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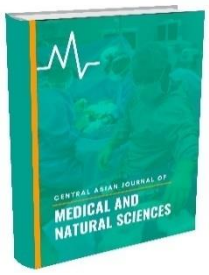

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Prevalence and the Risk Factors Associated with HIV-TB Co-Infection Among Clinic Attendees in Dots and Art Centres in Ibadan, Nigeria

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ABSTRACT: *Tuberculosis (TB) and Human Immunodeficiency Virus (HIV) co-infection form a very serious public health menace in Nigeria. Among patients confirmed to have been infected with either of the disease, co-infection with the other is highly prevalent. However, comprehensive studies focusing on the distributions and correlates of TB/HIV co-infections among Patients attending TB clinics in Ibadan are lacking in the literature. The objective of this study was to determine the prevalence and correlates of TB/HIV co-infection among patients suspected to be TB positive at various health facilities offering TB/HIV Collaboration Service (THCS) in Ibadan. A descriptive cross-sectional study was carried out among 500 TB/ HIV clinic attendees in Ibadan, Nigeria. A simple random sampling method was used to select 8 TB clinics in Ibadan from the list of all clinics offering THCS in Ibadan. An interviewer administered questionnaire was used to elicit information on TB/HIV status, risk factors and knowledge of HIV and TB from all participants who consented to be interviewed. Descriptive statistics, Chi-square test and logistic regression were used for data analysis at 5% level of significant. Mean age of the patients was 33.98±13.15 years. The overall prevalence of TB/HIV co-infection among the participants was found to be (41.6%). Prevalence of TB/HIV co-infection were highest (11.2% and 14.8%) among participants in age group 20-29 years and 30-39 years respectively. More females (25.2%) than males (16.4%) had been infected with TB/HIV co- infection. While the prevalence of TB/HIV co-infection were respectively 2.0%, 6.6% 18.4% and 14.6% among participants with no formal education, Primary education, Secondary education and Tertiary education, the prevalence was 20.6% and*

16.4% among the married and the unmarried respectively. Results of the Chi-square test show that TB/HIV co-infection was found to be associated with History of the use of TB and HIV drugs defaults, Multiple sex partners, Paid sex, Marital status and occupation of participants. Also, Multiple sex partners (OR = 6.0, 95% CI: 2.4-15.0), Extra-vaginal intercourse (OR= 0.3, 95% CI: 0.1- 0.8) and Paid sex (OR= 0.1, 95% CI: 0.5-0.7) were found to be associated with TB/HIV co-infection among the participants. The study revealed that a higher prevalence of co-infection was observed among 10-49 years age group. This implies that the productive age group bears the brunt of TB/HIV co-infection. It was also found that participants with multiple sex partner (OR=6.01) those whose partners are residing with them(OR=1.45) and those with formal education(OR=1.59) are more likely to have TB/HIV co-infection while those with History of anti-TB drug default(OR=0.54), History of anti-retroviral drug default(OR=0.49), those who practice Extra-vaginal intercourse(OR=0.346) and paid sex(OR=0.19) are less likely to be TB/HIV co-infected. TB/HIV control programs that educate people on the prevalence and focus on these subgroups are likely to decrease the joint burden of TB and HIV

Key words: TB/HIV Co-infection, Extra-vaginal intercourse, Antiretroviral Therapy (ART) Multidrug therapy (MDT).

1.0 Introduction

Tuberculosis, an ancient disease, continues to constitute global health problem and remains the second leading cause of death among infectious diseases globally after HIV (Hussain, Akhtar, & Nanan, 2003 & Middelkoop et al, 2011). In 2012, World Health Organization (WHO) reported about 8.6 million new TB cases and 1.3 million mortalities. In 2014, approximately 9.6 million cases of TB were identified (5.4 million among men, 3.2 million among women and 1.0 million among children) and 1.5 million died from the disease. The same year, 480,000 people were reported to have developed multidrug-resistant TB worldwide. Out of 1 million children that were diagnosis with the disease, 140,000 died (WHO, 2009).

Left untreated, each person with active TB disease will infect an average of 10 to 15 people every year (WHO report, 2003). The rate of progression of tuberculosis infection depends on the integrity of the individual's cellular immunity (Brooks et al., 2004).

Human immunodeficiency virus (HIV) infection is caused by a retrovirus that spread through body fluids. The virus attacks the immune system, thereby weakening it and increasing the susceptibility of the individual to opportunistic infections. Tuberculosis is a major opportunistic infection and leading cause of death among people living with HIV/AIDS (PLWHA) (FMOH, 2006).

