

“The prevalence of HIV infection among TB patients engaged in various occupations in North Central Nigeria”

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Abstract

Background

TB is one of the top 10 causes of death in the world. On the other hand, HIV/AIDS remain one of the world's most significant public health challenge particularly in low- and middle-income countries. Africa accounts for about 70% of the global burden of Co-infection with TB and HIV with a vast number of persons so infected resident in sub-Saharan African countries. The study aimed at determining the prevalence of TB/HIV Co-infection among pulmonary TB patients in North Central Nigeria.

Methods

A total of 106 participants between the ages of 18- and 75-years attending clinics in some facilities in North Central Nigeria were enrolled in the study. Six samples were rejected because they did not meet the acceptance criteria (inadequate sample). Sputum samples were transported in cold chain to Zankli laboratory in Bingham University, Karu where the samples were decontaminated and concentrated using Petroff method. Each specimen was inoculated into two Lowenstein Jensen slants prepared according to the SOP. The concentrate remaining after culture were spread (2cm/3cm smear size) on the labeled slides. The dried smears were stained following Ziehl-Neelsen staining using standard protocol.^{13,14}

Results

Sixty four percent of the participants were males while 34% were females. Twenty five percent of the females were HIV positive compared to 23.4% of males. AFB positivity rate was 66% while culture positivity rate was 57%. TB/HIV co-infection was higher in males (15.6%) compared to females (11%). TB/HIV Co-infection were highest among two age brackets, 26-35 yrs. (20%) and 46-55 yrs. (20%). The prevalence of TB/HIV Coinfection in the region was 14%. The occupation most affected by HIV and TB/HIV Co-infection was the apprentice/unemployed.

Conclusion

Priority should be given to sexually active age group in routine HIV and TB screening and apprentice/unemployed should be targeted for sensitization and awareness creation of these two diseases in the zone.

Keywords

HIV, Tuberculosis, Co-infection, North Central Nigeria

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I. Background

Tuberculosis (TB) and HIV/AIDS are two worlds public health concerns.¹TB is one of the top 10 causes of death in the world. On the other hand, HIV/AIDS remain one of the world's most significant public health challenge particularly in low- and middle-income countries. In 2016 40% of HIV deaths were due to TB.²*Mycobacterium tuberculosis* and HIV act in synergy, accelerating the decline of immunological functions and leading to subsequent death of patients if untreated.³Globally, the prevalence of TB/HIV shows marked variation from one region to another.⁴Africa accounts for about 70% of the global burden of Co-infection with TB and HIV with a vast number of persons so infected resident in sub-Saharan African countries.⁵

The high rates of HIV/AIDS have caused a sharp rise in the prevalence of tuberculosis, for example in Kenya, the number of new TB cases is increasing at the alarming rate of 12% each year.⁶ In Nigeria, Ethiopia, and South Africa the rate is increasing at 7% annually. Globally, the rate of new TB infection is about 9% but is as high as 31% in regions and countries with high rate of HIV infection. While the prevalence of HIV infection among TB patients also varies from country to country, the highest rates have been reported in areas where HIV

prevalence is high in the general population.^{6,7}The prevalence of HIV and TB Co-infection has been reported to be linked with poverty and poornutrition.⁸

In 2016, most of the gaps in detection of HIV-positive TB cases and provision of Antiretroviral Therapy (ART) were accounted for by the African region. Same year 476,774 cases of TB among people living with HIV were notified which represents 13% of TB patients with an HIV test results.⁹ WHO have previously recommended that everyone living with HIV should be screened for TB symptoms using a simple algorithm at each clinical visit.¹⁰ According to provisional data from 62 countries in 2012, more than 3.5 million people attending HIV care service were screened for TB.¹⁰

