

# The Prevalence of HIV/AIDS Among Tuberculosis Patients In a Tuberculosis/Leprosy Referral Center in Alushi, Nasarawa State, Nigeria.

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## Abstract

The study was carried out to determine the seroprevalence of HIV infection among Tuberculosis (TB) confirmed patients of a TB/Leprosy referral centre in Alushi in view of the significance of HIV in TB. Its association with gender and age was also determined. Blood samples were collected by venepuncture from 257 TB patients and their HIV status determined. Viral antibody detection was carried out using a WHO approved ELISA kit called 'Determine' which detects both HIV-1 and HIV-2. Of the 257 patients screened, 44.20% (106) were HIV positive. The prevalence of coinfection was higher among the females (44.82%) than the males (38.30%) patients and highest among those aged 21-40 years old (45.30%). Coinfection was found to be statistically highly associated with gender and age ( $p < .05$ ). This high prevalence calls for routine screening of TB patients for HIV.

## INTRODUCTION

Tuberculosis (TB) has existed in humans since antiquity and has been reported as the most common expressive and infective respiratory disease that results from the inhalation of air droplets infected with tubercle *Mycobacterium tuberculosis*.<sup>1</sup> An estimated 1/3 of the world's population is infected with the bacterium, with the highest prevalence of the disease found in sub-Saharan Africa and Asia.<sup>2,1</sup> More than half of these live in countries ravaged by HIV/ AIDS.<sup>3</sup> However, Nigeria has been noted as among the leading countries burdened by the scourge and even ranks 4<sup>th</sup> among the 22 countries that account for 80% of the world's TB cases.<sup>4</sup>

The emergence of Human Immunodeficiency Virus (HIV) has paved way for the resurgence of *Mycobacterium tuberculosis* infection. While HIV is the most powerful risk factor for the progression of *M tuberculosis* infection to TB disease, TB accelerates the progression of HIV infection to AIDS and shortens the survival of such patients.<sup>5,6</sup> The two are intricately linked to malnutrition, unemployment, poverty, drug abuse and alcoholism and have also been referred to as the 'Cursed Duet'.<sup>3</sup> HIV is known to increase the risk of reactivation in people with latent tuberculosis and also increases the risk of subsequent episodes of TB from exogenous reinfection.<sup>3,7</sup> It has also corroborated by noting

that HIV patients are highly vulnerable to TB because of their weakened immune systems and the latter is now their number one killer.<sup>2</sup> Surveillance of HIV among TB patients has been recognised as important as the HIV epidemic continues to fuel TB epidemics. In many countries, HIV prevalence among TB patients is a sensitive indicator of the spread of HIV into the general population.<sup>8</sup>

In the view of the aforementioned, this study became imperative in this area with a reported HIV prevalence of 38.65%<sup>17</sup> in order to provide baseline data in Nasarawa State to alert the TB and HIV/ AIDS programs of the potential HIV problems leading to the development of joint strategies.

## MATERIALS AND METHODS

### STUDY AREA

The study was designed to cover individuals receiving treatment at the Tuberculosis/Leprosy unit of Evangelical Reformed Church of Christ (ERCC) Alushi, Nigeria.

The Medical Centre is in Nasarawa State, in the Northern part of Nigeria. It is 134km from Abuja the Federal Capital and 62km from Lafia the state capital.

### STUDY POPULATION

The study was hospital based. Blood samples were collected

from patients admitted into the medical centre (TBL unit) Alushi for TB treatment between March 2007-Oct 2008. These patients were screened for HIV either as a result of complications requiring HIV test or voluntary counselling and testing (VCT). Demographic information about each patient screened was obtained as the sample was collected, such information included sex, and age. Oral informed consent was also obtained from the patients prior to enrolment. For those below 20 years, permission was sought from their parents/guardians. The study did not interfere with the normal management of the patients.