HIV/AIDS is life threatening and there is an ongoing pandemic ravaging mankind. About 39.5million people are living with HIV/AIDS globally. It is estimated that over 16,000 persons are infected everyday with HIV (Olise, 2004). The increasing global burden of TB is linked to human immunodeficiency virus infection (Corbett et al., 2003).

The co-existence of HIV infection and Tuberculosis has been described as one of the most serious threats to human health, since the Black death and has been described as 'the cursed duet' (Lucas & Gilles, 2003). The two diseases constitute a lethal combination of diseases that individually have significant impact on public health, with each making the situation of the other worse (FMOH, 2006). HIV is the biggest single challenge to TB control efforts. The life expectancy of an HIV infected person with TB is measured in weeks, if treatment is not available (Parks, 2009). The rise in tuberculosis cases among PLWHA poses an increased risk of tuberculosis transmission to the community (Datiko et.al., 2008). The extent to which HIV fuels TB depends on the degree of overlap between the population infected with TB and the population with HIV (FMOH 2006). The TB/HIV epidemic impacts negatively on existing parallel AIDS and TB programmes in several ways. These includes: Increased case load of active TB attributable to HIV.

HIV also poses increased burden of TB services on human and infrastructural resources. HIV led to a 4-fold rise in number of TB cases in southern Africa where up to 75% of TB cases are also HIV-seropositive. With many countries in Africa being poor, resources available are inadequate to control the dual epidemic. (Godfrey-Fausset. and Ayles,2002). Reduced access to health services for TB suspects due to stigma associated with HIV may also affect treatment outcomes. Similarly, TB impacts on HIV control efforts in many ways, of which are: Increased case load of active TB among PLWHA.TB is now the most common co-infection that occur with HIV disease and is a major factor responsible for increased morbidity and mortality rates in HIV infected individual.

The global TB and HIV/AIDS epidemic represent an enormous amount of human suffering, pain and grief. The stigma attached to both diseases has serious psychological and social consequences. Every year, thousands of people die as a result of the lethal combination of TB and HIV. Families are wiped out and this creates a growing population of orphans and vulnerable children who are at heightened risk to the diseases. Life expectancies have been tragically shortened and development stifled as the most productive segments of the populace continue to die from the dual epidemic of TB and HIV. About 53% of TB deaths occur within 15-59 age group in 2004 (WHO, 2008).

A substantial amount of global and national resources is continually being expended on the control of these diseases. About 55million US Dollars was expended on Tuberculosis control in 2009 (Equivalent to 500USD per patient), 13% of the expenses was devoted to HIV-TB control activities (WHO report, 2009). TB leads to loss of about 20-30% of annual household income and 3-7% loss of GDP on national level (TBCTA, 2010).

The information that will be provided from this study will be helpful in ascertaining the extent of overlap of the two deadly diseases as well as identifying the risk factors which can further help in planning effective control program and strengthen the existing TB-HIV Collaborative Activities in Nigeria.

2.0 Materials and Methods

Study Area

The study was conducted in Ibadan the capital of Oyo-State, which is one of the largest cities in Africa and the largest in West Africa. The Local Government Area is Ibadan South- West which covers an area of about 133.500 square meters of land with an estimated population of 291,628.The Local Government Area has 10 political wards with 10 State owned health facilities, 11 Primary Health Centers/Maternity center and 127 private health institutions.

Study Location

A cross section of the primary and secondary Health care facilities in Ibadan serve as centres for Directly observed treatment Short course. Patients were recruited from nine DOTS centers such as Chest Clinic Jericho and Ibadan South-West Local Government Health Care Center, Molete.

Study Population

The population in this cross-sectional study consists of attendees at DOTS and ART centres in Ibadan. The attendees include both first time attendees and those who are for follow-up visits.

Data collection procedure

Data was collected using a 66-item structured, interviewer-administered questionnaire. The questionnaire contains seven sections: first section consists of questions on the socio-demographic characteristic of respondent. Other sections include: Knowledge of TB, Knowledge of HIV, TB risk factors, HIV risk factor information, private medical history, and Diagnostic test results.

The English version of the questionnaire was translated into Yoruba and back translated to English to ensure uniformity. Twenty-eight (10%) of the questionnaire was pre-tested at the state TB lab.

Ethical considerations

Informed consent was obtained from each participant. Ethical approval was granted by the Ethical review committee of Oyo State Ministry of Health to carry out this project.

