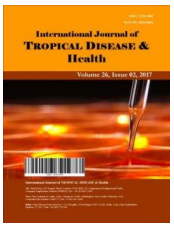

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Seroprevalence of HCV and HIV Antibodies in Tuberculosis Confirmed Patients in Ekiti State, Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. Author OOB designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors TF and TOK managed the analyses of the study. Authors AAA and CTO managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

This study was conducted to determine the seroprevalence of HCV and HIV antibodies in TB confirmed patient attending the Federal Medical Centre (FMC), Ido Ekiti, Ekiti State, Nigeria. A total of 500 tuberculosis confirmed patients were selected by random sampling. Their blood samples were collected and assayed for HCV and HIV antibodies using Clinotech diagnostic Anti-HCV detection test and Abbot determine HIV ½ in conjunction with Chembio HIV ½ STAT-PAK assay kit respectively. Out of 500 TB patients tested, 10(2.0%), 21(4.2%) and 3(0.6%) tested positive to

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HCV, HIV, and HCV/HIV antibodies respectively. Age group 36-45 was the most prevalence of HCV, HIV, and HCV/HIV antibodies with P-value 0.000, 0.000 and 0.002 respectively. The associated risk factors were alcoholism 14 (45.2%), being the highest identified risk factor, followed by previous unprotected sex, multiple sex partner, previous blood donor, previous transfusion, tattoos, and history of the Sexually transmitted disease being the least risk factor 3 (9.68%). The degree of disparity in regards to HCV, HIV and co-exists of HCV/HIV antibodies between 302 male and 198 female that participated were not statistically significant. (P-value 0.531, 0.549,and 0.824 for HCV, HIV and HCV/HIV antibodies respectively).These findings confirmed that both HCV and HIV can co-exist in TB patients, and may increase the risk of antituberculosis drug-induced hepatotoxicity, if overlooked, there will be a greater risk for TB patients, and these infections will continue to spread through the associated risk factors. However, in managing the TB patients, there is a need to screen for Anti- HCV, as it has been for HIV antibody.

Keywords: Nigeria; HCV and HIV antibodies; tuberculosis; seroprevalence.

1. INTRODUCTION

Hepatitis C virus (HCV) belongs to the family of Flaviviridae, genus- hepacivirus and it is 50nm in size with enveloped, single-stranded, positive-sense RNA [1]. It infects an estimated 170 million person's worldwide. The institution of blood screening measures in industrialized countries has reduced the risk of transfusion-associated hepatitis to a minimal level, but the transfusion-related transmission still occurs in developing countries that have not fully implemented blood screening procedures. Globally, new cases of HCV also continue to occur as a result of injecting drug use (IDU) and through other means of percutaneous or mucous membrane exposure [2].

HIV infection in humans is now pandemic as of January 2006, the Joint United Nations Programme on HIV/AIDS (UNAIDS) and the world health organization (WHO) estimates that AIDS has killed more than 25 million people since it was first recognized in 1981, making it one of the most destructive pandemics in recorded history (It is estimated that about 0.6% of the world's population is infected with HIV [3]. HIV prevalence varies widely by geographic region and vulnerable population, Nigeria has an overall national prevalence of 3.1% but statewide; HIV prevalence among pregnant women has ranged from as low as 1.6% in Ekiti in the west to 10% in Benue in south-east [4].

However, the current estimate state that HIV is set to infect 90 million people in Africa, resulting in a minimum estimate of 18 million orphans. Antiretroviral drug reduce mortality and morbidity of HIV infection, but routine access to antiretroviral medications are not available in all countries [5]. HCV co-infection with HIV is common and rates among HIV positive population are higher [6]. About 10,000-20,000 death yearly in the US is from HCV; expectations are that this mortality rate will increase, as those who were infected by transfusion before HCV testing become apparent. It is responsible for 90-95% of all transfusion-related hepatitis [7].

