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PREVALENCE OF ACTIVE PULMONARY TUBERCULOSIS AMONG HIV POSITIVE PATIENTS ATTENDING ADULT HIV CLINIC IN A TEACHING HOSPITAL IN IMO STATE, SOUTH EAST, NIGERIA: A 6 YEAR REVIEW (2006-2012)

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Pulmonary tuberculosis, HIV/AIDS, co-infection, and prevalence.

Abstract

Background: Worldwide, the HIV/AIDS pandemic has been accompanied by a severe epidemic of tuberculosis. HIV is the most potent risk factor for the progression of TB infection to active disease.

Aim: The aim of this study is to determine the prevalence of HIV/PTB Co-infection among HIV Sero-positive patients attending HIV clinics in Imo State University Teaching Hospital Orlu, Imo State.

Methods: This is a retrospective review of case files of HIV/AIDS patients attending HIV Clinic at Imo State University Teaching Hospital Orlu, Imo State, Nigeria from 2006-2012.

Results: A total of 3200 HIV/AIDS Patients had complete records and were reviewed, among which 204 (6.4%) were co-infected with PTB (95% CI, 6.1-7.7%). The age group with the highest prevalence and burden of co-infection was the 31-40 years bracket, 89 (8.8%) and 43.6% respectively. Co-infection rate was found to be statistically higher among males, 8.2%, (χ^2 = 8.77, p=0.003), ever married patients, 7.2% (χ^2=5.879, p=0.015), those with no tertiary education, 8.4% (χ^2=47.020,P=0.000), Civil servants, 15.2% (χ^2 =28.774, p=0.000), those with CD4 count Less than or equal to 200 cell/µl, 7.4%, (χ^2=17.847, p=0.000) and those with advanced stages of HIV diseases, 13.3%, (χ^2=126.908, p=0.000), when compared with their counterparts. The factor with the highest influence among the significant ones was the stage of HIV diseases at diagnosis (OR=5.12, 95C1; 3.76-6.97) while the factor with the least influence was marital status (OR=1.56, 95C1; 1.09-2.01).

Conclusion: The moderately high prevalence of PTB found among HIV positive patients is of grave public Health concern so there is need to develop strategies to reduce co-infection rate among HIV Seropositive patients.

Introduction

Human Immune deficiency Virus (HIV) is a retro virus identified as the etiologic agent for acquired immune deficiency syndrome (AIDS), while tuberculosis (TB) is an air borne infection caused by the tubercle bacillus mycobacterium tuberculosis (MTB)[1,2]. TB is a global health priority being a killer disease that manifest in its pulmonary form in up to 70% of cases or as extra pulmonary affecting all parts of the body[3].

Africa is facing the worst tuberculosis epidemic since the advent of the antibiotics era. Driven by a generalized human immune deficiency virus (HIV) epidemic and compounded by weak health care systems, inadequate diagnostic laboratories and conditions that promote transmission of infectious agents, the devastating situation has

become exacerbated by the emergence of drug-resistant strains of mycobacterium tuberculosis[4,5]. HIV and TB are two leading causes of death and continue to be serious problems in developing countries[6]. Worldwide, the HIV/AIDS epidemic has been accompanied by a severe epidemic of tuberculosis.[7] Available data suggests that this increase in TB infection rate is mainly as a result of the burden of HIV infection primarily because HIV induces immune suppression. HIV is the most patient risk factor for the progression of TB infection to active disease. Individuals infected with tuberculosis alone have an approximately 10% life time risk of developing active TB compared to 10% annual risk among HIV-infected patients with a life time risk of developing TB which approaches 50% or more among them[8,9].

A 2011 estimate indicates that 23.5 million people living with HIV resided in Sub Sahara Africa, which represents 69% of the global HIV burden. Also in 2011, 8.7 million people became ill with tuberculosis of which 1.4million died. There were about 1.1 million new cases of HIV-positive new TB cases with 79% of them living in Africa and globally about 430,000 people died in the same year of HIV associated TB[10,11]. It is estimated that almost 33% of all people living with HIV are co-infected with both TB and HIV, (between 12 and 15 million people).[12] In parts of Sub Sahara Africa, up to 70% of TB Patients are co-infected with HIV. It is estimated that up to 33% of all AIDS deaths Worldwide can be directly attributed to TB. In Sub-Sahara Africa this increases to 50%. Tuberculosis and HIV together are responsible for the deaths of over 4 million people annually[13,14]. When HIV was emerging in the early 1990s in Nigeria, 2% of TB Patients were HIV infected but the co-infection rate rose to 21%-29% [8,15,16].