Data management and statistical analysis

Information on the questionnaires was entered, coded and the data was cleaned prior to analysis. Charts were used to present the distribution of Comprehensive knowledge of HIV and Comprehensive knowledge of TB by disease status of respondents.

Tables were used to present the socio-demographic characteristics of the respondents. Frequency distribution was generated for all categorical variables and measure of location and spread for quantitative variables. Association between co-infection status and qualitative variables was explored using chi-square test. Crowding index created by Phil et al. 2006 was used to analyse the number of people in a household and number of people living in a room. Logistic Regression was used to explore the contribution of the significant variables to HIV-TB co-infection status after adjusting for confounders. Binomial test was used to investigate whether there is a significant difference between the proportion with and without the risk factors among those who have TB only and those with HIV only. All analysis was being carried out at 5% level of significance.

3.0 Results

The following results below were obtained from the study of 500 suspected TB patients attending TB clinic with a mean age and standard deviation (SD) of 33.98 ± 13. 15 years. Table1 below indicates that the majority, 54 (30. 8%) of the participants were within 30- 39 years age. Patients in the age group 20-29 were 130(26%), 87 (17. 4%) of them were between 40- 49 years, 59 (11. 8%) were within 10- 19 years. Age group 50- 59 years had 34 (6. 8%), 20 (4. 0%) of the respondents were within age group 60-69 years, 6 (1. 2%) were within 70- 79 years. Age group 80 years above had the least number of cases 3 (0. 6%). There were 242 (48. 4%) males and 258 (51. 6%) females' respondents. Largest number of the respondents were Yoruba ethnic group 373 (74. 8%), 76 (15.2%) were Igbo while Hausa had the least number of respondents.

The largest part of the respondents 289 (57.8%) were Christian, 190 (38.0%) belonged to the Islamic group and 21(4.2%) were involved in traditional religion. Forty-three, 43 (8.6%) of the 500 respondents had no formal education, 83(16.6%) had primary education, 168 (33.6%) had tertiary education and 205 (41.0%) had secondary education. Married people constituted 267 (53.4%) 159

(31.8%) were single while 51 (10.2%) were cohabiting. Divorced people constituted 12(23.2%). Monogamous family constituted 221 (44.2%) of the total respondents. Only 110 (22.0%) were polygamists

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Table 1: Social-Demographic Characteristics

VARIABLE	FREQUENCIES	PERCENTAGE (%)
AGE (YEARS)		
10 – 19	59	11.8
20 – 29	130	26.0
30 – 39	154	30.8
40 – 49	87	17.4
50 – 59	34	6.8
60 – 69	20	4.0
70 – 79	6	1.2
> 80	10	2.0
TOTAL	**500**	**100.0**
GENDER		
Male	242	48.4
Female	258	51.6
TOTAL	**500**	**100.0**
ETHNIC GROUP		
Yoruba	374	74.8
Igbo	76	15.2
Hausa	50	10.0
TOTAL	**500**	**100.0**
LEVEL OF EDUCATION		
No formal Education	43	8.6
Primary	83	16.6
Secondary	205	41.0
Tertiary	168	33.6
TOTAL	**500**	**100.0**
RELIGION		
Christianity	289	57.8
Islam	190	38.0
Traditional	21	4.2
TOTAL	**500**	**100.0**
MARITAL STATUS		
Single	159	31.8
Married	267	53.4
Cohabiting	51	10.2
Divorced/separated	11	2.2
Widowed (er)	12	2.4
TOTAL	**500**	**100.0**
CURRENT OCCUPATION		
Barber	11	2.2
Civil servant	65	13.0
Driving	22	4.4
Farming	18	3.6
Hair dressing 1	14	2.8

Student	116	23.2
Tailoring	65	13.0
Teaching	33	6.6
Trading	116	23.2
Others	40	8.0
TOTAL	**500**	**100.0**
FAMILY TYPE		
Monogamous	221	44.2
Polygamous	110	22.0
Not applicable (Single)	169	33.8
TOTAL	**500**	**100.0**
NO OF CHILDREN		
0-2	144	43.6
3-5	132	40.0
> 5	54	16.4
TOTAL	**330**	**100.0**

Table 2 shows that 41.6% of the respondents had HIV/TB co-infection out of the 500 TB clinic attendees. The respondents within the 30-39 age group were more/mostly affected by HIV/TB co-infection. Co-infection was highest (25.2%) among female attendees. There was highest prevalence (19.4%) among those who had secondary education. Highest prevalence (32.4%) of co-infection was also found among the Yoruba ethnic group. Co-infection was also found, to be common among the traders while the students had the highest prevalence.

