a population of 4,177,828 (NPC, 2006.) and a land mass of 4844 square kilometers. The state capital, Awka has a land mass of 120 kilometers square and estimated population of about 306,657 according to the 2006 National population census by National Population Commission. The presence of different ministries, government agencies, three institutions of higher learning and a major market makes for the greater number of civil servants and business men seen in Awka.

2.2 Study Design

This was a cross-sectional study whereby the participants gave their full consents before their

blood samples were drawn. Recruitment into the study was based on the age, consent and HIV status. Volunteers from the GOPD phlebotomy unit whose samples were reactive to UNIGOLD HIV kits were dropped so as to get a balanced result.

2.3 Study Population

The subjects included a total of 200 consented patients. These comprised of 100 HIV positive patients, and another 100 patients (HIV negative patients) attending Chukwuemeka Odumegwu Ojukwu University Teaching Hospital [COOUTH] Awka. They were aged between 15 and 70 years, males and females inclusive. Relevant information of the patients' personal and demographic data was extracted using a well prepared questionnaire.

2.4 Study Location

The specimens for the Hepatitis B and Hepatitis C screening were obtained from two major locations in Chukwuemeka Odumegwu Ojukwu University Teaching Hospital Amaku Awka.

1. HIV/ART phlebotomy clinic.
2. GOPD phlebotomy unit.

2.5 Sample Collection and Processing

Within the study period, 200 clinical specimens (venous blood samples) were collected aseptically from the study participants. This was about 5ml of blood drawn from the vein of each of the participants into a labelled sterile EDTA vacutainer tubes. After centrifugation and separation, 2ml of plasma transferred into sterile plain tubes were used for testing.

2.6 HCV Antibody Testing (HCV Ab)

Using rapid chromatographic immunoassay HCV kits, the 200 plasma samples (100 HIV positive samples from ART phlebotomy unit and 100 HIV negative samples from GOPD phlebotomy unit) were assayed for hepatitis C virus antibody following the manufacturers instruction.

2.7 Statistical Analysis

This was done using SPSS version 25. Chi-square was used to determine if there was significant association between prevalence of Hepatitis C (HCV) with respect to HIV status, age group and sex. Alpha level was set at 0.05. Chi

square was also used to determine if there was a significant association between prevalence of hepatitis and some risk factors like HIV status, multiple sex partners, blood transfusion and tattoo.

ANOVA was used to test for significant difference in the mean of the liver enzymes (ALT and AST) of the samples and alpha was set at 0.05. Significant means were separated using Duncan multiple range test.

Independent t test was used for the comparison of CD4 count of HIV and hepatitis coinfecting subjects and mono infected subjects.

3. RESULTS

This study included a total of 200 patients with an age range of 15 to 70 years. 100 patients i.e. (50%) were HIV patients and 100 (50%) of the study population were HIV negative. 80 (40%) of the subjects were males and 120 (60%) were females. 11 (5.5%) of the 200 samples screened were positive for HCV antibody. 5 (5%) out of the 100 HIV positive samples screened for HCV antibody were positive while 6 (6%) out of the 100 HIV negative samples tested positive for HCV antibody. Age groups (25-34) and (45-54) had the highest number of infection i.e. 3 (4.9%)

and 3(11.1%) respectively. Age groups 15-24 and 55-64 had 2(5.4%) and 2(11.1%) each. While in (35-44) age group, only 1(2.3%) person was infected and none was infected in those 65 years and above. 7 (63.6%) of the HCV positive population were male, 4 (36.4%) were female. 5(5%) out of the HIV patients sampled were co-infected with HCV and HIV.

Table 1 showed that 11 (5.5%) of the 200 samples screened for HCV were infected while 189 (94.5%) were uninfected.

Table 2 showed that 5 (5%) out of the 100 HIV positive samples screened for HCV antibody were positive.

Table 3 showed that 6 (6%) out of the 100 HIV negative samples tested positive for HCV antibody.

Table 4 showed that of the 6 age groups (200 samples) tested for HCV, age groups (25-34) and (45-54) had the highest number of infection i.e. 3 (4.9%) and 3(11.1%) respectively. Age groups 15-24 and 55-64 had 2(5.4%) and 2(11.1%) each. While in (35-44) age group, only 1(2.3%) person was infected and none was infected in those 65 years and above.

