Sero-prevalence of human immunodeficiency virus infection among patients with newly diagnosed pulmonary tuberculosis in a teaching hospital in Bauchi, North-Eastern Nigeria

Sabiu Abdu Gwalabe,[1] Jacob Dunga,[1] Yusuf Jibrin Bara,[1] Alkali Muhammad,[1] Mustapha Sabo Umar,[1] Sule Bathna[2]

[1]Department of Medicine, Abubakar Tafawa Balewa University Teaching Hospital, Bauchi, Bauchi State; [2]Department of Medicine, Federal Teaching Hospital, Gombe, Gombe State, Nigeria

Abstract

About a third of the human immunodeficiency virus (HIV) positive population worldwide is co-infected with *Mycobacterium tuberculosis*. However, data are lacking about the prevalence of HIV among patients with pulmonary tuberculosis (PTB) in a teaching hospital in Bauchi, northeast Nigeria. The aim of this study is to determine the sero-prevalence of HIV among patients with sputum smear positive PTB at Abubakar Tafawa Balewa University Teaching Hospital (ATBUTH), Bauchi, Bauchi State, Nigeria. This is a retrospective study review of patients' medical records diagnosed with sputum smear positive PTB that attended and received treatment at directly observed treatment short course (DOTS) clinic of Abubakar Tafawa Balewa University Teaching Hospital (ATBUTH), Bauchi, Bauchi State, North-Eastern Nigeria from January, 2015- December, 2017. All the patients were newly diagnosed with sputum smear positive PTB using ZN stain testing of their sputum and screened for HIV antibodies. There were 155 patients studied comprising of 95 (61.29%) males and 60 (38.71%) females. One hundred and twenty (77.42%) patients were sero-negative and 35 (22.58%) sero-positive for HIV. Most of the patients were within the ages of 15-54 years with mean age of 34.63±15.55. The sero-prevalence of HIV infection among the patients is 22.58%. Sero-prevalence of HIV is observed to be high among young and married patients with secondary level of education.

The sero-prevalence of HIV infection among the patients is relatively lower than those reported in most parts of Nigeria and the sub-Saharan Africa, hence there is still need for continued screening of HIV antibodies among patients with PTB so as to reduce the morbidity and mortality that may result from the co-infection.

Correspondence: Gwalabe Sabiu Abdu, Department of Medicine, Abubakar Tafawa Balewa University Teaching Hospital, Bauchi, Bauchi State, Nigeria.
E-mail: sabiuag@yahoo.com

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Introduction

More than two billion people (about one-third of the world population) are estimated to be infected with *M. tuberculosis*.[1] The global incidence of tuberculosis (TB) peaked around 2003 and appears to be declining slowly.[2] According to the World Health Organization (WHO) in 2015, 10.4 million individuals became ill with TB and 1.8 million died.[2]

About a third of the human immunodeficiency virus (HIV) positive population worldwide is co-infected with *Mycobacterium tuberculosis*. This accounts to about 14 million people worldwide.[3] Tuberculosis is the largest single cause of death in the acquired immune deficiency syndrome (AIDS),[4] accounting for about 26% AIDS related deaths,[3] 99% of which occur in developing countries.[5] Globally, 9% of all TB cases in adults are attributed to HIV.[4] Human immunodeficiency virus co-infection is the most powerful known risk factor for progression of *Mycobacterium tuberculosis* infection to active disease, increasing the risk of latent tuberculosis reactivation 20-fold.[3,6] Likewise TB has been reported to exacerbate HIV infection.[7,8]

HIV patients are highly vulnerable to TB because of their weakened immune systems and the latter is now their number one killer. Surveillance of HIV among TB patients has been recognized as important as the HIV epidemic continues to fuel TB epidemics. Reports show that in Sub-Saharan Africa, HIV sero-prevalence rates among TB patients range from 24-67%, while lower rates of 0.4-20.1% was reported from India,[9] 3.7% in San Francisco[10] 30.0% in Trinidad and Tobago,[11] 28.2% in Guyana,[12] 9.9% in Cambodia,[13] 23.6% in Florida[14] and 10.8% in Southwest Guatemala.[15] Among European countries, France, Iceland and Portugal have reported co-infection prevalence of approximately 11-15%, but central European countries have reported a lower prevalence (0-1%).[16]

Many studies have been done in parts of Nigeria on prevalence of HIV among TB patients with prevalence of 18.8% in Kano,[17] 28.12% in Ibadan[18] and 48% in North-Central, Nigeria.[19]

However, data are limited on the prevalence of HIV among patients with pulmonary tuberculosis (PTB) in a teaching hospital in Bauchi, Northeastern, Nigeria. The aim of this study is to determine the sero-prevalence of HIV among patients with sputum smear positive PTB at ATBUTH, Bauchi, Bauchi State, Nigeria. The finding of the study will possibly provide baseline data to alert the TB control programs of the potential HIV problems with a view to the development of joint strategies. More so that anti-tuberculosis treatment has been shown to be complicated by frequent drug interactions with highly active antiretroviral therapy (HAART) and adverse drug reactions are more common among HIV-infected patients.[9]

Materials and Methods

This is a retrospective study review of patients diagnosed with sputum smear PTB that attended and received treatment at the TB directly observed treatment short course (DOTS) clinic of ATBUTH, Bauchi, Bauchi State, Northeastern Nigeria from January, 2015- December, 2017. The hospital is a 750-bed tertiary health care facility that provides specialist services and served as a major referral center in Northeast region of Nigeria and other neighboring states.