#### Sample Collection

Blood samples were collected through venepuncture. The arm of the patient was tied with a tourniquet and the position of the veins disinfected using a swab soaked in methylated spirit. Using a disposable sterile needle and 2ml syringe, blood was collected. A different needle and syringe were used for each sample collected. Each blood sample was transferred into a labelled plastic microtitre tube containing Ethylene diamine tetraacetic acid (EDTA) (anticoagulant). Samples were then transferred in a cold box to the Microbiology Laboratory of Nasarawa State University for screening.

### HUMAN IMMUNODEFICIENCY VIRUS DETECTION

A World Health Organisation (WHO) approved kit manufactured by Abbot Laboratory called 'Determine' was used for the HIV detection. It is an invitro visually read quantitative immunoassay for the detection of antibodies to HIV-1 and/or HIV-2 in human plasma, serum or whole blood. It is made up of a strip impregnated with selenium colloid HIV antigen conjugate at one end and two reaction windows at the other end. The kits were stored at 4°C until ready for use and screening of the specimen was carried out as recommended by the manufacturer.

### PRINCIPLE OF THE TEST

Determine HIV-1/2 is an immunochromatographic test for the qualitative detection of antibodies to HIV-1 and/or HIV-2. Test serum sample was added to the sample pad (impregnated strip) and as the test serum migrates through the conjugate pad it reconstitutes and mixes with the selenium colloid-antigen conjugate. The mixture continues to migrate through the solid phase to the immobilised recombinant antigens and synthetic peptides at the patient window site.

If antibodies to HIV-1 and/or HIV-2 are present in the sample, the antibodies bind to the antigen-selenium colloid and to the antigen at the patient window forming a red line at the patient window site.

### TEST PROCEDURE

The Abbot Determine HIV-1/2 test kit was brought to room temperature and the protective foil cover was removed from each strip before use, the test sera collected were also brought to room temperature. Using a microtitre pipette 50µl of each test serum sample was introduced and left to stand for 5-15 minutes at room temperature. The result was read visually. Result interpreted invalid was repeated.

### INTERPRETATION OF RESULTS

When a red bar appeared in the control and another in the patient window of the test strip, the result was interpreted as POSITIVE. However, the appearance of a red bar only in the control window of the strip was interpreted as NEGATIVE. The absence of a red bar in the patient and control window was reported as INVALID.

### STATISTICAL ANALYSIS

The incidence of HIV/TB co-infection was determined as a proportion of HIV seropositive individuals to the total number of patients under consideration and expressed as a percentage. The chi-squared test was employed as a statistical tool to determine the relationship between sex, age and HIV/TB co-infection. P values of <0.05 were considered to be statistically significant.

### RESULTS

The study population was made of 257 confirmed Tuberculosis Patients screened for HIV. Of these, 116(45%) were females while 141 (55%) were males. There were more patients in the 21-40 years age group (62%) than in any other age group. Patients above 60 years old were the least (30%).

The overall prevalence of coinfection of M. tuberculosis and HIV in this population was 41.2%. In relation to gender, it was 44.8% and 38.3% among females and males respectively (Table1).

**Figure 1**

Table 1. Prevalence of HIV infection among Tuberculosis Patients in relation to gender

Gender	Number Screened	Number Positive	Prevalence (%)
Female	116	52	44.83
Male	141	54	38.30
Total	257	106	41.24

There was a statistically significant relationship between gender and viral infection ( $p < 0.05$ ). The prevalence of coinfection also varied with age of the patients. It was highest among TB patients aged 21-40 years (45.3%) followed by those aged 41-60 years (36.8%), 1-20 years (34%) and least among those aged above 60 years (25.00%) (Table 2).

**Figure 2**

Table 2. Prevalence of HIV infection among Tuberculosis Patients in Relation to Age

Age (Years)	Number Screened	Number Positive	Prevalence (%)
1-20	50	17	34.00
21-40	161	73	45.30
41-60	38	14	36.83
>60	8	2	25.00
Total	257	106	41.24

There was a statistically significant association between age and HIV infection among TB patients in this study ( $p < 0.05$ ).