There have been several studies on the prevalence of HIV in TB Patients in different parts of Nigeria, with prevalence of 6.1% in Jos[17], 12.7% in Ife[18], 19% in Maiduguri[19], 28.1% in Ibadan[20], 41.2% in Benue State[21], 19.8% and 7.5% in Benin city [22, 23], 35.1% in Benue State [24], 14.9% in Shagamu [25], 10.8% in Irrua[26], and National median is 17.0%.[24] Elsewhere in Africa, higher prevalences of 33.2%, 43.6% and 57.2% were reported in Chad [27], Tanzania [28] and Ethiopia [29] respectively. However, reports on the prevalence of TB in HIV infected patients in Nigeria were few, in Ibadan[30] and Ilorin[31] the prevalence of active TB among HIV/AIDS patients was reported to be 32.8% and 40.0% respectively, in Kano the prevalence was 10.5%[32] while in Port Harcourt it was 16.8%[33]. Also worthy to note is that Pulmonary tuberculosis (PTB) is predominantly responsible for TB transmission in human populations.[35,35] Prevalence and known risk factors for PTB among HIV infected patients vary from one setting to another[36,37,38]. The global prevalence of PTB-HIV is reported to be 0.18%[39], with reports of 9.6% in Jos Nigeria[40] and 19.0% in Durban South Africa.[41] Despite these high prevalences of co-infection and its attendant problems to the global community, only a little is being done to address HIV and TB co-infection. The WHO reports that only 2.4% of all people living with HIV or AIDS are even being tested for TB [42]. This low rate of screening is shocking, given that TB causes a third of global HIV/AIDS death.[42] Political and resource commitments are needed to make necessary diagnostic facilities available. Thus the aim of this study is to determine the rate of co-existence of PTB /HIV among patients attending HIV Clinics in a tertiary Hospital in Imo State and to asses the factors associated with the development of active pulmonary tuberculosis among the patients.

Methods

SETTING: Imo State University Teaching Hospital was established in 2003 and started offering Clinical services in 2004. It is situated in Orlu, the 2nd largest town in Imo State. It is the only Teaching Hospital serving the State that has about 4.2 million people though there is a Federal Medical Centre in Owerri and other cadres of medical facilities scattered around the state[43]. It has a 250 bed space and also provides services for people from neighbouring States of Anambra, Abia, Enugu, and Ebonyi States. The majority of patients are Igbos and most of them were farmers, traders, Artisan, or Civil servants. Three days in a week, the hospital operates a specialist Clinic for HIV/ AIDS patients which are located at the HIV Clinic of the hospital. Similarly, a chest clinic has been established within the same complex and it provides free anti tuberculosis treatment to all TB Patients. The study population comprised of all HIV/AIDS Patients attending the HIV Clinic from January 2006 to September 2012.

STUDY DESIGN: This study was a retrospective review of patient case files who attended HIV Clinic in the hospital from January 2006 to September 2012.
DATA COLLECTION: We reviewed medical records of all the patients that attended HIV Clinic within the stipulated period using a profoma. A total of 3200 patients' records were retrieved. Ethical clearance was obtained from the Ethics committee of Imo State University Teaching Hospital, Orlu, Imo State. At the study centre HIV

infection is diagnosed using a combination of ELISA(Enzyme linked Immunoabsorbant Assay) test for HIV-1 and HIV -2 (Rapid test kits with serial algorithm) and the Western blot test (Determine, Unigold and Stat pak). A positive result on the ELIZA test is confirmed using the Western blot test. HIV Seropositive Patients who attended the Clinic at least once and had received a diagnosis of pulmonary TB during the initial evaluation or on subsequent visits were included in this study. A diagnosis of PTB Co-infection was made on the basis of the Ziehl-Neelsen staining technique of Sputum, imaging study, and TB Culture studies or a combination of these. Data regarding TB/HIV Co-infection were extracted from case records. A Standardized form was used to collect information about socio demographic characteristics of Patients, identification of all PTB Cases diagnosed by Ziehl- Neelsen staining, TB Culture studies and imaging studies. In addition, base-line CD4 count and WHO clinically stage at presentation were recorded.

DATA ANALYSIS: The data were cleared, validated and analysed using EPI info version 7.1 software. Quantitative variables were summarized using mean and standard deviation as appropriate. Categorical variables were tabulated using frequencies and percentages. For bivariate analysis, the Chi-square test was used for testing the significance of association between categorical variables, 95% Confidence interval estimation. The calculations of the crude odds ratios (OR) and their Confidence intervals were used to assess the level of influence of the significant factors. A p- value of less than 0.05 was considered as statistically significant.