Tuberculosis (TB) has been major public health problems for centuries. The implementation of effective public health interventions for the prevention and control of TB has significantly contributed to a substantial reduction of the global disease but the emergence of the HIV epidemic has posed major challenges to TB control effort globally. In a country with almost 40% population already infected with TB, increasing prevalence of HIV will be jeopardized TB central effort with such consequences [8]. HIV has been thought to account for much of the recent increase in the global TB burden, especially in Africa [9].

HIV is the most important risk factor for the development of TB among person infected with *M. tuberculosis* and both Centres for Disease Control and Prevention (CDC) and WHO guidelines recommend offering HIV testing to those person diagnosed with TB disease [2].

The prevalence of HCV infection among persons with TB has been poorly defined, and few data are available from most areas around the world. One recent study from the US has suggested that veterans with HCV infection are at risk for other selected infectious disease including TB. Part of the lack of data on HCV seroprevalence stems from the fact that there is no recommendation for universal screening of person with TB for HCV infection as there are for HIV testing [2].

Richard et al. [2] reported that HIV and HCV are both global public health problems infections with HIV and or HCV may have an impact among those with TB. The high presence of HCV co-infection among patients with TB in Georgia has the potentials to have a major impact on TB management, treatment and control.

Hepatitis C virus is one of the deadly blood-borne viruses that has almost the same route of transmission as of HIV, it is noted to have its major activity in the liver where it causes inflammation of the liver, on the other hand, HIV and TB are closely connected that they are often referred to as co-epidemics among confirmed TB patient, however, drug or regimes given to TB or TB/HIV co-infection patient has hepatotoxicity effect and can eventually lead to hepatocellular carcinoma.

In this study, the seroprevalence of HCV and HIV in confirmed TB patient were determined to provide an updated reference data for effective empiric management of Tuberculosis patients with co-infection of HCV and HIV. Also, the possible predisposition factor(s) to HCV and HIV coinfection in TB patients were identified.

2. METHODOLOGY

2.1 Study Area

The study area for this work was Federal Medical Centre (FMC), Ido Ekiti located in Ekiti North senatorial district of Ekiti State, Nigeria.

2.2 Study Population

The study population is Tuberculosis confirmed patients attending FMC, Ido Ekiti. A total number of 500 samples were collected from TB confirmed patient after due consultation with the patients.

2.3 Sample Collection

About 5 mls of blood was collected by venous puncture from the antecubital foci of the arm after disinfecting the area with 70% alcohol. The blood was allowed to clot and was spun at 1000rpm for 5 minutes and the serum was aseptically collected into sterile cryovials bottles, appropriately labelled and stored at -20°C until the test was performed.

2.3.1 Sample processing

HCV detection: Clinotech diagnosis anti-HCV cassette detection test was used which is a rapid direct binding procedure, which visually determines antibodies to hepatitis C infection.

Detection of HIV: The Abbot Determine HIV-1/2 was used in conjunction with STAT-PAK which are *in-vitro*, visually ready, qualitative immunoassays for the detection antibodies to HIV-1 and HIV-2 in human serum, plasma or whole blood.

2.4 Statistical Analysis

The data generated from this study were analysed using SPSS version 16 (SPSS Inc. Chigago IL).

3. RESULTS

3.1 Response Rate

A total of 500 questionnaires and consent forms were distributed to the patients screened and out of 500 questionnaires distributed, 500 were returned indicating a 100% response rate.

The overall seroprevalence of HCV, HIV and HCV/HIV antibodies in tuberculosis confirmed patients are shown in Table 1. It shows that out of 500 samples tested for HCV, HIV antibodies, 10(2.0%) are positive for HCV, 21(4.2%) are positive for HIV and 3(0.6%) are positive for both HCV and HIV antibodies.