All the patients were newly diagnosed with sputum smear positive PTB using ZN stain testing of their sputum and screened for HIV-antibodies using *Determine* and confirmed if reactive by *Unigold*. Data were extracted from the patients' medical records and treatment cards by using a structured data extraction form. Information retrieved from the records included the age, sex, marital status, educational level and occupation of the patients. The extraction of patient's details from the record was done by the TB DOTS health officers.

Permission to carry out the study was obtained from the research and ethical committee of ATBUTH, Bauchi, Bauchi State, Northeastern Nigeria. Socio-demographic variables of the patients were entered into the study database and analyzed using SPSS version 18.0 (SPSS, Ill., Chicago, USA). The values were expressed in frequencies and percentages. Sero-prevalence of HIV among the patients was determined by the percentage of the total number of patients were sero-positive for HIV. Tables were used for illustration. Comparison of means was done with the Student's *t*-test. Chi-square (χ^2) was also been used to determine the difference in some variable. A P value of <0.05 was considered statistically significant.

Results

There were 155 patients studied comprising of 95 (61.29%) males and 60 (38.71%) females. Their ages range from 15-94 years. Most of the patients (90.32%) were within the ages of 15-54 years. The mean age ± standard deviation (SD) of the patients was 34.63±15.55. There is no significant difference between the mean age of males and that of females 34.31±13.12, 35.15±18.82 respectively (P=0.74). Likewise there is no statistically significant difference between the mean ages of those that are sero-negative and those that are sero-positive 34.23±16.82, 36.03±10.07 respectively (P=0.54). None of the patients above or equal to 65 years of age is sero-positive for HIV. The sero-prevalence of HIV among the patients is 22.58% (Table 1).

Table 2 shows that out of the total 95 males, 78 (50.32%) were sero-negative and 17 (10.97%) sero-positive. Out of the total 60 females 42 (27.10%) were sero-negative and 18 (11.61%) sero-positive. There is no statistically significant difference in HIV sero-positive males *vs* females [Chi Square χ^2=3.083 df=1 (P=0.079)].

Sixty-two (40.00%) patients were single, 89 (57.42%) were married and 4 (2.58%) widows. Among those that were sero-negative for HIV, 57 (36.77%) were single, 60 (38.71%) were married and 3 (1.94%) were widow. Among those that were sero-positive for HIV, 5 (3.23%) were single, 29 (18.71%) were married and 1 (0.64%) was a widow. This shows that co-infection is high among married patients (Table 3).

Table 4 shows educational level of the patients. Among those

Table 1. Age and HIV status distribution of the patients.

Age group	HIV sero-negative N (%)	HIV sero-positive N (%)	Total N (%)
15-24	41 (26.45)	3 (1.94)	44 (28.39)
25-34	35 (22.58)	13 (8.39)	48 (30.97)
35-44	18 (11.61)	10 (6.45)	28 (18.06)
45-54	12 (7.74)	8 (5.16)	20 (12.90)
55-64	4 (2.58)	1 (0.64)	5 (3.23)
65-74	5 (3.23)	0 (0.00)	5 (3.23)
75-84	3 (1.94)	0 (0.00)	3 (1.94)
85-94	2 (1.29)	0 (0.00)	2 (1.29)
Total	120 (77.42)	35 (22.58)	155 (100)

Table 2. Sex and HIV status distribution of the patients.

Sex	HIV sero-negative N (%)	HIV sero-positive N (%)	Total N (%)
Male	78 (50.32)	17 (10.97)	95 (61.29)
Female	42 (27.10)	18 (11.61)	60 (38.71)
Total	120 (77.42)	35 (22.58)	155 (100)

There is no significant difference in HIV sero-positive males *vs* females [Chi Square χ^2=3.083 df=1 (P=0.079)].

Table 3. Marital and HIV status of the patients.

Marital status	HIV sero-negative N (%)	HIV sero-positive N (%)	Total N (%)
Single	57 (36.77)	5 (3.23)	62 (40.00)
Married	60 (38.71)	29 (18.71)	89 (57.42)
Widow	3 (1.94)	1 (0.64)	4 (2.58)
Total	120 (77.42)	35 (22.58)	155 (100)

Table 4. Educational level and HIV status distribution of the patients.