Table 1. Prevalence of HCV among the study population

Number (%) screened	No (%) infected	No (%) uninfected
200 (100%)	11 (5.5%)	189 (94.5%)

Table 2. Prevalence of HCV among HIV sub population

No (%) screened	No (%) infected	No (%) uninfected
100 (100%)	5 (5%)	95 (95%)

Table 3. Prevalence of HCV in HIV negative sub population

No (%) screened	No (%) infected	No (%) uninfected
100 (100%)	6 (6%)	94 (94%)

Table 4. Prevalence of HCV among different age groups

Age Groups	No (%) Screened	No (%) infected	No (%) uninfected
15 – 24	37 (18.5%)	2 (5.4%)	35
25 – 34	61 (30.5%)	3 (4.9%)	58
35 – 44	44 (22%)	1 (2.3%)	43
45 – 54	27 (13.5%)	3 (11.1%)	24
55 – 64	18 (9%)	2 (11.1%)	16
65 & above	13 (6.5%)	0 (0%)	13
Total	200 (100%)	11 (5.5%)	189 (94.5%)

Table 5. Prevalence of HCV among different sexes

Sex	No screened	No infected	No uninfected
Male	80 (40%)	7 (63.6%)	73
Female	120 (60%)	4 (36.4%)	116
Total	200 (100%)	11 (100%)	189

Table 5 showed that 80 (40%) of the study population were male, while 120 (60%) of the study population were female. However, 11 out of the 200 persons sampled tested positive for HCV. Then, while 7 (63.6%) of the HCV positive population were male, 4 (36.4%) were female.

Table 6. Co-infections among study population

	HCV/HIV
No (%) infected	5 (5%)
No (%) uninfected	95 (95%)
Total no screened	100 (100%)

Table 6 showed that 5(5%) out of the HIV patients sampled were co-infected with HCV and HIV.

Table 7. Prevalence of HCV in relation to few risk factors

Risk factors	No positive
HIV	5 (45%)
Multiple sex partners	8 (72%)
Injection drug use	0 (0%)
Blood transfusion	1 (9%)
Tattoo	2 (18%)

Table 7 showed that of the 11 persons infected with hepatitis C, 72% had multiple sex partners, 45% had HIV, 18% had tattoos, and 9% had been transfused in the past.

Table 8. Comparism of liver enzymes (ALT & AST) of HCV/HIV co-infected samples and HIV samples

ALT/AST in HIV samples	ALT/AST in HIV negative samples
56 / 44	23 / 29
48 / 38	16 / 21
62 / 69	21 / 22
28 / 34	17 / 24
150 / 71	13 / 22

Table 8 showed that hepatitis C co-infection with HIV raises the liver enzymes

Table 9. Comparism of CD4 counts of co-infected samples and mono (HIV) infected samples

CD4 IN HIV co-infections	CD4 in HIV mono infections
38	631
274	310
388	376
133	467
24	289
484	222
567	1222
166	699
855	567
103	588
120	1054
512	856

The Table 9 above shows that hepatitis B and C co-infections with HIV further reduces immunity of the patients.

4. DISCUSSION, CONCLUSION AND RECOMMENDATIONS

4.1 Discussion

Human immunodeficiency virus (HIV) and hepatitis C virus (HCV) are among the leading causes of death by infectious diseases worldwide. Immunosuppression caused by HIV infection has been associated with the increased progression of hepatic diseases as well as increased risk of chronic infection with HCV. In addition, a body of evidence suggests that in HIV infection, and HCV infections, among other opportunistic infections are associated with CD4+ T-cell counts reducing to values below normal. This cross-sectional study was conducted to determine the seroprevalence of hepatitis C viruses among HIV patients attending Chukwuemeka Odumegwu Ojukwu University Teaching Hospital Awka. The data obtained from this research has revealed that hepatitis C 11(5.5%) viruses are prevalent in Awka, Anambra state both amongst the HIV positive population and the non-HIV positive population as well. This was deduced from the fact that the

study was done using specimens from HIV positive and HIV negative patients attending Chukwuemeka Odumegwu Ojukwu University Teaching hospital (COOUTH), Amaku-Awka; which happens to be the only tertiary hospital in Awka-the capital city of Anambra state. This however, suggests that inhabitants of Awka and its environs are at risk of these viral infections. The prevalence rates of HBV (7.5%) and HCV (5.5%) as obtained in this study suggests endemicity of these viruses within the geographical locale of study. This may be attributed to the fact that most study participants also have HIV infection which shares common routes of transmission with these viral hepatitis infections. Although the prevalence of hepatitis C viral infections vary in different parts of the world from country to country, and from one region to another region and from one population group to another in a country; it can be said that this result is in correspondence with some studies done in Nigeria while varied views exist in some others as well. For instance, in Anambra state (Eastern Nigeria), [9] reported a lesser prevalence of 1% (HCV) in a study on prevalence of hepatitis C viral infections in pregnant women attending antenatal clinic in Nnewi. In northern Nigeria, there is a corresponding HCV prevalence a report of 5.7% as found in a study on prevalence of antibodies to hepatitis C virus among Nigerian patients with HIV infection in Jos, Plateau state; very close to 5.5% that was obtained here in the east. [10] reported an HCV prevalence of 4.7% in a survey of HCV antibodies in HIV patients attending General Hospital Suleja, Niger state; This report is a bit lesser than the 5.5% HCV prevalence obtained in this present study. Also, 2.3% (HCV) prevalence have been recorded by [11] in a study on seroprevalence of hepatitis C infection among HIV positive population in Abuja, Nigeria.

