

1 **SEROPREVALENCE OF HCV AND HIV ANTIBODIES IN TUBERCULOSIS**
2 **CONFIRMED PATIENT IN EKITI STATE, NIGERIA**

3
4 **ABSTRACT**

5 This study was conducted to determine the seroprevalence of HCV and HIV antibodies
6 in TB confirmed patient attending Federal Medical Centre (FMC), Ido Ekiti, Ekiti State,
7 Nigeria. A total of 500 tuberculosis confirmed patients were selected by random
8 sampling. Their blood samples were collected and assayed for HCV and HIV antibodies
9 using Clinotech diagnostic Anti-HCV detection test and Abbot determine HIV ½ in
10 conjunction with Chembio HIV ½ STAT-PAK assay kit respectively. Out of 500 TB
11 patients tested, 10(2.0%), 21(4.2%) and 3(0.6%) tested positive to HCV, HIV, and
12 HCV/HIV antibodies respectively. Age group 36-45 was the most prevalence of HCV,
13 HIV, and HCV/HIV antibodies with P value 0.000, 0.000 and 0.002 respectively. The
14 associated risk factors were alcoholism 14 (45.2%), being the highest identified risk
15 factor, followed by previous unprotected sex, multiple sex partner, previous blood donor,
16 previous transfusion , tattoos, and history of Sexually transmitted disease being the least
17 risk factor 3 (9.68%). The degree of disparity in regards to HCV, HIV and co-exists of
18 HCV/HIV antibodies between 302 male and 198 female that participated were not
19 statistically significant. (P value 0.531, 0.549, and 0.824 for HCV, HIV and HCV/HIV
20 antibodies respectively). These findings confirmed that both HCV and HIV can co-exist in
21 TB patients, and may increase the risk of antituberculosis drug-induced hepatotoxicity, if
22 overlooked, there will be greater risk for TB patients, and these infections will continue
23 to spread through the associated risk factors. However, in managing the TB patients,
24 there is a need to screen for Anti- HCV, as it has been for HIV antibody.

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26 **Keywords:** Nigeria, HCV and HIV antibodies, tuberculosis, Seroprevalence

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28 **INTRODUCTION**

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30 **HCV** belongs to the family of flaviviridae, genus- hepacivirus and it is 50nm in size with
31 enveloped, single stranded, positive sense RNA [1]. It infects an estimated 170 millions

Comment [WU1]: ???

Comment [WU2]: Risk factor for both HCV and HIV?

Comment [WU3]: Full meaning before abbreviation

32 person's world wide. The institution of blood screening measures in industrialized
33 countries has reduced the risk of transfusion-associated hepatitis to a minimal level, but
34 transfusion- related transmission still occurs in developing countries that have not fully
35 implemented blood screening procedures. Globally, new cases of HCV also continue to
36 occur as result of injecting drug use (IDU) and through other means of per cutaneous or
37 mucous membrane exposure [2]

Comment [WU4]: Provide full meaning before abbreviation

38 HIV infection in humans is now pandemic as of January 2006, the Joint United
39 Nations Programme on HIV/AIDS (UNAIDS) and the world health organization (WHO)
40 estimates that AIDS has killed more than 25 million people since it was first recognized
41 in 1981, making it one of the most destructive pandemics in recorded history. It is
42 estimated that about 0.6% of the world's population is infected with HIV [3]. HIV
43 prevalence varies widely by geographic region and vulnerable population, Nigeria has an
44 overall national prevalence of 3.1% but state wide; HIV prevalence among pregnancy
45 women has ranged from as low as 1.6% in Ekiti in west to 10 % in Benue in south east
46 [4].

Comment [WU5]: Provide reference

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

55 TB has been major public health problems for centuries. The implementation of
56 effective public health interventions for the prevention and control of TB has
57 significantly contribute to substantial reduction of the global disease but, however, the
58 emergence of the HIV epidemic has posed major challenges to TB control effort
59 globally. In a country with almost 40 % population already infected with TB, an increase
60 prevalence of HIV will be jeopardize TB central effort with such consequences [8]. HIV
61 has been thought to account for much of the recent increase in the global TB burden,
62 especially in Africa. [9].

Comment [WU6]: Full meaning when use for the first with abbreviation

Comment [WU7]: Reference

63 HIV is the most important risk factor for the development of TB among person
64 infected with *M. tuberculosis* and both CDC and WHO guidelines recommend offering
65 HIV testing to those person diagnosed with TB disease [2].

Comment [WU8]: Full meaning

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

Comment [WU9]: How?