The demographic relationships in respect to sex are shown in Table 2, Table 3 and Table 4 for HCV, HIV and HCV/HIV co-infection respectively. They revealed that out of 302 male subjects that participated, 7(2.32%) positive for HCV (Table 2), 14(4.64%) positive for HIV (Table 3) and 2 (0.66%) were positive for HCV/HIV antibodies (Table 4), while out of 198 female, 3(1.52%) positive for HCV (Table 2), 7(3.54%) positive for HIV (Table 3), 1(0.51%) positive for HCV/HIV antibodies (Table 4).

Age group distributions for HCV, HIV and HCV/HIV antibodies are shown in Table 5, Table 6 and Table 7 respectively. In the age group 18-25, out of 4 (0.8%) subjects that participated, no subjects were positive for HCV and HIV antibodies as shown in Table 5 and Table 6 respectively. In age group 26-30, 20 (4.0%)

Table 1. Overall seroprevalence of HCV, HIV and HCV/HIV antibodies in TB confirmed patient

Infection	No of samples	No of positive (%)
HIV	500	21(4.2)
HCV	500	10(2.0)
HIV/HCV	500	3 (0.6)

Table 2. Seroprevalence of HCV in relation to sex

Sex	No positive (%)	P value
Male	7.0 (2.32)	0.531
Female	3.0 (1.52)	

Table 3. Seroprevalence of HIV concerning sex

Sex	No positive (%)	P Value
Male	14.0 (4.64)	0.549
Female	7.0 (3.54)	

Table 4. Seroprevalence of HCV/HIV co-infection in relation to sex

Sex	No positive (%)	P Value
Male	2.0 (0.66)	0.824
Female	1.00 (0.51)	

subjects participated, 4 (0.8%) positive for HCV(Table 5), 2(0.4%) positive for HIV (Table 6), but no subject had HCV and HIV together (Table 7). 70(14%) subjects are within 36-45 age group, 5(1%) had HCV (Table 5), 10(2%) had HIV(Table 6), 2(0.4%) had HCV/HIV antibodies (Table 7). In the age group of 46-55, 136(27.2%) participated, 1(0.2%), 5(1%), and 1(0.2%) were seropositive for HCV, HIV, and HCV/HIV antibodies and these were shown in Table 5, Table 6 and Table 7 respectively. Out of 150(30%) subjects within 56-65 age group, 3(0.6%) were seropositive for HIV (Table 6), no subject was positive for HCV (Table 5) and HCV/HIV antibodies (Table 7). In age 66-75, 70 (14%) participated, 1(0.2%) was positive for HIV (Table 6), no seropositivity in HCV and HIV/HCV as shown in Table 5 and Table 7 respectively. 50(10%) subjects participated in age group 75-above, no seropositivity was recorded in both HCV and HIV as shown in Table 5and Table 6 respectively.

The risk factors associated with HCV, HIV and co-infection of HIV/HCV in TB patient was based on patient self-report. Alcoholism, previous unprotected sex, multiple sex partner, previous blood donation, Previous transfusion, Tattoos and History of Sexual Transmitted disease are the risk factors. Out of 31 infected subjects, 14(45.2%) identified with alcoholism, previous unprotected sex 11(35.5%), Multiple sex partner 10(32.3%), Previous blood donation 8(25.8%), previous transfusion 7(22.6%), others are Tattoos 7(22.6%) and history of STD 3(9.68%). The risk factors were represented in the pie chart shows in Fig. 1.

4. DISCUSSION

HIV and HCV are both global public health problems. Infections with HIV and or HCV may have a major impact on those with TB. HIV is the most important risk factor for the development of TB among person infected with *M. tuberculosis* and both CDC and WHO guidelines recommended offering HIV testing to those person diagnosed with TB disease [2,10].