Results

Three thousand two hundred folders of HIV positive clients who attended clinics in the hospital within the 6 year review period were retrieved and analysed for HIV/TB co-infection. Patients' age ranged from 18 to 72 years with a mean age of 37$\pm$ 0.4 years. The mean age of patients with co-infection and those with no co-infection were, 36.7 $\pm$ 2.7 and 37.1 $\pm$ 0.2 years respectively. About a third of the HIV positive patients were within the age group of 18-40 years of age. There were more females 2145 (67.1%) than males, 1055 (32.9%), with female to male ratio of 2:1. Most of the patients were ever married, 1980(61.9%), had no tertiary education 2187, (68.3%), and by occupation were mainly artisans/traders 1804(56.4%) and unemployed, 1015(31.7%). All the patients reviewed were Igbos with a higher proportion, 1892(59.1%) residing in rural areas of the state. The number of new cases of HIV diagnosed each year increased progressively from 166(5.2%) in 2006 to 866(27.1%) in 2012. In majority, 2442(76.3%) of them, CD4 count level was less than or equal to 200 cells/ml and also most of them presented at WHO stage I and II, 2132, (66.6%) of the disease (Table 1).

The burden and distribution of HIV-TB co-infection irrespective of the prevalence level showed that by age the greatest burden of co-infection was among those 31-40 years of age 89(43.6%), followed by those 18-30 years of age, 52(25.5%) while the least was among those greater than 50 years of age, 23(12.3%). The burden of the co-infection was more on females, 117(57.4%) than males, 87(42.6%) and on ever married individuals, 143(70.1%) than the never married individuals, 61(29.9%) attending HIV clinic in the hospital. Also those who had no tertiary education, 184(90.2%), were Artisan/traders, 101(49.5%), and who live in the rural areas, 144(70.6%) attending the HIV clinic in the hospital had greater burden of the disease than their counterparts. The burden of the disease increased progressively from 16(7.8%) in 2006 which had the least burden to 54(26.4%) in 2012 which had the highest burden of co-infection among patients attending HIV clinic in the hospital. (Table 2)

Prevalence and pattern of TB/HIV co-infection revealed that of the 3200 HIV positive patients reviewed within the study period, 204 were co-infected with pulmonary tuberculosis given a period prevalence of 6.4% (95% CI; 6.1%-6.7%). In majority of Cases, 193(94.6%), TB/HIV co-infection was diagnosed before the commencement of ART while only 11(5.3%) was diagnosed during ART treatment. About eighty three percent of patients, (169) were sputum positive and presented with the cardinal symptoms of chronic cough, with or without hemoptysis, weight loss and low grade fever. Although the number of patients diagnosed of HIV disease and pulmonary tuberculosis increased in 2006 from 16 and 166 to 54 and 866 in 2012 respectively, the rate of co-infection was highest in 2006, (9.6%) and 2007 (9.4%) with the least rate observed in 2008 (5.5%). The variations were not statistically significant, ($\chi^2_{\text{trend}} = 3.634$, p=0.06). With respect to age of respondents the highest prevalence of pulmonary TB was observed among patients aged 31-40, 89(8.8%), this was followed by those 51 years and above, 23(5.6%) while the least prevalence occurred among those 41-50 years of age, 40(5.0%). This trend was not statistically significant, ($\chi^2_{\text{trend}} = 3.272$, p=0.07). By sex, co-infection rate was higher among the males, 87(8.2%) when compared with co-infection

rate among their female counterparts, 117(5.5%). This difference was statistically significant, (χ^2=8.77, p=0.003). Marital status showed that those who have ever married before (currently married, divorced, separated or widowed) had a higher prevalence of co-infection than their counterparts that had never married before, 143(7.2%) versus 61(5.0%). The difference was statistically significant (χ^2=5.879, p=0.015). Also those who had no form of tertiary education, 184(8.4%) had higher prevalence of co-infection than their counterparts with any form of tertiary education, 20(2.0%). The difference was statistically significant, (χ^2 = 47.020, p=0.000). With respect to occupation of patients, co-infection was higher among civil servants 58(15.2%) followed by Artisans/traders, 101(4.6%) and the least prevalence among was found among the unemployed, 45(4.4%). This trend was statistically significant, (χ^2_{trend} = 28.774, p=0.000). Also worthy to note is that prevalence was higher among those who reside in the rural areas, 144(7.6%) than those who live in the urban areas, 60(4.6%). This difference due to place of residence of patient was statistically significant (χ^2=11.346, p=0.000). Higher prevalence of co-infection was noticed among those whose CD4 count level were 200cells/ml or less, 181(7.4%) and who were at stage III and IV, 142(13.3%) of HIV disease respectively. These differences were statistically significant. (χ^2=17.847, P=0.000 and χ^2=126.908, P=0.000). (Table 3)