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

76 Hepatitis C virus is one of the deadly blood-borne virus that has almost the same
77 route of transmission as of HIV, it is noted to have its major activity in the liver where it
78 causes inflammation of the liver, on the other hand HIV and TB are closely connected

79 that they are often referred to as co-epidemics among confirmed TB patient, however,
80 drug or regimes given to TB or TB/HIV co infection patient has hepatotoxicity effect and
81 can eventually lead to hepatocellular carcinoma

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

87 2.0. METHODOLOGY.

88 2.1 Study Area.

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

91 2.2. Study population

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

95 2.3 Ethical consideration

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

100 2.4 Questionnaire and informed consent

Comment [WU10]: Information about this study setting and why it was chosen for the study is necessary

Comment [WU11]: In your abstract you said they were randomly sample. how was randomization done?

Comment [WU12]: After explanation what happen ?

101 Questionnaire to obtain the demographic characteristics, possible risk factors and
102 other relevant information to the study as well as an informed consent were administered
103 to the participant.

Comment [WU13]: You may merge some headings to enhance logical flow

104 **2.5 Sample collection**

Comment [WU14]: You may merge the two sub-heading, which came first? filling questionnaire of taking of blood sample and why?

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

109 **2.5 Sample processing**

110 **2.5.1 HCV Detection**

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

Comment [WU15]: Equipment and manufacturer should be describe

113 **2.5.2. Detection of HIV**

114 The Abbot Determine HIV-1/2 was used in conjunction with STAT-PAK which
115 are invitro, visually ready, qualitative immunoassays for the detection antibodies to HIV-
116 1 and HIV-2 in human serum, plasma or whole blood.

Comment [WU16]: provide a brief description of equipment use and manufacturer etc.

118 **2.6. Statistical analysis**

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

121 **3.0 RESULT** 122 123

124 **3.1. Response rate**

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

128 The overall seroprevalence of HCV, HIV and HCV/HIV antibodies in tuberculosis
129 confirmed patients is shown in table 1. It shows that out of 500 samples tested for HCV,
130 HIV antibodies, 10(2.0%) are positive for HCV, 21(4.2%) are positive for HIV and
131 3(0.6%) are positive for both HCV and HIV antibodies.

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133 **TABLE 1: OVERALL SEROPREVALENCE OF HCV, HIV AND HCV/HIV**
134 **ANTIBODIES IN TB CONFIRMED PATIENT.**

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INFECTION	NO OF SAMPLES	NO OF POSITIVE (%)
HIV	500	21(4.2)
HCV	500	10(2.0)
HIV/HCV	500	3 (0.6)

149 The demographic relationships in respect to sex are shown in table 2, table 3 and
150 table 4 for HCV, HIV and HCV/HIV co-infection respectively. They revealed that out of
151 302 male subjects that participated, 7(2.32%) positive for HCV (table 2), 14(4.64%)
152 positive for HIV (table 3) and 2 (0.66%) were positive for HCV/HIV antibodies (table
153 4), while out of 198 female, 3(1.52%) positive for HCV(table 2), 7(3.54%) positive for
154 HIV (table 3), 1(0.51%) positive for HCV/HIV antibodies (table 4).

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157 **TABLE 2: SEROPREVALENCE OF HCV IN RELATION TO SEX.**

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SEX	NO POSITIVE (%)	P VALUE
Male	7.0 (2.32)	0.531
Female	3.0 (1.52)	

Comment [WU17]: Edit finding within table, and present a more detail table

TABLE 3: SEROPREVALENCE OF HIV IN RELATION TO SEX

SEX	NO POSITIVE (%)	P VALUE
Male	14.0 (4.64)	0.549
Female	7.0 (3.54)	

Comment [WU18]: Same as above

TABLE 4: SEROPREVALENCE OF HCV/HIV CO-INFECTION IN RELATION TO SEX

SEX	NO POSITIVE (%)	P VALUE
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201			
202	Male	2.0 (0.66)	
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206			0.824
207	Female	1.00 (0.51)	
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210 Age group distributions for HCV, HIV and HCV/HIV antibodies are shown in
 211 table 5, table 6 and table 7 respectively. In age group 18-25, out of 4 (0.8%) subjects that
 212 participated, no subjects were positive for HCV and HIV antibodies as shown in table 5
 213 and table 6 respectively. In age group 26-30, 20 (4.0%) subjects participated, 4 (0.8%)
 214 positive for HCV(table 5), 2(0.4%) positive for HIV (table 6), but no subject had HCV
 215 and HIV together (table 7). 70(14%) subjects are within 36-45 age group, 5(1%) had
 216 HCV (table 5), 10(2%) had HIV(table 6), 2(0.4%) had HCV/HIV antibodies (table 7). In
 217 age group 46-55, 136(27.2%) participated, 1(0.2%), 5(1%), and 1(0.2%) were
 218 seropositive for HCV, HIV, and HCV/HIV antibodies and these were shown in the table
 219 5, table 6 and table 7 respectively. Out of 150(30%) subjects within 56-65 age group,
 220 3(0.6%) were seropositive for HIV (table 6), no subject was positive for HCV (table 5)
 221 and HCV/HIV antibodies (table 7). In age 66-75, 70(14%) participated, 1(0.2%) was
 222 positive for HIV (table 6), no seropositivity in HCV and HIV/HCV as shown in table 5
 223 and table 7 respectively. 50(10%) subjects participated in age group 75- above, no
 224 seropositivity was recorded in both HCV and HIV as shown in table 5and table 6
 225 respectively .

