

Original Research Article**LOWER LUNG FIELD TUBERCULOSIS: OBSERVATION
FROM YENAGOA, NIGERIA****ABSTRACT:**

Background: this study, undertaken in a major tertiary hospital in the Niger Delta region of Nigeria, was designed to examine the incidence of lower lung field tuberculosis in HIV infected and uninfected patients, and in diabetic patients as well as their AFB status and outcome of treatment.

Methods: Between January 2011 and December 2013, admission records, HIV status, chest radiographs findings, blood glucose levels and AFB status of all pulmonary tuberculosis patients seen in our hospital were retrieved and retrospectively analyzed according to HIV status, AFB status, chest radiographs findings and blood glucose levels. All the patients with pulmonary tuberculosis who had lesions below an arbitrary line across the hilar region in their chest PA radiograph were included in the study as cases of lower lung field tuberculosis.

Results: Of the 596 pulmonary tuberculosis patients reviewed, 76 (12.8%) had lower lung field tuberculosis. It was more common in females (14.1%) than in males (10.9%). Majority of the patients (57.9%) were in the 24-34 years age groups. HIV infected cases had significantly higher occurrence at 46.4%. Diabetic patients had an incidence of 15.0%. Bilateral disease was more common (74.6%) and when unilateral the right side was more affected (51.4%). Cavitation (44.7%). Fibrosis (30.6%) and nodular opacities (22.3%) were the main radiological findings.

26 Conclusion: HIV infection and diabetes mellitus increase the risk of lower lung
27 field pulmonary tuberculosis.

28 Key words: pulmonary tuberculosis, lower lung field, HIV, diabetes

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30 **BACKGROUND**

31 Although in the past decade there has been substantial progress in the development
32 and implementation of strategies necessary for effective tuberculosis control, the
33 disease remains an enormous and growing global health problem. One third of the
34 world's population is infected with *M. tuberculosis*, mostly in developing
35 countries, where 95% of cases occur². In the African region of the WHO, the
36 tuberculosis case rate continues to increase, both because of the epidemic of HIV
37 infection and diabetes in sub-Saharan countries and the poor primary care services
38 in parts of the region^{1, 2}. The upsurge in HIV/AIDS and increasing prevalence of
39 diabetes has considerably increased the occurrence of middle and lower lung field
40 tuberculosis³. This middle and lower field presentation of pulmonary tuberculosis
41 often lead to misinterpretation that may lead to delay in appropriate diagnostic test
42 and treatment thus risking dissemination of the organism to others⁴. In this study,
43 we sought to find out how common lower lung field tuberculosis is in our
44 environment among HIV infected patients and in diabetics.

45 **METHODS**

46 The hospital ethical committee approved this retrospective study, with a waiver of
47 informed consent from the patients.

Design: A retrospective cohort analysis of all medical records adult patients (>15 years) with pulmonary tuberculosis seen in the Federal Medical Centre, Yenagoa between January 2011 and December 2013 was undertaken using standardized data extraction form. Only cases on the TB control program with complete clinical details indicating diagnosis, demographics, clinical and laboratory parameters were included. Patients who had both pulmonary and extra pulmonary tuberculosis were considered as cases of pulmonary tuberculosis and included in the study⁵. Moreover, only patients who had sputum for AFB examination by Zeihl – Neelson method, detailed clinical history, examination; and chest radiograph were included. Those patients whose sputum were negative for AFB by direct smear on 3 specimen were diagnosed as cases of smear negative pulmonary tuberculosis on the basis of suggestive Clinico-radiological findings and Clinico- radiological non-responsiveness to a 2-3 week course of antibiotics⁶. An arbitrary horizontal line across the hilar in a PA chest film was taken as the diving line between upper and lower lung field³. Records with the following features were not included in the study- those of less than 15 years of age, those with either ipsilateral or contralateral involvement of both upper and lower lung fields, and those with chest radiographs showing pleural effusion and thickening, unless associated with parenchymal lesions in the lower zones⁷.

The diagnosis of diabetes had been made in those patients who were concomitantly being followed up in the diabetic clinic using the WHO guidelines⁸. The diagnosis of HIV/AIDS was based on WHO guidelines^{9,10}. All the patients with pulmonary tuberculosis had completed the short course chemotherapy for PTB according to the WHO guidelines¹.

SETTING: The study was undertaken in the Federal Medical center, Yenagoba, a tertiary hospital in Bayelsa State, South –South, Nigeria. The tuberculosis control programme in the hospital is supported by the USAID and it offers comprehensive diagnosis, treatment and care of TB patients.

Statistical analysis: Statistical analysis was undertaken using SPSS 17. A bivariate logistic regression analysis of lower lung field tuberculosis between males and females, between HIV negative and positive patients and between non diabetic and diabetic patients was done. The chi-square test was used in assessing the association between categorical variables. $P < 0.05$ was considered statistically significant for all analysis.