The factor with the highest influence on the development PTB/HIV co-infection among the significantly associated factors was clinical stage of HIV disease (OR=5.12, 95% CI; 3.76-6.97), this was followed closely by educational status of respondents, (OR = 4.56, 95%CI; 2.86-7.26) and CD4 count level of respondents, (OR = 2.56, 95%CI; 1.65-3.98) while the factor with the least influence was marital status (OR = 1.56, 95%CI; 1.09-2.01). (Table 4)

Discussion

The mean age of HIV patients reviewed was 37.0 ± 0.4 years and the mean age of patients with co-infection was 36.7 ± 2.7 years while majority, 87.1% were within the reproductive age group. This age pattern is in line with what was found in Kano[32], Jos[17,40], Nasarawa[21], and Ibadan[30]. This is related to the fact that at reproductive age group, most people are sexually active and the transmission of HIV virus and its attendant problems are higher at this age bracket. Also contributing to this is that most patients in HIV burden countries might likely have reduced life span due to problems associated with HIV care in low resource countries bordering on low antiretroviral coverage, late presentation, social stigma, religions/cultural beliefs, poor health systems, ignorance poor nutrition and poverty leaving a large proportion of individuals with the disease at the younger age group.

In this present study, 6.4% of HIV positive patients within the reviewed period had pulmonary tuberculosis. This is much lower than the prevalence of active TB reported among HIV seropositive patients in the Nigerian Cities of Ibadan[30], Ilorin[31], Kano[32] and Port Harcourt[33]. Also higher prevalence figures of HIV in TB patients were reported in many studies within Nigeria[18-24] and elsewhere in Africa[27-29]. It was consistent with prevalence of PTB among HIV patients in Jos[17] which stood at 6.1% but higher than the global prevalence of pulmonary tuberculosis in HIV patients which was reported to be 0.18%[39]. Other prevalences of pulmonary TB in HIV patients reported in Jos, Nigeria[40] and Durban, South Africa[41] were higher than our findings. The differences in prevalence in the other Nigerian studies reported could be due to selection factors; some of the studies were conducted before free antiretroviral drugs were provided in government hospitals while in some others the variations in prevalence may be due to differences in methodology used. It is worthy to note that our study and some of the studies reviewed assessed PTB among HIV positive patients while in most of reviewed works HIV antibodies was assessed in patients with active tuberculosis. The prevalence in the later may be higher in that most of the TB cases are always screened for HIV but only a few proportion of HIV cases are screened for TB. Approximately only 2.4% of HIV clients globally are screened for TB using appropriate laboratory methods[42]. This high prevalence is worrisome in that majority of TB transmission is from PTB cases and Nigeria still remains the country in Africa with the highest TB burden and was placed among the top five of the WHO's high burden TB countries. Unfortunately, Directly Observed Treatment of short course (DOTs) is available to only 75% of the Nigerian population. Of even greater concern is the 20% rate of detection of new TB cases under DOTs which is one of the lowest in Sub-Saharan Africa[44]. Therefore high prevalence of TB among HIV patients has implications for already overburdened health care systems in resource poor setting like ours where TB programmes are often unable to manage the high number of HIV related TB cases and ensure completion of TB therapy.

Factors found to influence TB/HIV co-infection significantly in our study were sex, education status, place of residence, employment status, marital status, CD4 count level and WHO stage of HIV disease of patients.
There was a significantly higher prevalence of HIV/TB co-infection ($p<0.05$), found among males than females even though the burden of the disease was more among the female population. This pattern has been reported in PortHarcourt[33] and Jos[40], but the reverse was the case in a study done in Nasarawa state[21] which revealed that females had a significantly higher co-infection rate than their male counterparts. Several studies have shown that male gender is associated with TB-HIV co-infection[45]. This association might further be explained by the X-chromosome susceptibility gene contributing to excess of males with TB in Some African populations as suggested by Bellamy *et al*[47]. Also to note is the high burden of co-infection in women which is likely connected to high prevalence and burden of HIV in women which in turn predisposes them to TB as the former is known to activate dormant TB. Women also have a higher susceptibility to HIV infection and are usually exposed to sexual activities earlier than men mainly due to economic reasons[21].