In the western parts of Nigeria, there was a 4.8% HCV prevalence report in a study on Prevalence of hepatitis C seropositive in a Nigerian cohort of HIV-infected patients by [12] in Ibadan. This is also a bit lower than the 5.5% obtained in this study. This closeness could be linked to the fact that HIV positive patients were sampled in these studies. Nonetheless, there're reports of higher HCV prevalence rates which include the 8.2% as was reported by [13]. The HCV co-infection among HIV-infected patients have been reported frequently across geographical regions of Nigeria in agreement with results from this study. The (6%) coinfection rate of HCV and HIV from this study is on the high side compared to (5.1% and

4.8%) obtained by [14] while studying the Epidemiology of chronic hepatitis C virus infection in sub-Saharan Africa; and [12] respectively. Reasons for this variation is yet unclear. Also, higher HCV/HIV coinfection prevalence rates exist like (8.2%), reported by Agwale et al., [13] in a study on Prevalence of HCV co-infected HIV-infected individuals in Nigeria and characterization of HCV genotypes. Likewise, [15] reported even a higher coinfection rate of (11.1%). This co-infection is non-negligible, and patients co-infected with these two viruses should receive special care, as it is known that HCV infection causes increased morbidity and mortality in HIV-positive patients.

The hepatitis C viral infections seem to slightly lower the CD4 count of HIV seropositive patients, as this study showed a significant difference between the CD4 count of HIV co-infected patients and those of the mono-infected patients. This is in conformity with what was reported in Nigeria by many researchers like [16] and [17]. It was also observed from this study that prevalence of HCV were higher among males than the females. [HCV (males: 8.80%; females: 3.30%)]. On evaluation of the liver enzymes (ALT/AST) of the study population, ALT for HBV/HIV coinfection and HCV/HIV coinfection are significantly different (higher) from ALT of other samples. AST for HBV/HIV coinfection and HCV/HIV coinfection are also significantly different (higher) from AST of other samples. This result could be linked to the fact that viral hepatitis causes some damages to the hepatocytes. There was no significant association with hepatitis mono-infections and liver enzymes unlike the report of –[9].

4.2 Conclusion

This study has revealed that hepatitis C virus is endemic in Anambra state, Nigeria. It also showed that it is present in both HIV patients (“immunocompromised”) and the “seemingly” healthy individuals that visit the hospital for some random checks. Hepatitis C virus is implicated in low CD4 counts noticed in HIV co-infected patients. It is also important to note that there is increased risk of liver problems in co-infected patients hence, elevation in transaminases observed in most of these patients. No wonder [18] and [10] rightly stated “The HCV co-infection among HIV-infected patients have been reported frequently across geographical regions of Nigeria in agreement with variations noticed in this study. This co-infection is non-negligible, and patients

co-infected with these two viruses should receive special care, as it is known that HCV infection causes increased morbidity and mortality in HIV-positive patients.” However, patients who are singly infected with HCV deserve prompt treatments equally so as to reduce chances of lowered immunity and or liver degenerations.

4.3 Recommendations

The reports from this work has shown that there is more work yet to be done in the fight against the spread of viral hepatitis C in the country. Also, the government of Anambra state and Nigeria at large should ensure to make;

- Public awareness of viral hepatitis targeted at sensitizing the masses about the health implications of untreated hepatitis.
- Free and accessible testing and counseling sessions at strategic levels where massive contacts would be available.
- Compulsory free testing for all HIV patients.
- Compulsory free testing of HCV in antenatal and postnatal clinics to avail positive mothers’ opportunity to get prompt intervention thereby preventing mother to child transmission.
- There should be general counseling on the risk factors of HCV so as to infuse a consciousness on the masses against this silent killer disease.

CONSENT AND ETHICAL APPROVAL

Ethical approval/clearance for the study was sought and obtained from the Health Ethics and Research Committee of the Chukwuemeka Odumegwu Ojukwu University Teaching Hospital Amaku, Awka while consent was obtained from the respective patients that present in the COOUTH’s General Out Patient Department and HIV clinics during the course of this study.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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