However, the prevalence of HCV infection among persons with TB has been poorly defined and few data are available from the most area around the world. One study in the US suggested that veterans with HCV infection are at risk for other selected infectious disease including TB [2]. Of 500 (100%) samples collected and tested against HCV and HIV antibodies, HIV antibodies were positive in 21(4.2%) which might be because HIV prevalence in Ekiti State is low and this agreed with previous work of USAIDS [11]. This also agreed with the work of Idigbe et al. [12] that prevalence of HIV in TB in Nigeria, Lagos to be specific is 5.3%. However, HCV antibodies were positive in 10(2.0%) patients

which also agreed with previous work of Mwangi [13] that the prevalence in Ekiti State and Nigeria is low. This might be due to the proper screening of donor which is one of the major predisposing factors to increase in the incidence of HCV [13]. However, the prevalence of HCV among TB has been poorly defined and few data are available around the world. Part of the lack of data on HCV seroprevalence stem from the fact that there are no recommendations for universal screening of TB patient for HCV as there for HIV testing [2]. Although, Halim and Ajayi [14] reported 12.3% seroprevalence of HCV in Nigeria among the donor and the findings from Richard et al. [2] reveals that patient with TB may have among the highest prevalence of HCV infection.

The prevalence of HCV and HIV antibodies together in TB patient is 3(0.6%) which appears to be low but can pose a major threat to the management of TB patients and this agreed with previous work of Richard et al. [2] who reported a 0.4% prevalence rate of HCV and HIV antibodies in TB patient in Georgia.

Gender wise distribution of seroprevalence of HCV and HIV in TB patients revealed that although the number of males that participated in more than female but there was no significant difference (0.531, 0.549, 0.824) between male and female for HCV, HIV, and HCV/HIV co-infection respectively, which shows that HCV, HIV, and HCV/HIV can infect any sex and this agreed with previous work of Richard et al. [2].

Age distribution revealed that age group 36-45 had the highest prevalence of HCV, HIV and both HCV/HIV antibodies and this is statically significant (P-value 0.000 for HCV, 0.000 for HIV and HCV/HIV is 0.002). This might be because, at this age, subjects are sexually active and are involved in some of the risk factor(s) that

Table 5. Seroprevalence of HCV in relation to age

Age group in years	Not examined (%)	No positive (%)	P value
18-25	4 (0.8)	0 (0.0)	0.000
26-35	20 (4.0)	4 (0.8)	
36-45	70 (14.0)	5 (1.0)	
46-55	136 (27.2)	1 (0.2)	
56-65	150 (30.0)	0 (0.0)	
66-75	70 (14.0)	0 (0.0)	
75-above	50 (10.0)	0 (0.0)	

Table 6. Seroprevalence of HIV in relation to age

Age group in years	Not examined (%)	No positive (%)	P value
18-25	4 (0.8)	0 (0.0)	
26-35	20 (4.0)	2 (0.4)	
36-45	70 (14.0)	10 (2.0)	
46-55	136 (27.2)	5 (1.0)	0.000
56-65	150 (30.0)	3 (0.6)	
66-75	70 (14.0)	1 (0.2)	
75-above	50 (10.0)	0 (0.0)	

Table 7. Seroprevalence of HCV/HIV co-infection in relation to age

Age group in years	Not examined (%)	No positive (%)	P value
18-25	4 (0.8)	0 (0.0)	0.002
26-35	20 (4.0)	0 (0.0)	
36-45	70 (14.0)	2 (0.4)	
46-55	136 (27.2)	1 (0.2)	
56-65	150 (30.0)	0 (0.0)	
66-75	70 (14.0)	0 (0.0)	
75-above	50 (10.0)	0 (0.0)	

