

Research Article

Prevalence of Mycobacterium Tuberculosis among HIV-positive Patients Attending COCIN Rehabilitation Center in Mangu, Jos, Plateau State, Nigeria

Banda JM^{1*}, Essien UC¹, Ebu M¹, Isa BE¹, Yakubu BD¹, Joshua IA², Sheyin Z¹

¹Department of Medical Laboratory Science, University of Jos, Jos, Plateau State, Nigeria

²Department of Community Medicine, College of Medicine, Kaduna State University, Kaduna state, Nigeria

***Corresponding Author:** Jim Monday Banda, Department of Medical Laboratory Science, University of Jos, Jos, Plateau State, Nigeria, Tel: +2348025595945; E-mail: jimbanda31@yahoo.com

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Abstract

Background: Globally, tuberculosis (TB) is the leading cause of death among People Living with HIV/AIDS (PLWHA). Nigeria has one of the largest burdens of TB and HIV/AIDS in the world. Most cases of TB in Nigeria are closely linked to HIV infections.

Aim: In this study, the prevalence of TB among PLWHA was investigated.

Methodology: One hundred and sixty three (163) sputum specimens were collected from patients attending COCIN Rehabilitation Center in Mangu Jos, Plateau State. The sputum specimens were

stained by ZiehlNeelsen's technique and examined microscopically for Acid Fast Bacilli (AFB).

Results: Out of the 163 sputum specimens tested six were positive for AFB giving an overall prevalence of 3.7%. The prevalence of TB/HIV co-infection with respect to age group and gender revealed that patient within the age range of < 20 years had the highest prevalence of 14.3%, while male patients were found to have a prevalence of 4.9% compared to their female counterparts (1.7%). Regarding marital status, higher prevalence (9.1%) was recorded among patients who are married compared to the prevalence of 2.3% found among the singles. The prevalence in relation to occupation, showed that patients who engaged in

farming had the highest prevalence of 5.2%, followed by those who identified as student (5.0%) and business (2.9%). However, no case of TB was recorded among patients who identified as civil servants and housewives.

Conclusion: This study has established the link between TB and HIV infection in the study area. We therefore recommend that further studies be conducted in the entire Plateau State for possible intervention in terms of improve antiretroviral treatment coverage tuberculosis screening, treatment and prevention as a way of reducing active TB among people living with HIV.

Keywords: Co-infection; Health seeking behavior; HIV; Tuberculosis

1. Introduction

Tuberculosis (TB) is the world's deadliest infectious disease that claims more than a million lives each year (WHO, 2020). Tuberculosis is a communicable disease that is the leading cause of death worldwide ranking above HIV/AIDS. About a quarter (1/4) of the world's population is infected with *Mycobacterium tuberculosis* (WHO, 2020). Tuberculosis is caused by the bacillus *Mycobacterium tuberculosis* which spreads when a sick person expels bacteria into the air; by coughing or sneezing. The diseases primarily affect the lungs (pulmonary TB) but can also affect other sites of the body (extra-pulmonary TB) [1,2]. Human Immunodeficiency Virus is the most common risk factor for the progression of *M. tuberculosis* infection to TB disease. Immunodeficiency Virus infection is characterized by the progressive depletion of CD4+ T-lymphocytes which results in the weakening of the immune system leaving the victim vulnerable to TB by reactivation of latent TB to active TB disease [1,3,4]. The risk of developing TB is

estimated to be between 16-27 times greater in PLWHA than among those without HIV infection (WHO, 2020). Human Immunodeficiency Virus associated tuberculosis has become a major public health problem in many countries including Nigeria (WHO, 2020). Human Immunodeficiency Virus-associated tuberculosis has been reported worldwide including Nigeria by many researchers [2,4-10]. Indeed, the knowledge of HIV-TB co-infection is necessary to understand the spread of the dual infections and to monitor the performance TB and HIV control programmes. In addition, this information is important in the formulation of policies that might help in planning the management of patients with HIV-TB co-infection.

This study was conducted to determine the prevalence of *M. tuberculosis* among HIV/AIDS patients attending COCIN Rehabilitation Centre Sabon Layi Mangu, Magu L.G.A, and Plateau State, to contribute to the field of knowledge regarding HIV-TB co-infection.

2. Materials and Methods

2.1 Study area: Mangu is one of the local government areas in the Plateau Central Senatorial district with a population of 294,931 according to 2006 National population census. The local government covered an area of 1,653 square kilometers [11].