Table 2: Pattern of Prevalence of HIV/TB Co-Infection among the Respondent

VARIABLE AGE Age (years)	Total N (%)	FREQUENCIES OF HIV/TB	PREVALENCE (%) HIV/TB.
10 – 19	59(12.0)	31	31
20 – 29	130(26.4)	55	11.2
30 – 39	154(31.2)	73	14.8
40 – 49	87(17.6)	31	6.3
50 – 59	34(6.9)	11	2.2
60 – 69	20(4.1)	7	1.4
70 – 79	6(1.2)	0	0
> 80	10(2.0)	0	0
TOTAL	**500(100)**	**208**	**41.6**
FAMILY TYPE			
Monogamous	221(44.2)	82	16.4
Polygamous	110(22.0)	39	7.8
Not applicable (Single)	169(33.8)	87	17.4
TOTAL	**500(100)**	**208**	**41.6**
GENDER			
Male	242(48.4)	82	16.4
Female	258(51.6)	126	25.2
TOTAL	**500(100)**	**208**	**41.6**
LEVEL OF EDUCATION			
No formal education	43(8.6)	10	2.0

Primary	83(16.6)	33	6.6
Secondary	205(41.1)	92	18.4
Tertiary	168(33.1)	73	14.6
TOTAL	**500(100)**	**208**	**41.6**
ETHNICITY			
Yoruba	374(74.8)	162	32.4
Igbo	76(15.2)	34	6.8
Hausa	50(10.0)	12	2.4
TOTAL	**500(100)**	**208**	**41.6**
RELIGION			
Christianity	289(57.8)	122	24.4
Islam	190(38.0)	78	15.6
Traditional	21(4.2)	8	1.6
TOTAL	**500(100)**	**208**	**41.6**
MARITAL STATUS			
Cohabiting	51(10.2)	13	2.6
Single	159(31.8)	82	16.4
Married	267(53.4)	103	20.6
Divorced/Separated	11(2.2)	9	1.8
Widowed (er)	12(2.4)	1	0.2
TOTAL	**500(100)**	**208**	**41.6**
CURRENT OCCUPATION			
Barber	11(2.2)	0	0.0
Civil servant	65(13.0)	33	6.6
Driving	22(4.4)	4	0.8
Farming	18(3.6)	0	0.0
Hair dressing	14(2.5)	6	1.2
Student	116(23.2)	53	10.6
Tailoring	65(13.0)	31	6.2
Teaching	33(6.6)	20	4.0
Trading	116(23.2)	39	7.8
Other	40(8.0)	22	4.4
TOTAL	**500(100)**	**208**	**41.6**
NO OF CHILDREN			
0-2	144(43.6)	46	13.9
3-5	132(40.0)	49	14.8
> 5	54(16.4)	23	7.0
TOTAL	**330(100)**	**118**	38.7

Table 3 shows that majority (86.2%) of the participants have heard of TB. The proportion that reported prolonged cough as symptoms of TB is 67.6%. It is very significant that 7.6^ of the participants knew that TB is not transmitted through sharing utensils. However, about 53% of the participants knew that mosquito does not transmit (not a carrier of TB causative organism) TB, 42.6% knew that TB cannot be contracted through sexual intercourse and about 93.6% confirmed that it can be contracted transmitted through coughing and sneezing. Only few of the participants knew that TB can be cured.

Table 3: Distribution of Correct Responses to Knowledge Questions on TB

VARIABLE (ITEM)	FREQUENCIES OF CORRECT RESPONSE	PROPORTION
Have heard of TB	431	86.2
knowledge of symptoms of TB		
Prolonged cough	338	67.6
Fever	99	19.8
Blood in sputum	290	58.0
Loss of appetite	275	55.0
Night Sweating	255	51.0
Pain in the chest	288	57.6
Tiredress/Fatigue	189	37.8
Paleness	103	20.6
Other /Weight loss	245	49.0
Knowledge of transmission of TB		
Through sharing utensils	38	7.6
Through touching TB patient	191	38.2
Through food	59	11.8
Through sexual intercourse	213	42.6
Through mosquito bite	265	53.0
Coughing /sneezing	468	93.6
Can TB be cured	48	9.6

Table 4 shows that 96.2% of the participants have heard about AIDs. Also, 82.2% of the participants knew that AIDs can spread through sexual intercourse and 66.6% through sharing unsterilized sharp object, 67.0% knew that it can spread from an infected mother to child. About 20.2% said that it can spread through sharing of cups, spoons and plates.