The association of lower CD4 cell counts and late clinical stages (III and IV) of HIV disease with PTB-HIV co-infection observed in our study is as expected as this has been consistently reported several in studies[22,23,30]. Although in most medical literature, there is no clear cut off for CD4 count above which the risk for TB development is diminished but it is well recognized that the risk of opportunistic infections, including TB in persons with HIV increases markedly when CD4 cell count drops below 200 cells/mm^3 [3 49-51]. Depletion of CD_{4+}T cells seen in advanced HIV disease impairs host response to mycobacteria tuberculosis, particularly granuloma formation hence facilitating progression of recent infection as well as reactivation of latent TB to active disease.[52] Co-infection and burden of the disease was found to be higher among those who were less educated, live in the rural areas, ever married or had any employment irrespective of their income status. There was wide variation in the influence of these factors in several reviewed studies with some having significant influence while the others do not[30, 32, 40]. This is likely connected to the fact that HIV and tuberculosis are diseases common among those with low socio economic status who cannot afford good nutrition, healthcare, and are vulnerable to all forms of sexual abuse, and poor living conditions including poor housing and overcrowding, which are known risk factors for developing both diseases.
The higher prevalence (8.8%) and burden (43.6%) of PTB seen among patients aged 31-40 years is consistent with findings in studies from Nasarawa state[21], Jos[17,40] and also within the bimodal figures observed in Ibadan[30] but differ slightly with peak of 41-50 years found in Kano Nigeria[32]. This is expected in that this peak falls within the reproductive age group where sexual activity is still high and also some of the patients due to proper management of the disease live longer and survive into this age bracket.

Conclusion

This is a hospital based study and so, there are some limitations; the hospital receives severe complicated cases and the diagnostic difficulties are therefore greater. This prevalence observed may not accurately reflect that of the region due to iceberg phenomenon. Also a known drawback of retrospective studies of case records is that the number of variables available for analysis is limited. Despite these drawbacks the prevalence of PTB/HIV co-existence found is still high when compared to the global prevalence of 0.18%, so there is need to strengthen existing facilities especially in early case finding using appropriate technology and personnel, which is lacking in our environment and also to create the necessary awareness so that communities will be involved in TB active case finding and early reporting to appropriate authorities. A prospective study is also recommended to explore other factors that may be associated with TB/HIV co-infection not found in this study.

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Table 1: ***Socio demographic characteristics of patients attending ART clinic at IMSUTH, Orlu (n=3200)***

Socio demographic characteristic	Frequency	Percentage
Age group (yrs) n=3200		
18< 30	966	30.2
31-40	1014	31.7
41-50	807	25.2
> 50	413	12.9
Total	3,200	100.0
Sex n=3200		
Male	1055	32.9
Female	2145	67.1
Total	3200	100.0
Marital status (n=3200)		
Ever married	1980	61.9
Never married	1220	38.1
Total	3200	100.0
Educational status n=3200		
Had tertiary education	1013	31.7
No tertiary education	2187	68.3
Total	3200	100.0
Occupation (n=3200)		
Artisan/traders	1804	56.4
Civil servants	381	11.9
Unemployed	1015	31.7
Total	3200	100.0
Residence n=3200		
Rural	1892	59.1
Urban	1308	40.9
Total	3200	100.0

Table 2: Burden/distribution of HIV/TB co-infection among respondents (N=204)

Characteristic	Frequency(n)	Percentage[n/Nx100]
Age (yrs)		
18-30	52	25.5
31-40	89	43.6
41-50	40	19.6
>51	23	12.3
Total	204	100.0
Sex		
Male	87	42.6
Female	117	57.4
Total	204	100.0
Marital status		
Ever married	143	70.1
Never married	61	29.9
Total	204	100.0
Educational status		
Tertiary Education	30	9.8
No Tertiary Education	184	90.2
Total	204	100.0
Occupation		
Artisans/Traders	101	49.5
Civil servant	58	28.4
Unemployed	45	22.1
Total	204	100.0
Residence		
Rural	144	70.6
Urban	60	29.4
Total	204	100.0
Year		
Jan – Dec 2006	16	7.8
Jan –Dec 2007	18	8.8
Jan – Dec 2008	29	14.3
Jan – Dec 2009	42	20.6
Jan – Dec 2010	45	22.1
Jan 2011 – Sept 2012	54	26.4
Total	204	100.0
CD4 count level		
≤ 200	181	88.7
>201	23	12.3
Total	204	100.0
WHO stage		
I and II	62	30.4
III and IV	142	69.6
Total	204	100.0

Table 3: TB/HIV co-infection among HIV-Seropositive patients attending Imo State university Teaching Hospital Orlu, Nigeria.