RESULTS:

TABLE 1

GENDER INCIDENCE OF LOWER LUNG FIELD TUBERCULOSIS (LLFT)

Gender	Total no of PTB patient	No. of lower lung field tuberculosis	Percentage of lower lung field tuberculosis
Males	256	28	4.7
Females	340	48	8.1
Total	596	76	12.8

TABLE 2

LOWER LUNG FIELD TUBERCULOSIS IN DIFFERENT AGE GROUPS

Gender	Number of patients	15-24 years	25-34 years	35-60 years	➤ 60 years
Males	28 (36.8%)	4 (5.3%)	12 (15.8%)	8(10.5%)	4 (5.3%)
Females	48 (63.2%)	2 (2.6%)	32 (42.1%)	10 (13.2%)	4 (5.3%)
Total	76 (100%)	6 (7.9%)	44 (57.9%)	18(23.7%)	8 (10.5%)

TABLE 3

INCIDENCE OF LOWER LUNG FIELD TUBERCULOSIS AMONG PATIENTS WITH PULMONARY TUBERCULOSIS

Variable	PTB patient (n)	LLFT patient (n)	Incidence of LLFT (%)	X ²	p-value
Gender					
Male	256	28	10.9	1.33	0.249
Female	340	48	14.1		
HIV status					

Positive	56	26	46.4	63.01	0.00
Negative	540	50	9.5		
Diabetes status					
Diabetic	40	6	15.0	2.12	0.147
Non-diabetic	556	46	8.2		

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108 **TABLE 4**

109 **BIVARIATE LOGISTIC REGRESSION OF LOWER LUNG FIELD**
110 **TUBERCULOSIS AMONG PATIENTS WITH PULMONARY**
111 **TUBERCULOSIS**

Gender	Odds ratio	95% ci	p-value
Male	1	-	>0.05
female	1.3		
HIV status			<0.05
Negative	1	-	
Positive	8.5	4.7-155	
Diabetes status			

Non-diabetic	1		
Diabetics	2.0	0.8-4.9	>0.05

RESULTS

In the period under review, 596 patients (256 males and 340 females) was the total number that had pulmonary tuberculosis out of which 76 (12.8%) met the inclusion criteria for lower lung field tuberculosis. Lower lung field tuberculosis was found to be more common in females (63.3%) than in males (36.8%). (Table 1). Majority of the cases with lower lung field tuberculosis 44 (57.9%) were in the 25-34 years age group. (Table 2)

HIV positive patients were significantly at higher risk of lower lung field tuberculosis among this cohort than those who were HIV negative (odds ratio 8.5, 95% CI (4.7 – 15.5%), $p < 0.05$). Diabetic patients ($n=40$) had a higher occurrence of lower lung field tuberculosis in 6 (15.0%), though not at statistically significant level (odd ratios 2, 95% ci 0.8 – 4.9, $p > 0.05$) (Table 3 and 4).

Bilateral disease was more common (74.6%) and when unilateral the right side was more affected (51.4%). Cavitation (44.7%), fibrosis (30.6%) and nodular opacities (22.3%) were the main radiological findings.

Sputum was positive for AFB in 48 (63.3%) patients (ZN – method) among the cohort.

Seventy three (96.1%) of the 76 patients with lower lung field tuberculosis completed their treatment while two defaulted and one death was recorded.

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134 **DISCUSSION**

135 It was the prevailing opinion, in the past that pulmonary tuberculosis almost
136 always originated from the apices. In 1886, however, lower lung field tuberculosis
137 was first reported¹³. A review of the literature shows that the incidence of lower
138 zone tuberculosis varies widely¹⁴.

139 In this study, we observed an incidence of 12.8%. The variation in the reported
140 incidences may be explained by the variation in the terms and definitions used; for
141 example, basal, lower lobe or lower lung field tuberculosis¹⁴. HIV/AIDS epidemic
142 has also caused an increase in the incidence of lower lung field tuberculosis^{2, 3, 4}.
143 Majority of the studies done worldwide, including this study, show a female
144 predominance. This may be explained in the hypothesis that females have costal
145 type of respiration which results in poor aeration of lower lobe and higher chances
146 of tuberculosis^{2, 3, 4}.

147 In our study, majority of the patients of the patients with lower lung field
148 tuberculosis (57.9%) were in the age group of 35 – 34 years which was followed
149 by the 35 – 60 years age group (23.7%). All other studies had reported similar
150 figures^{3, 6, 14}. The incidence of lower lung field tuberculosis was clearly higher in
151 females than in males in the 25 -34 years age group. The higher incidence may be
152 due to pregnancies and other social factors^{12,14}.

153 The radiological presentation of tuberculosis in HIV infected persons is known to
154 depend on the level of immunodeficiency. Increasing cases of mid and lower lung
155 zone tuberculosis are encountered as the immunodeficiency progress^{4,5}. In our
156 study, 26 (46.4%) out of the 56 HIV infected pulmonary tuberculosis patients were
157 found to have lower lung field tuberculosis (odds ratio 8.5, 95% CI 4.7-15.5 p <

0.05). Other studies have reported frequencies between 40 – 50%^{5,6,14}. The diabetic patients had more incidence of lower lung yield tuberculosis, though this was not statistically significant (odds ratio 2, 95% ci 0.8-4.9, p<0.05). These observations in HIV infected and diabetic patients were similar to most other studies^{4, 5, 14, 15}.

The observation of bilateral disease being commoner (74.6%) in our study seem unique and at variance with other studies^{4, 6, 14, 15}. However, when unilateral the reasons for higher predilection for right lung are not well understood apart from anatomical factors. There is higher incidence of right sided hilar lymphadenopathy in tuberculosis and these lymph nodes may rupture through any bronchus and can cause lower zone infection^{14, 15}. We could not adduce any reason for the preponderance of bilateral disease in our cohort.

All the patients were treated with six month course of anti-tuberculosis drugs according to WHO guidelines¹⁶.

Our study has some limitations. First, we evaluated radiographic findings only on PA films. Thus, we might not have found minimal effusion, mediastinal or hilar lymph nodes. Secondly, visual examination of the airways by bronchoscopy was not done on these patients.

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In conclusion, lower lung field tuberculosis is not a rare occurrence in our environment. This condition should be sought for in HIV infected persons, in diabetics and in women of child bearing age having lower lung field lesions that may mimic pneumonic consolidations. Sputum AFB offers the quicker and easiest way of making diagnosis in our setting. Short course chemotherapy is equally effective in lower lung field tuberculosis as in classical upper lung zone tuberculosis.

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