Isoniazid (INH) Preventive therapy is given to persons without symptoms of TB to prevent TB disease and the therapy is given for at least 6 months. More than 40 countries provided INH preventive to over half a million people living with HIV in 2012.¹⁰ Prompt initiation of HIV patients on ART regardless of CD4count reduces the illness and death associated with HIV.¹⁰ Studies have also shown that ART is strongly associated with reduction in the incidence of TB. A study in Malawi revealed that ART brought about 65% reduction in the risk of TB.¹⁰ In recent time WHO have recommended TB Preventive Treatment (TPT) for PLHIV, household contacts of bacteriologically confirmed pulmonary TB cases and clinical risk groups.¹¹

Although studies on prevalence of HIV among patients with TB exists in Nigeria, a few have focused on persons living in North Central region. Limited knowledge about the prevalence of HIV infection among TB patients compromises the planning and resource allocation to prevention and control activities.¹² More so, with the strategic location of North Central in the country, where we have the Nigeria capital city, the study will also give an insight into the TB/HIV situation in the region. It is against this backdrop that the study aimed at determining the prevalence and associated risk factors of HIV infection among patients with pulmonary tuberculosis engaged in various occupations in North Central Nigeria.

II. Methods

Study population

Participants between the ages of 18- and 75-years attending clinics in some facilities in North Central Nigeria were enrolled in this study. These participants comprised of newly diagnosed TB cases. Individuals under 18 years were excluded from the study. A total of 106 participants were enrolled in the study but 6 samples were rejected because they did not meet the acceptance criteria (inadequate sample).

Sample collection and Processing

Sputum samples (2 – 3 ml) were collected from newly diagnosed pulmonary TB patients. These samples were transported in cold chain to Zankli laboratory in Bingham University, Karu where sputum samples were decontaminated and concentrated using Petroff method. Each specimen was inoculated into two Lowenstein Jensen slants prepared according to the SOP. The set up was incubated at 37°C and inspected for characteristic growth weekly. The concentrate remaining after culture was spread (2cm/3cm smear size) on the labeled slides. The dried smears were stained following Ziehl-Neelsen staining using standard protocol.^{13,14}

Ethical Approval

This study was approved by Federal Ministry of Health, Abuja. Informed consent was obtained from all participants.

III. Results

Sixty four percent of the participants were males while 34% were females. Twenty five percent of the females were HIV positive compared to 23.4% of males. AFB positivity rate was 66% while culture positivity rate was 57%. TB/HIV co-infection was higher in males (15.6%) compared to females (11%), Table 1.

Table 1: Sex distribution of HIV, AFB, Culture and TB/HIV Coinfection

Sex	Number Tested	HIV +	AFB +	Culture +	TB/HIV Co-infection
Male	64	15 (23.4)	43 (67.2)	41 (64.1)	10 (15.6)
Female	36	9 (25)	23 (63.9)	16 (44.4)	4 (11)
Total	100	24 (24)	66 (66)	57 (57)	14 (14)

The percentage of HIV positives were higher among participants within the age bracket of 46-55yrs (60%). TB/HIV Co-infection were highest among two age brackets, 26-35 yrs. (20%) and 46-55 yrs. (20%), Figure 1.