Characteristic	Coinfected Freq (%)	Not Coinfected Freq (%)	Total Freq (%)	χ^2	p-value

Age (yrs)					
18-30	52(5.4)	914(94.6)	966(100.0)	3.272	P=0.070
31-40	89(8.8)	925(91.2)	1014(100.0)	df=3	
41-50	40(5.0)	767(95.0)	807(100.0)		
> 51	23(5.6)	390(94.4)	413(100.0)		
Total	204(6.4)	2996(93.6)	3200)100.0)		
Sex					
Male	87(8.2)	968(91.8)	1055(100.0)	8.774	0.003*
Female	117(5.5)	2028(94.5)	2145(100.0)	df=1	
Total	204(6.4)	2996(93.6)	3200(100.0)		
Marital status (n=3200)					
Ever married	143(7.2)	1837(92.8)	1980(100.0)	5.879	0.015*
Never married	61(5.0)	1159(95.5)	1220(100.0)	df=1	
Total	204(6.4)	2996(93.6)	3200(100.0)		
Educational status n=3200					
Had tertiary education	20(2.0)	993(98.0)	1013(100.0)	47.020	0.000*
No tertiary education	84(8.4)	2003(91.6)	2187(100.0)	df=1	
Total	206(6.4)	2996(93.6)	3200(100.0)		
Occupation (n=3200)					
Artisan /traders	101(5.6)	1703(95.4)	1804(100.0)	20.970	0.000*
Civil servants	58(15.2)	323(84.8)	1381(100.0)	df=2	
Unemployed	45(4.4)	970(95.6)	1015(100.0)		
Total	204(6.4)	2996(93.6)	3200(100.0)		
Residence n=3200					
Rural	144(7.6)	1748(92.4)	1892(100.0)	11.346	0.000*
Urban	60(4.6)	1248(95.4)	1308(100.0)	df=1	
Total	204(6.4)	2966(93.6)	3200(100.0)		
CD4 count level					
≤ 200	181(7.4)	2261(92.6)	2442(100.0)	17.847	0.000*
> 201	23(3.0)	735(97.0)	758(100.0)	df =1	
Total	204(6.4)	2996(93.6)	3200(100.0)		
WHO stage					
I and II	62(2.9)	2070(97.1)	2132(100.0)	126.908	0.000*
III and IV	142(13.3)	926(86.7)	1068(100.0)	d=1	
Total	204(6.4)	2996(93.6)	3200(100.0)		
Years reviewed					
Jan – Dec 2006	16(9.6)	150(90.4)	166(100.0)	3.634	0.057
Jan –Dec 2007	18(9.4)	173(90.6)	191(100.0)	df =5	
Jan – Dec 2008	29(5.5)	495(94.5)	524(100.0)		
Jan – Dec 2009	42(6.0)	661(94.0)	703(100.0)		
Jan – Dec 2010	45(6.0)	705(94.0)	750(100.0)		
Jan 2011 – Sept 2012	54(6.2)	812(93.8)	866(100.0)		
Total	204(6.4)	2996(93.6)	3200(100.0)		

*= Significant

Table 4: Comparison of the level of influence of significantly associated factors in co-infection using odds Ratio (ORs).

Variable	**Freq. (%)**	**OR (Estimate)**	**95% (C.I)**

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WHO Stage			
I and II	62(2.9)	5.12	3.76-6.97
III and IV	142(13.3)		
Educational Status			
Had Tertiary Education	20(2.0)	4.56	2.86-7.28
No Tertiary Education	184(8.4)		
CD4 count level			
≤ 200	187(7.4)	2.56	165-3.98
≥ 201	23(3.0)		
Residence			
Rural	144(7.6)	1.71	1.26-2.34
Urban	60(4.6)		
Occupational status			
Employed	159(7.8)	1.69	1.21-2.38
Unemployed	45(4.4)		
Sex			
Male	87(8.2)	1.56	1.17-2.10
Female	117(5.5)		
Marital status			
Ever married	143(7.2)	1.50	1.09-2.01
Never married	61(5.0)		