## DISCUSSION

The HIV prevalence of 41.2% among TB patients of the TB/Leprosy hospital is the highest that has been reported for such studies in Nigeria. This is a cause for alarm especially in view of the fact that HIV prevalence among TB patients is a good indicator of the spread of HIV in the general population. This high prevalence might not be unconnected with the relatively high HIV prevalence in the area<sup>17</sup> which is important in latent TB reactivation<sup>3</sup> leading to a preponderance of HIV/TB coinfection. Reports of similar studies in Nigeria ranged from 12.0% in Ile-Ife<sup>9</sup> 10.0% in Kano<sup>10</sup>, 10.5% and 14.9% among children and adults respectively in Sagamu<sup>11,12</sup>, 10.8% in Irrua<sup>13</sup>, 6.1% among

those aged 20-40 years in Jos,<sup>14</sup> 37.5% in Benin City,<sup>15</sup> 4.2% in Oyo and 35.1% in Benue States.<sup>16</sup> Results from this study are however similar to that of a study in Tanzania where 44.1% was reported<sup>18</sup> although it is higher when compared with reports from other parts of the globe. For example, 0.4-20.1% was reported from India<sup>3,19</sup>, 30.0% in Trinidad and Tobago<sup>20</sup>, 28.2% in Guyana<sup>21</sup>, and 9.9% in Cambodia.<sup>22</sup>

There was a significantly higher prevalence of HIV/TB coinfection ( $p < 0.05$ ) among females than males. This is probably related to the higher incidence of HIV infection in females which predisposed 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 circumstances. Furthermore, most African women are so subordinated to their husbands that they have little or no say in issues related to sexual relationships.<sup>13</sup> The study was in an area where polygamy and early marriage thrive. It is therefore possible for one male to be the source of infection to several females.

The preponderance of HIV/TB coinfection among patients aged 21-40 years observed in this study ( $p < 0.05$ ) is similar to some other reports.<sup>14,5,16,22</sup> This is a sexually active group in which both TB and HIV prevail most.<sup>17</sup> Thus the significantly high prevalence of coinfection.

## CONCLUSION

The high HIV seroprevalence in this TB patient population is of great concern both in terms of patient management and public health prospective. It also underscores the need for routine HIV serology on all TB patients to avoid adverse drug reactions to antituberculosis drugs. There is also a need to develop aggressive public awareness, good health education and provide routine HIV screening for TB patients.

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## References

- Ojo, D.A., Mafiana, C.F. and Adeniran-Sonola, A. : Prevalence of Mycobacterium tuberculosis and HIV Infections in Abeokuta, Ogun State, Nigeria. Nig. J. Paras. 2007; 28(1):39-42.
- Science Daily (2009): Alarming New Data shows TB/HIV Coinfection a Bigger Threat. Science Daily. Retrieved 28th May 2009 from