2.2 Study population: The study population included 163 HIV positive patients within the age range of 4 to 60years attending COCIN Rehabilitation Center Mangu within the period of December 2015 to February 2016.

2.3 Sampling technique: The 163 HIV positive patient receiving treatment at the COCIN Center during the period of the research and have consented were enrolled as they present.

2.4 Data collection tool: An interviewer-administered, structured questionnaire was used to collect the necessary information. The questionnaire had sections A-F, namely A: Bio-data, B: Educational Qualification, C: Socio-economic status, D: Clinical symptoms, E: Knowledge of the diseases, F: HIV status.

2.5 Sample collection: Sputum specimen collections were done in an open ventilated space with the assistance of medical personnel in the health facility. The patients were given sterile wide open mouth screwed-bottles in which they produced paired sputum samples (one early morning and one spot). For young children who cannot expectorate spontaneously, once the child start to cough, sputum was obtained by sucking through the nasopharynx by the collaborating pediatrician.

2.6 The procedure for Laboratory test: The samples were analyzed by making sputum smears on a well labeled slide, stained by Ziehl-Neelsen's technique and examined according to method previously described in (WHO, 2004) [12]. The dried sputum smears were heat fixed and flooded with strong carbol fuchsin. The strong carbol fuchsin was maintained on the smears by heating for 5 minutes, followed by decolorization using 3% acid-alcohol. The slide was rinsed with water and counter stained with 0.3% methylene blue for 2 minutes. It was washed with water and allowed to air dry before examination for Acid Fast Bacilli (AFB). Stained smears were examined under a binocular microscope, the presence of a bright red slender rod (bacilli) on a blue background signifies a positive AFB.

2.7 Statistical analysis: Data obtained from the study were analyzed using Statistical Package for

the Social Sciences (SPSS) version 21.0. The results were presented as tables. Pearson chi-square test was used to find the relationship between the socio-demographic characteristics of the respondents and the AFB positivity. P value of <0.05 was considered to be statistical significance.

2.8 Ethical consideration: Ethical approval for the study was sought for and obtained from the Plateau State Ministry of Health and an informed written consent from adults and children below 18 years were obtained from all participants prior to the commencement of sputum sample collection.

3. Results

One hundred and sixty-three (163) sputum specimens were examined in the study. Out of which six (3.7%) were positive for AFB. The prevalence of *M. tuberculosis* among HIV-positive patients in relation to socio-demographic characteristics is shown in Table 1. In relation to age, the highest prevalence 14.3% was recorded among the age group <20 years, followed by the age group 36-60 years (3.3%), while the age group 21-35 years had the least prevalence (3.0%). There was no statistical significance ($P=0.321$). Regarding the gender of patients, a prevalence of 4.9% was observed among male patients compared to the 1.7% recorded in females ($P=0.016$). In respect to marital status, higher prevalence of 9.1% was recorded among the married compared to 2.3% found among the singles. However, no significant difference ($P=0.065$) was observed in *M. tuberculosis* prevalence in relation to marital status. The results in Table 1 also showed that patients who engage in farming activities recorded a prevalence of 5.2% while; students and business client had 5.0% and 2.9% respectively. However, there was no *M. tuberculosis* detected in sputum collected from patients who were identified as civil servants and housewives.

Table 1: Prevalence of *M. tuberculosis* among HIV-positive patients in relation to their socio-demographic characteristics

Variable	No examined	No positive	Prevalence (%)	P value X ² value
Age (in years)				
<20	7	1	14.3	0.321
21-35	66	2	3.0	
36- 60	90	3	3.3	
Total	163	6	3.7	
Gender				
Male	103	5	4.9	0.016
Female	60	1	1.7	
Total	163	6	3.7	
Marital status				
Married	130	3	2.3	0.065
Single	33	3	9.1	
Total	163	6	3.7	
Occupation				
Business	35	1	2.9	0.764
Student	20	1	5.0	
Civil servant	19	0	0.0	
Farmer	77	4	5.2	
Housewife	12	0	0.0	
Total	163	6	3.7	

4. Discussion

The study was conducted to determine the prevalence of TB in HIV patients attending COCIN rehabilitation center in Mangu, Plateau State. *Mycobacterium tuberculosis* was determined by examination of Acid-Fast Bacilli (AFB) on sputum smear stained by Ziehl Neelsen's staining technique. Out of the 163 sputum specimens examined, six were positive for AFB giving an overall prevalence of 3.7%. The overall prevalence is comparable to 6.4% recorded among HIV patients attending Nnamdi Azikiwe University