Only 7.8% said that it can spread through mosquito. Majority of the participants knew the means of reducing HIV transmission. About 99.8% of the respondents knew that abstinence and faithfulness to a partner, 56.6% knew condom use and 58.4% knew avoiding sharing of unsterilized sharp object as means of reducing the chances of contracting AIDs (HIV).

TABLE 4: Distribution of Correct Responses to Knowledge Questions on HIV.

VARIABLE (ITEM)	FREQUENCY OF CORRECT RESPONSE	PROPORTION
Have heard of Aids	481	96.2
Knowledge on transmission of AIDS		
By unprotected sexual intercourse	411	82.2
Through mosquito bites	39	7.8
By sharing, cups, spons & plate	101	20.2
By sharing unsterilized sharp object	333	66.6
By transfusion of unscreened blood	335	67.0
From infected mother to child	90	18.0

Knowledge on HIV prevention		
Faithful to one uninfected partner	499	99.8
By using condom during sex	283	56.6
Avoid sharing of sharp object	292	58.4

Figure 2 below shows that 336(73.2%) of the total respondents have poor knowledge of HIV and 438(87.6%) of TB. About 57(11.4%) and 119(23.8%) had moderate knowledge of TB and HIV respectively.

Table 5 shows that the socio-demographic variable: Age, Gender, Ethnicity, marital status and occupation have significant relationship with HIV/TB co-infection (Because they are statistically significant ($P < 0.05$).

TABLE 5: Bivariate analysis of relationship between co-infection and socio-demographic characteristics

VARIABLE AGE Age (years)	Proportion of co-infection (%)	Chi-square	df	P-VALUE
10 – 19	52.5			
20 – 29	42.3			
30 – 39	47.4			
40 – 49	35.6			
50 – 59	32.4			
60 – 69	35.0			
70 – 79	0.0			
> 80	0.0	14.184	7	0.048*
Gender				
Male	33.9			
Female	48.8	11.492	1	0.001*
Level of Education				
No formal education	23.3			
Primary	39.8			
Secondary	44.9			
Tertiary	43.5	7.210	3	0.065
Ethnicity				
Yoruba	43.3			
Igbo	44.7			
Hausa	24.0	7.136	2	0.028*
Religion				
Christianity	42.2			
Islam	41.1			
Traditional	38.1	0.175	2	0.916
Marital Status				
Cohabiting	25.5			
Single	51.6			

Married	38.6			
Divorced/Separated	81.8			
Widowed (er)	8.3	25.751	4	0.000*
Current occupation				
Barber	0.0			
Civil servant	50.0			
Driving	18.2			
Farming	0.0			
Hair dressing	42.9			
Others	55.0			
Student	45.7			
Tailoring	47.7			
Teaching	60.6			
Trading	33.6	41.590	10	0.000*
No of Children				
0-2	31.9			
3-5	37.1			
> 5	42.6	2.117	2	0.347

Table 6 below shows that smoking, History of anti-TB drug and history of anti-TB drug default are statistically associated with HIV/TB co-infection (P<0.05).

TABLE 6: Bivariate analysis of relationship between risk factor of TB and HIV/TB co-infection

Variable	Prevalence of co-infection (%)	Chi-square	Df	P-value
Crowding				
Yes	43.2			
No	41.5	0.107	1	0.743
Persistent cough in the family				
Yes				
No	35.2			
	41.2	0.908	1	0.341
History of TB				
Yes	36.4			
No	44.0	2.917	1	0.088
Current smoking				
Yes	21.5			
No	44.0	12.053	1	0.001*
Drinking Alcohol				
Yes	36.8			
No	40.4	0.516	1	0.473
History of anti-TB drug				
Yes				
No	36.1			
	49.2	7.524	1	0.006*
History of drug default				
Yes	33.9			
No	49.4	12.414	1	0.000*

Table 7 below shows that multiple sex partner, sexual activity in last 1 year, partner residency, sex partner type, paid sex, History of anti-retroviral and History of Art default are also statistically associated with HIV/TB co-infection P < 0.05).

TABLE 7: Bivariate analysis of relationship between risk factor of HIV and HIV/TB co-infection.