<http://www.sciencedaily.com/releases/2009/03/090324131600.htm>

3. Sharma, S.K., Mohan, A. And Kadiravan, T.. HIV/TB Coinfection: Epidemiology, diagnosis and Management. *Ind. J. Med. Res.* 2005; 121: 550-567.
4. Egah, T.E. and Okoli, C.U.: Tuberculosis in Jos Nigeria: A 9 year Review of Laboratory Report at Jos University Teaching Hospital (JUTH). *Nig. Med. Pract.* 2004; 46:36-46.
5. Yusuph, H., Lailani, S.B. and Ahedjo, A.: Prevalence of HIV in TB patients in Nguru, North Eastern Nigeria. *Sahel Med. J.* 2005; 8(3): 65-67.
6. Van Altena, R., Van der Werf, T.S.: Underdiagnosis of HIV in patients with Tuberculosis. *Ned Tijdschr Geneesk.* 2007; 151(48): 2674-2679.
7. Verman, S. and Mahajan V.. HIV-Tuberculosis Coinfection. *The Int. J. Pulmon. Med.* 2008; 10(1).
8. Maher, D., Floyd, K., Ravigolione, M.. Strategic framework to reduce the burden of HIV/TB. Geneva, World Health Organisation 2002 (WHO/CDC/TB/2002-296).
9. Onipede, A.O., Idigbe, O., Ako-Nai, A.K., Omojola, O., Oyelese, A.O., Aboderin, A.O., Komolafe, A.O. and Wemambu, S.N.C. . Seroprevalence of HIV antibodies in TB patients in Ile-Ife. *E. Afr. Med. J.* 1999; 76(3): 127-132.
10. Iliyasu, Z. and Babashani, M. . Prevalence and Predictors of TB coinfection Among HIV seropositive patients attending Aminu Kano Teaching Hospital, Northern Nigeria. *J. Epid.* 2009; 19(2): 81-87.
11. Daniel, O.J., Salako, A.A., Oluwole, F.A., Alausa, O.K. and Oladapo, O.T.: HIV seroprevalence among newly diagnosed adult PTB patients in Sagamu. *Nig. J. Med.* 2004; 13(4): 393-397.
12. Daniel, O.J., Ogunfowora, O.B. and Oladapo, O.T.: HIV seroprevalence among Children diagnosed with TB in Nigeria. *Trop. Doc.* 2007; 37(4): 268-269.
13. Nwobu, G.O., Okodua, M.A. and Tاتفeng, Y.M.: Comparative study of HIV Associated Pulmonary Tuberculosis in Chest Clinics from Two Regions of Edo State, Nigeria. *Online Journal of Health and Allied Sciences.* 2004; 3:4
14. [ojhas.org/issue/11/2004-3-4.htm](http://ojhas.org/issue/11/2004-3-4.htm)
15. Anteyi, E.A., Idoko, J.A., Ukoli, C.O. and Bello, C.S.: Clinical pattern of HIV in PTB in Jos Nigeria. *Afr. J. Med. Sci.* 1996; 25(4): 317-321.
16. Uche, A. and Alozie, O.. Emerging Prevalence of HIV among TB patients in Benin City, Nigeria. *International Conference on AIDS.* 2004, July 11-16; Abstract no. TUPeD5203.
17. Odaibo, G.N., Gboun, M.F., Ekanem, E.E., Gwarzo, S.N., Saliu, I., Egbewunmi, S.A., Abebe E.A. and Olaleye, D.O. HIV infection among patients with TB in Nigeria. *Afr. J. Med. Med. Sc.* 2006; 35:93-98.
18. Pennap, G.R.I., Makut, M.D., Gyar, S.D. and Owuna, G.. Seroprevalence of HIV/AIDS in Keffi and Environs. *Nig. J. Microb.* 2006; 20(3): 1141-1146.
19. Range, N., Ipuge, Y.A., O'Brien, R.J., Egwaya, S.M., Mfinanga, S.G., Chonde, T.M., Mukadi, Y.D., Borgdorff, M.V. : Trend in HIV Prevalence among TB patients in Tanzania, 1991-1998. *Intl. J. Tuber. Lung Dis.* 2001; 5(5): 405-412.
20. Piramanagaya, P., Talur, M., Sharma, S.K., Smith-rohrberg, D., Biswas, A. and Vajpayee, M. : Persistently high HIV seroprevalence among adult TB patients at a tertiary care centre in Delhi. *Ind. J. Med. Res.* 2007; 125: 163-166.
21. Babool, S., Millet, J., Akpaka, P.E., Remoutar, D. And Rastogi, N. : First Insight into M. Tuberculosis, Epidemiology and Genetic Diversity in Trinidad and Tobago. *J. Clin. Microb.* 2009; 47(6): 1911-1914.
22. Kaiser Global Health Report.Org (2008). Increase in HIV coinfection leads to Increasing TB Prevalence in Guyana. Nov. 26, 2008. [www.kaisernetwork.org/dailyreports/index.cfm?DR\\_ID=55760](http://www.kaisernetwork.org/dailyreports/index.cfm?DR_ID=55760).
23. Tamura, M., Eam, K.K., Yoshihara, N., Miura, T., Yanai, H., Yamada, N., Jayaranta, P., Maaren, P., Okada, K., Onozaki, I., Eang, M.T. . National HIV Prevalence among TB patients through periodic survey: Experience in Cambodia. *Intl. J. Tuber. Lung Dis.* 2008; 12(3):520-525.

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