Teaching Hospital, Nnewi, Anambra State and 9.6% reported by Agbaji *et al.* (2013) [5] in a study conducted among patients attending HIV clinic at Jos University Teaching Hospital, Jos, Plateau State. However, the 3.7% revealed in this study is much lower than 13.8% published by Olaniran *et al.*(2011) [9] at Obafemi Awolowo University teaching Hospital in Ile Ife, Nigeria. Also 14% was reported by Okonkwo *et al.* (2015) [13] at DOTS the center in Military Hospital, Port Harcourt, Rivers State, Nigeria. While 33.9% was reported in a similar study conducted at the University of

Benin Teaching Hospital [14]. Additionally, a prevalence of 34.4% was revealed in a study conducted at the Dalhatu Araf Specialist Hospital Lafia, Nassarawa State [2]. The differences in the prevalence may be as a result of different sample sizes, sampling techniques, selection criteria or health seeking behaviour of the patients, level of awareness and education on TB, prevalence of HIV/AIDS, and population densities in the study areas in the different studies among others.

Regarding age-related prevalence, TB in HIV infected patient was highest which agrees with the findings of Which agrees with the findings of 34.4% as reported by Gyar *et al.* (2014) [2] in the age group 31-40 years in Nasarawa state (3) 1.8% among the age group 36-60 years, Which agrees with the findings of 34.4% as reported by Gyar *et al.* (2014) [2] in the age group 31-40 years in Nasarawa State this agrees closely with the findings of Gyar *et al.*, (2014) [2] who reported most cases of TB among age groups 31-40 years. However, our prevalence is lower than those reported by other researchers: Okwokwo *et al.* (2015) [13] reported a prevalence of 21.2% among the age group <30 years in Enugu, State and Olaniran *et al.* (2011) [9] had a figure of 5.8% among the age group 21-30 years in Ogun State.

Our findings, however, is contrary to the findings of other researchers: Okonkwo *et al.* (2015) [13] who reported the majority (21.2%) of TB cases among the age group <30 years, and Olaniran *et al.* (2011) [9] revealed 5.8% as the highest prevalence among the age range of 21-30 years.

Also, we observed a significantly higher prevalence 3.0% of TB/HIV co-infection amongst male patients compared to their female counterparts. Similar findings have been reported by the following authors: Terry Alli *et al.* 2010; Olaniran

et al. 2011; Okonkwo *et al.* 2015; Musa *et al.* 2015 [8,9,13]. On the other hand, studies that recorded higher cases of TB in HIV infected patient among females have been reported by (Agbaji *et al.* 2013; Effiong and Nwakaego, 2015; Okonkwo *et al.* 2015) [5,13,14].

The present study did not record any difference in the prevalence of the TB in HIV infected patient among the married and the singles; this is contrary to previously documented report with more TB/HIV co-infection among the singles as reported by Oladeinde *et al.* 2014 [15] in Edo state, prev 32.8% Nigeria and Musa *et al.* 2015 [8] in Kano state 13.6.

Concerning occupation-related prevalence, patients who engaged in farming had the highest figure of 2.6% case of TB; this could be as a result of the large sample size of the patients being farmers that are likely to have low level of education, poor level of awareness and education on how to prevent TB. Their nutritional status may also play a role in this regards too. The public health implications of the high prevalence among farmers is that the co-existence of the TB-HIV will affect their productivity, thereby leading to poor food production and ultimate food insecurity, especially in this study area where majority of the people are farmers, thus the need to control TB among this community. On the contrary, Oladeinde *et al.* (2014) [15] in a similar study conducted in Edo State recorded the highest prevalence of 41.1% among traders and Olaniran *et al.* (2011) [9] reported figure of 33.3% of TB/HIV co-infections among artisan. Similar to our finding, Oladeinde *et al.* (2014) [15] did not find any TB among civil servant living with HIV, the reason for this could be due to good health seeking behaviors good nutrition and knowledge of TB prevention among civil servants living with HIV.

5. Conclusion

The present study has established the link between TB and HIV infection in the study area. TB remains the most common opportunistic infection among HIV-positive people. We therefore recommend improve antiretroviral treatment coverage and increase uptake of tuberculosis screening, treatment and prevention as a way of reducing active TB among people living with HIV. In addition, occupational health services should be provided by government to famers, which are in most cases forgotten very important workers.

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