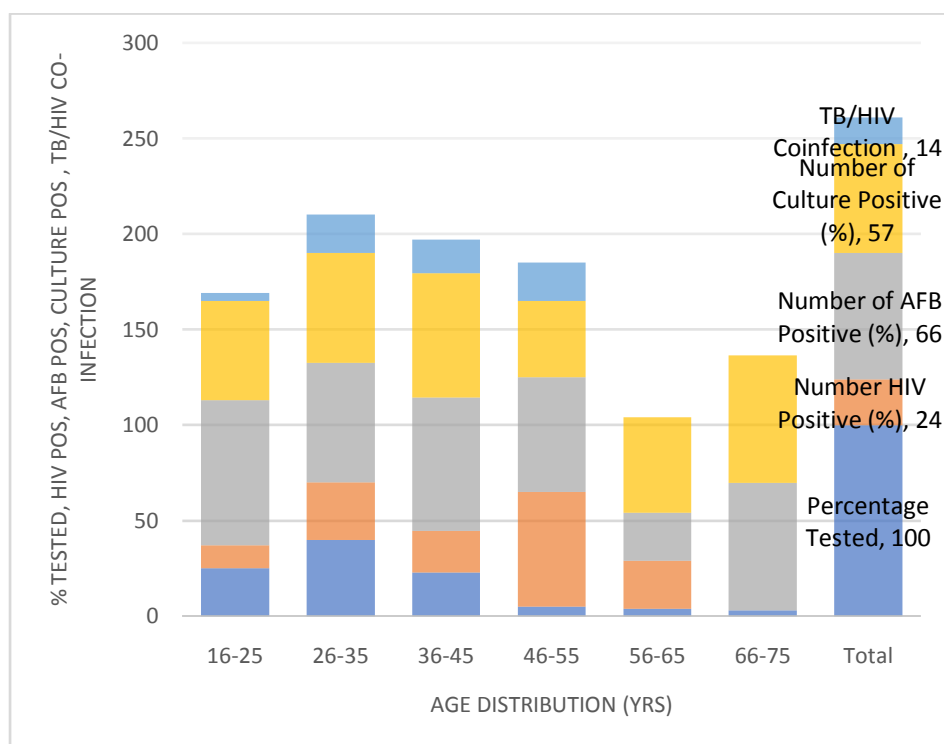


Figure 1: Age distribution of HIV, AFB, culture and TB/HIV Co-infection

The HIV positivity rate among participants in the study was 24% while culture positivity rate was 57% (Table 2). The prevalence of TB/HIV Co-infection in the zone was 14%. The study recorded highest HIV positivity (45.8%) rate among the age group of 26-35 years and the lowest (0%) among age group of 66-75 years (Table 2). Similarly, culture positivity rate was highest (40.4%) among age group 26-35 years and lowest from age 46 years down. The rate of TB/HIV co-infection was highest (57%) among age group 26- 35 years and lowest from 56 years down (Table 2).

Table 2: Age group and Sex distribution of HIV, AFB, Culture and TB/HIV Co-infection (n=100)

Age Distributi on	Number Tested		HIV Positive (%)		AFB Positive (%)		Culture Positive (%)		TB/HIV Co-infection (%)	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
16-25	15 (60)	10 (40)	2 (66.7)	1 (33.3)	10 (52.6)	9 (47.4)	10 (76.9)	3 (23.1)	1 (100)	0 (0)
26-35	29 (72.5)	11 (27.5)	6 (54.5)	5 (45.6)	17 (68)	8 (32)	18 (78.3)	5 (21.7)	5 (62.5)	3 (37.5)
36-45	16 (69.6)	7 (30.4)	4 (66.7)	2 (33.3)	13 (81.3)	3 (18.8)	12 (80)	3 (20)	3 (75)	1 (25)
46-55	4 (80)	1 (20)	3 (100)	0(0)	3 (100)	0 (0)	2 (100)	0 (0)	1 (100)	0 (0)
56-65	0 (0)	4 (100)	0 (0)	1 (100)	0 (0)	1 (100)	0 (0)	2 (100)	0 (0)	0 (0)
66-75	0 (0)	3 (100)	0 (0)	0 (0)	0 (0)	2 (100)	0 (0)	2 (100)	0 (0)	0 (0)
Total	64	36	15	9	43	23	42	15	10	4

The occupation most affected by HIV and TB/HIV Co-infection was the apprentice/unemployed (Table 3).