Education level	HIV sero-negative N (%)	HIV sero-positive N (%)	Total N (%)
Primary	13 (8.39)	4 (2.58)	17 (10.97)
Secondary	48 (30.97)	20 (12.90)	68 (43.87)
Tertiary	48 (30.97)	7 (4.52)	55 (35.49)
None	11 (7.09)	4 (2.58)	15 (9.68)
Total	120 (77.42)	35 (22.58)	155 (100)

that were sero-negative, 13 (8.39%) attained primary education, 48 (30.97%) attained secondary, 48 (30.97%) also attained tertiary level and 11 (7.09%) had no education. Among those that were sero-positive, 4 (2.58%) attained primary education, 20 (12.90%) attained secondary level, 7 (4.52%) attained tertiary level and 4 (2.58%) had no formal education.

Table 5 shows occupational status of the patients. Among those that were sero-negative, 14 (9. 03%) were self-employed, 12 (7.74%) unemployed, 11 (7.09%) were doing business, 29 (18.71%) civil servants, 31 (20.00%) students, 6 (3.87%) farmers and 17 (10.97%) housewives. Among those that were sero-positive, 4 (2.58%) were self-employed, 5 (3.23%) unemployed, 2 (1.29%) were doing business, 8 (5.16%) civil servants, 3 (1.94%) students, 2 (1.29%) farmers and 11 (7.09%) housewives.

Discussion and Conclusions

The sero-prevalence of HIV infection among the patients is 22.58%. This is slightly higher than that reported Yusuf *et al.* of 18.8% in Kano,[17] North-Western, Nigeria, but lower than that reported by Ige *et al.* in Ibadan, South-western, Nigeria of 28.12%,[18] Mbaave *et al.* of 48%[19] in North-Central, Nigeria and by Corbett *et al.* of 38% in sub-Saharan Africa.[4] This variation in the prevalence could be due to difference in location of the study as the prevalence of HIV infection has been reported to have geographical variation in several other African studies.[20]

The mean age of the patients of 34.63±15.55 is similar to that reported in Nguru by Yusuf *et al.*[21] and Gwalabe *et al.* in Maiduguri[22] all in North-Eastern, Nigeria. The involvement of relatively younger people may among others, be due to exposure to predisposing risk factors for PTB such as sustained contact with people having PTB early in life.[23] Most of the patients studied were within the ages of 15-54 years. Patients in these groups by virtue of their vigorous adventurism and survival pursuits are exposed to more infection by contact. This explains why TB is a problem of people below 50 years in our population. Joel and Nicholas in Kenya reported that 97% of persons affected by TB come from the economically productive age (15-50 years).[24] This age group is sexually active and most at risk of HIV infection. None of the patients above or equal to 65 years old is found to be sero-positive for HIV and hence, younger age is a significant risk factor for acquiring HIV infection among the patients. This is consistent with findings in Nigerian study[25] and in a previous African study.[26]

There is predominance of males in the study with males to female ratio of 1.58:1.00. This finding is slightly higher than those reported by Ige *et al.* of 1.16:1.00[18] and Raviglione *et al.*[27] globally of 1.2:1. There is no statistically significant difference in HIV sero-positive males *vs* females [Chi Square χ^2=3.083 df=1 (P=0.079)], hence gender is not a significant factor in this study for TB/HIV co-infection. This is similar to the findings reported by Oladeinde *et al.*[20] and Ejikeme *et al.*[28] This is most likely, because most of the patients both males and females were young in their reproductive age group and have high risk for both TB and HIV infections.

The educational status of the patients as shown in Table 4, most of them were educated with secondary and tertiary level of education, even among those that were sero-positive for HIV; most of them have attained secondary level of education. This finding is not similar to those reported by Oladeinde *et al.*[20] where educational status is not a risk factor for TB/HIV co-infection. This is probably could be due to higher level of awareness among the educated ones in our locality to seek for prompt medical treatment.

In terms of occupation of the patients, most of them were civil servants and students as shown in Table 5. This is contrary to the finding reported by Yusuf *et al.*[17] in Kano, where unemployed people were the majority of their patients. The possible explanation for this disparity is difference in localities of the studies areas.

In conclusion, the sero-prevalence of HIV infection among the patients is relatively lower than those reported in most parts of Nigeria and the sub-Saharan Africa, hence there is still need for continued screening of HIV antibodies among patients with PTB so as to reduce the morbidity and mortality that may result from the co-infection.

Table 5. Occupation and HIV status of the patients

Occupation	HIV sero-negative N (%)	HIV sero-positive N (%)	Total N (%)
Self-employed	14 (9.03)	4 (2.58)	18 (11.61)
Unemployed	12 (7.74)	5 (3.23)	17 (10.97)
Business	11 (7.09)	2 (1.29)	13 (8.38)
Civil servant	29 (18.71)	8 (5.16)	37 (23.87)
Student	31 (20.00)	3 (1.94)	34 (21.94)
Farmer	6 (3.87)	2 (1.29)	8 (5.16)
Housewife	17 (10.97)	11 (7.09)	28 (18.06)
Total	120 (77.42)	35 (22.58)	155 (100)

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