226 **TABLE 5: SEROPREVALENCE OF HCV IN RELATION TO AGE.**

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229	AGE GROUP	NO EXAMINED (%)	NO POSITIVE (%) P VALUE

Comment [WU19]: Is this number examine ?

230 **IN YEARS**

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234	18-25	4 (0.8)	0 (0.0)	
235	26-35	20 (4.0)	4 (0.8)	
236	36-45	70 (14.0)	5 (1.0)	
237	46-55	136 (27.2)	1 (0.2)	0.000
238	56-65	150 (30.0)	0 (0.0)	
239	66-75	70 (14.0)	0 (0.0)	
240	75-above	50 (10.0)	0 (0.0)	
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242	TOTAL	500 (100.0)	10 (2.0)	

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248 **TABLE 6: SEROPREVALENCE OF HIV IN RELATION TO AGE.**

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250 AGE GROUP	NO EXAMINED (%)	NO POSITIVE (%)	P VALUE
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256	18-25	4 (0.8)	0 (0.0)
257	26-35	20 (4.0)	2 (0.4)
258	36-45	70 (14.0)	10 (2.0)
259	46-55	136 (27.2)	5 (1.0)
260	56-65	150 (30.0)	3 (0.6)
261	66-75	70 (14.0)	1 (0.2)
262	75-Above	50 (10.0)	0 (0.0)
263			
264	TOTAL	500 (100.0)	21 (4.2)

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270 **TABLE 7: SEROPREVALENCE OF HCV/HIV CO-INFECTION IN RELATION TO AGE**

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274 AGE GROUP	NO EXAMINED (%)	NO POSITIVE (%)	P VALUE
275 IN YEARS			

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Comment [WU20]: I suggest you narrow your findings to your specific objectives which appears at the end of your introduction.

Comment [WU21]: This P value is not significant

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278				
279	18-25	4 (0.8)	0 (0.0)	
280	26-35	20 (4.0)	0 (0.0)	
281	36-45	70 (14.0)	2 (0.4)	
282	46-55	136 (27.2)	1 (0.2)	0.002
283	56-65	150 (30.0)	0 (0.0)	
284	66-75	70 (14.0)	0 (0.0)	
285	75-above	50 (10.0)	0 (0.0)	
286				
287	TOTAL	500 (100.0)	3 (0.6)	
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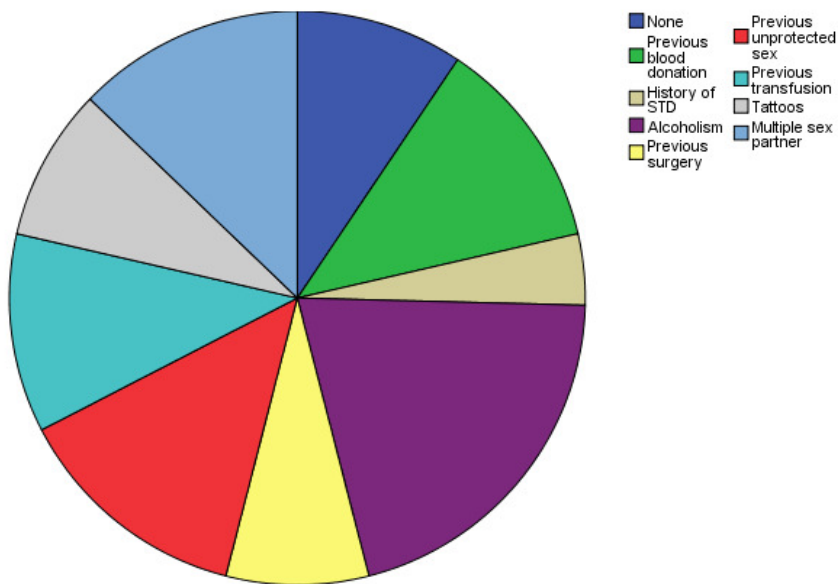
291 The risk factors associated with HCV, HIV and co- infection of HIV/HCV in TB
 292 patient was based on patient self-report. Alcoholism, previous unprotected sex, multiple
 293 sex partner, previous blood donation, Previous transfusion, Tattoos and History of Sexual
 294 Transmitted disease are the risk factors. Out of 31 infected subjects, 14(45.2%) identified
 295 with alcoholism, previous unprotected sex 11(35.5%), Multiple sex partner 10(32.3%),
 296 Previous blood donation 8(25.8%), previous transfusion 7(22.6%), others are Tattoos
 297 7(22.6%) and history of STD 3(9.68%). The risk factors were represented in pie chart
 298 shows in Figure I.