Variable	Prevalence of co-infection (%)	Chi-square	df	P-value
Multiple sex partners				
Yes	52.0			
No	32.8	12.181	1	0.000*
Sexual activity in last 1 year				
Yes	36.8			
No	56.7	14.754	1	0.000*
Partner residency				
Together (Yes)	35.3			
Not together (No)	51.2	9.472	1	0.002*
Sex partner type				
Husband/wife	31.7			
Live in partner	52.2			
Casual	50.6	12.720	2	0.002*
Condom use				
Yes	46.7			
No	44.1	0.027	1	0.869
Extravaginal intercourse				
Yes	36.3			
No	43.0	1.496	1	0.221
Paid sex				
Yes	78.0			
No	32.6	32.801	1	0.000*
STD				
Yes	43.4			
No	37.7	0.640	1	0.424
Use of personal barbing clipper				
Regularly				
Occasionally	35.2			
Not applicable	36.4			0.412
	41.7	1.771	2	
Sleeping away from spouse when travel				
Yes	37.4			
No	38.9	0.086	1	0.770
Chronic morbidities				
Yes	34.3			
No	43.5	1.090	1	0.296
History of anti-retroviral drug				
Yes	54.0			
No	35.7	15.120	1	0.000*

History of drug default				
Yes	52.2			
No	36.7	10.643	1	0.001*

Table 8 below shows that logistic regression of multiple sex partner against HIV/TB is statistically significant (OR = 6.008, 95% CI for OR: 2.402 – 15.023). The respondents that have multiple sex partner are about six times more likely to have HIV/TB co-infection than those who do not. Also, Extravaginal intercourse was found to be statistically significant (OR = 0.346, 95% U for OR: 0.141 – 0.850). Those that practice extravaginal intercourse are about 0.346 times more likely to have HIV/TB co-infection those that do not involve in extravaginal sex. Participants who engaged in paid sex was found to be statistically significant (OR= 0. 199, 95%cl for OR: 0. 500- 0. 794). Those who engaged in paid sex had about 0.199 times risk of having HIV/ TB co- infection than those who do not. The higher risk of co-infection was among those who had low level of education (OR= 1.587, 95%cl for OR: 1. 020- 2. 468).

TABLE 8: Multivariate analysis of factor associated with HIV/ co-infection

Variable	Odds ratio	P-value	95% confidence Infection
Currently Smoking			
Yes			
No	2.422	0.185	0.655 – 8.953
History of anti-TB drug			
Yes			
No	6.097	0.264	0.256 – 145.309
History of anti-TB drug default			
Yes			
No	0.542	0.725	0.81 – 16.533
Multiple Sex Partner			
(Multiple) Yes			
(Single) No	6.008	0.000	2.402 – 15.023*
Sexual activity in last one year			
Yes			
No	0.374	0.83	0.123 – 1.139
Partner residency			
Together (Yes)			
Not together (N)	1.448	0.559	0.419 – 5.000
Sex partner type			
Husband/wife			
Casual	0.774	0.535	0.344 – 1.741
Extravaginal intercourse			
Yes			
No	0.346	0.021	0.141 – 0.850*
Paid sex			
Yes			
No	0.199	0.022	0.50 – 0.794*
History of anti-retroviral			
Yes			
No	0.370	0.460	0.026 – 5.163

History of drug default			
Yes			
No	0.494	0.597	0.036 – 6.752
Level of Education			
Yes			
No	1.587	0.041	1.020 – 2.468*

4.0 Discussion and Conclusion

This study found that about one-third of HIV and TB clinic attendees have HIV-TB co-infection. The study also revealed that a higher prevalence of co-infection was observed among 10-49 years age group. This implies that the productive age group bears the brunt of the syndemic of HIV and TB and that HIV-TB co-infection. It was also found that the prevalence of HIV-TB co-infection was slightly higher among HIV clinic attendees than TB clinic attendees.

The studies also found that majority of the clinic attendees have poor knowledge of HIV and TB. The low knowledge of these diseases (HIV and TB) may lead to an increase in TB co-infection among the HIV positive patients because poor knowledge of means of transmission of a disease may be a correlate of poor attitude towards infection prevention. This may be pointing to the need for an improvement in patient counselling and education in Tb and HIV clinics.

In this study, condom use, Extraviginal intercourse, use of personal barbing clipper, chronic morbidity and sleeping away from spouse when travel were all not significant risk factors of HIV-TB co-infection among the clinic attendees. The study however identified multiple sex partners, sexual activity in last 1 year, sex partner type, paid sex, history of anti-retroviral drug, history of drug default, current smoking and current occupation as significant risk factors of HIV-TB co-infection among the clinic attendees. Existing Parallel TB and HIV control programs that focus on the sub-groups of patients that have these risk factors are more likely to succeed in their control efforts.

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