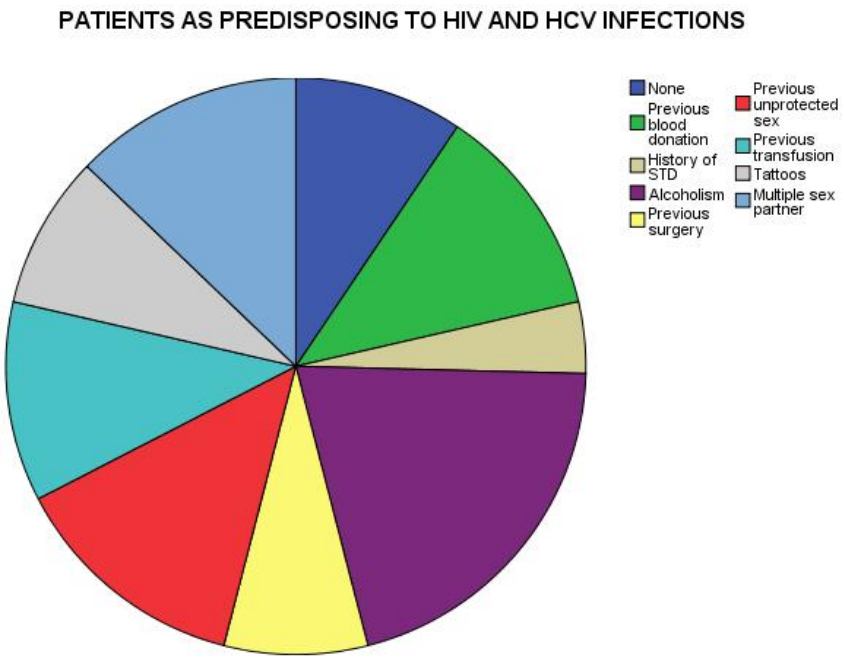

Fig. 1. Pie chart of risk factors with HCV and HIV

predispose them to the infections. This agreed with the work of Watanabe et al. [15] which revealed 25-45years as the most predispose age group to HIV. The predisposing risk factors to the seroprevalence of HCV, HIV and HCV/HIV antibodies in the study population, showed in figure I. Alcoholism is the highest of the factors, followed by previous unprotected sex, multiple sex partner, previous transfusion, tattoos and the least is a history of sexually transmitted disease. Although HCV and HIV are blood-borne diseases, the route of transmission is similar, nevertheless, a number of investigations have indicated that acquisition of HCV through sexual contact is uncommon and have suggested that HCV is inefficiently transferred through this mechanism [16,17] Despite these findings, a number of studies had found that high-risk sexual behaviour or history of STD are associated with an increased risk of HCV infection [16] and so, high-risk sexual behaviours and /or a history of STI may be a maker for other risks that have been implicated as mechanism of transmission of HCV. However, Richard et al. [2] revealed that most common route of HCV transmission worldwide is through hematogenous transmission, tattoos and nevertheless, hematogenous transmission may not be too implicated in this study because in Ekiti state, the WHO guidelines of screening of blood donor are followed strictly and this has contributed to the low prevalence of HCV, HIV in this part of Nigeria [11].

5. CONCLUSION

Since, HCV and HIV co-infection in TB patients increased the risk of antituberculosis drug-induced hepatotoxicity and that there is an even greater risk for drug-induced hepatotoxicity among those undergoing treatment for TB who had both HCV and HIV co-infection, to this end, more active screening for HCV should be done in this population (TB) as was done for HIV. There is also a need to know the underlying health status of TB patient as regards the HCV and HIV before administering drugs. Above all, there is a need for a sample of TB patient to send to the laboratory for a liver function test because of the effects of the regimes on the liver.

6. RECOMMENDATION

It is recommended that there should be a universal screening of a person with TB for HCV infection as there are for HIV testing.

CONSENT

Questionnaire to obtain the demographic characteristics, possible risk factors and other relevant information to the study as well as an

informed consent were administered to the participant.

ETHICAL APPROVAL

The ethical clearance for this research was granted by the Federal Medical Centre (FMC) (Now Federal Teaching Hospital) Ido-Ekiti ethical committee after due processes had been followed. Before the collection of the sample, information regarding the study was explained to the subjects.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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