Table 3: Occupational distribution of HIV, AFB, Culture and TB/HIV Co-infection

Occupation	Number Tested	HIV +	AFB +	Culture +	TB/HIV Co-infection
Apprentice/unemployed	16	8	12	12	6
Driver/Transporter/keke driver	7	2	6	5	1
Student	15	1	11	8	0
Farmer	16	6	9	10	4
Trader/Petty Trader	17	1	13	10	0
Labourer/Bricklayer	2	0	0	2	0
House wife	6	0	3	2	1
Dry cleaner	3	0	3	2	0
Pensioner/Retired	2	0	1	2	0
Business Centre	3	0	0	0	0
Tailor	4	3	3	2	1
Cyclist	2	0	1	0	0
Watch Repairer	1	0	0	0	1

Teacher	2	1	1	0	0
Mechanic	2	0	2	1	0
Hair dresser	1	1	0	0	0
Filling station	1	1	1	1	0
TOTAL	100	24	66	57	14

IV. Discussion

The study set out to access the prevalence of TB/HIV Co-infection among patients attending clinics in North Central Nigeria. The results revealed that more males (64%) than females (36%) participated in the study. This is contrary to similar study reported from Niger Delta region of Nigeria where more females (63.75%) participated compared to their male counterpart (36.25%).¹⁵ Naturally females tend to seek medical attention more than males, so the deviation observed in the study could only be attributed to increase in awareness to health seeking behavior among males.

An Overall HIV prevalence of 24% was observed among the 100 TB patients enrolled during the months of study period. This finding was consistent with similar study¹⁶ that reported 42% highest and 20% lowest during the period of their study. Other similar studies in Nigeria reported 12% in Ile Ife,¹⁷ 10% in Kano,¹⁸ 24.7% in Nasarawa¹⁹ and 28.2% in Ibadan.²⁰ In relation to gender, 25% (9/36) of female patients tested positive while 23.4% (15/64) of male patients tested positive for HIV infection and this agrees with similar study²¹ carried out in Nigeria. This could be attributed to the vulnerable disposition of the female gender. They are defenseless and are more exposed to rape and sexual exploitation.²²

However, the reverse is the case in relation to TB/HIV Co-infection rate which from the study is higher in males 15.6% (10/64) compared to females 11% (4/36). The higher Co-infection rate noted in males could easily be attributed to the poor health seeking behavior and their stronger sex and bread winner tendencies, would not go to the hospital until later during their illness. In a similar study, no significant difference was observed in the rate of co-infection in relation to gender.¹⁹ TB/HIV Co-infection rate observed among patients in the study was 14% which corroborates with findings in similar study in Nasarawa State,¹⁹ Other studies at Nnewi²³ and Niger Delta¹⁵ reported lower coinfection rate of 1.42% and 5.91% respectively.

With regard to age differential, highest HIV prevalence was observed among TB patients within the sexually active age group of 26-35 years (45.8%). A four-year retrospective study¹⁶ reported 25-49 years age bracket having highest HIV prevalence. Similarly, this same age group had the highest culture positivity rate and the highest TB/HIV coinfection rate. A similar study recorded age groups 31-40 years and 41-50 years as having highest HIV and TB/HIV Co-infection rates respectively.²²

On the angle of occupation, the highest HIV prevalence was noticed among the apprentice/unemployed followed by farmers. Studies have shown that factors such as level of poverty and unemployment are all associated with increased risk of HIV infection^{24, 25}

V. Conclusions

The study has revealed that age group 26-35 years should be targeted for intervention. This sexually active age group should be priority for routine HIV test and TB screening. Apprentice/unemployed should be prioritized for sensitization and awareness creation in the North Central Zone.

Ethics approval and consent to participate

This study was approved by the Federal Ministry of Health, Abuja, NHREC/01/01/2007. Informed consent was obtained from all participants.

Consent for publication

Not applicable

Availability of data and material

All data generated or analysed during this study are included in this published article. Data analysed during the study can be made available on request.

Competing interests

The authors declare that they have no competing interests

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Authors' contributions

This work was carried out in collaboration between all authors. TVO, KO and SSM designed the study. TVO was the project leader. KO managed the analyses of the data and the literature searches and SSM carried out most of the laboratory investigations and wrote the first draft of the manuscript. All authors read and approved the final manuscript.

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Not Applicable

Disclaimer

All the views expressed in this paper are those of the authors and not an official position of our institution

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