Comment [WU22]: This information should be integrated in your method section

Comment [WU23]: Your Pie chart should integrate percentages of frequency

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PATIENTS AS PREDISPOSING TO HIV AND HCV INFECTIONS



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FIGURE I: PIE CHART OF RISK FACTORS WITH HCV AND HIV

308 **4.0 DISCUSSION, CONCLUSION AND RECOMMENDATION**

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310
311 The HIV and HCV are both global public health problems. Infections with HIV and or
312 HCV may have a major impact among those with TB. HIV is the most important risk
313 factor for the development of TB among person infected with *M. tuberculosis* and both
314 CDC and WHO guidelines recommended offering HIV testing to those person diagnosed
315 with TB disease [2, 10]
316

317 However, the prevalence of HCV infection among persons with TB has been
318 poorly defined and few data are available from most area around the world. One study in
319 US suggested that veterans with HCV infection are at risk for other selected infectious
320 disease including TB [2]. Of 500 (100%) samples collected and tested against HCV and
321 HIV antibodies, HIV antibodies was positive in 21(4.2%) which might be due to the fact

Comment [WU24]: Your study is prevalence of HIV and HCV among pt with TB, from your study out of 500 Tb pt. only 21 had HIV

322 that HIV prevalence in Ekiti State is low and this agreed with previous work of USAIDS
323 [11]. This also agreed with work of Idigbe *et al*, [12] that prevalence of HIV in TB in
324 Nigeria, Lagos to be specific is 5.3%. However, HCV antibodies were positive in
325 10(2.0%) patients which also agreed with previous work of Mwangi [13] that the
326 prevalence in Ekiti State and in Nigeria is low. This might be due to proper screening of
327 donor which is one of the major predisposing factors to increase in incidence of HCV
328 [13]. However, prevalence of HCV among TB has been poorly defined and few data are
329 available around the world. Part of the lack of data on HCV seroprevalence stem from the
330 fact that there are no recommendations for universal screening of TB patient for HCV as
331 there for HIV testing [2]. Although, Halim and Ajayi [14] reported 12.3% seroprevalence
332 of HCV in Nigeria among the donor and the findings from Richard *et al*, [2] reveals that
333 patient with TB may have among the highest prevalence of HCV infection.

Comment [WU25]: Edit for clarity

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

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

343 Age distribution revealed that age group 36-45 had the highest prevalence of
344 HCV, HIV and both HCV/HIV antibodies and this is statically significant (P value 0.000
345 for HCV, 0.000 for HIV and HCV/HIV is 0.002). This might be due to the fact that at this
346 age, subjects are sexually active and are involved in some of the risk factor(s) that
347 predispose them to the infections. This agreed with work of Watanabe *et al*, [15] which
348 revealed 25-45years as the most predispose age group to HIV. The predisposing risk
349 factors to seroprevalence of HCV, HIV and HCV/HIV antibodies in the study population,
350 showed in figure I. Alcoholism is the highest of the factors, follow by previous
351 unprotected sex, multiple sex partner, previous transfusion, tattoos and the least is history
352 of sexual transmitted disease. Although, HCV and HIV are blood borne disease, the route

Comment [WU26]: How significant are these values

353 of transmission are similar, nevertheless, a number of investigations have indicated that
354 acquisition of HCV through sexual contact is uncommon and have suggested that HCV
355 is inefficiently transferred through this mechanism [16, 17] despite these findings, a
356 number of studies had found that high risk sexual behavior or history of STD are
357 associated with an increased risk of HCV infection [16] and so, high risk sexual
358 behaviors and /or a history of STI may be a maker for other risks that have been
359 implicated as mechanism of transmission of HCV. However, Richard *et al*, [2] revealed
360 that most common route of HCV transmission world wide are through hematogeneous
361 transmission, tattoos and nevertheless, hematogeneous transmission may not be too
362 implicated in this study because in Ekiti state, the WHO guidelines of screening of blood
363 donor are followed strictly and this has contributed to the low prevalence of HCV, HIV in
364 this part of Nigeria [11].

365 **CONCLUSION**

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

Comment [WU27]: General editorial will be necessary

374
375 **RECOMMENDATION**

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

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UNDER PEER REVIEW