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Lower Lung Field Tuberculosis: Observation from Yenagoa, Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Author POI did the study design and wrote the protocol. Authors JJ and IDE did the statistical analysis and literature searches while analyses of study was by author ZO. All authors read and approved the final manuscript.

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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 hila 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%). The main radiological findings were cavitation (44.7%), fibrosis (30.6%) and nodular opacities (22.3%).

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

Keywords: Pulmonary tuberculosis; lower lung field; HIV; diabetes.

1. BACKGROUND

Although in the past decade there has been substantial progress in the development and implementation of strategies necessary for effective tuberculosis control, the disease remains an enormous and growing global health problem. One third of the world's population is infected with *M. tuberculosis*, mostly in developing countries, where 95% of cases occur [1,2]. In the African region of the World Health Organization (WHO), the tuberculosis case rate continues to increase, both because of the epidemic of HIV infection and diabetes in sub-Saharan countries and the poor primary care services in parts of the region [1,2]. The upsurge in HIV/AIDS and increasing prevalence of diabetes has considerably increased the occurrence of middle and lower lung field tuberculosis [3]. This middle and lower field presentation of pulmonary tuberculosis often lead to misinterpretation that may lead to delay in appropriate diagnostic test and treatment thus risking dissemination of the organism to others [4]. In this study, we sought to find out how common lower lung field tuberculosis is in our environment among HIV infected patients and in diabetics.

2. METHODS

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

2.1 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 study [5]. 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 antibiotics [6]. An arbitrary horizontal line across the hila in a PA chest film was taken as the dividing line between upper and lower lung field [3]. Lesions were considered to be in the upper lung zone if cephalad to the pulmonary hila and in the lower lung zone if caudad to the hila [6]. 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 zones [7].

The diagnosis of diabetes had been made in those patients who were concomitantly being followed up in the diabetic clinic using the WHO guidelines [8]. 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 guidelines [1].

3. SETTING

The study was undertaken in the Federal Medical center, Yenagoa, 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.

3.1 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.

4. 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 (odds ratios 2, 95% CI 0.8 – 4.9, p >0.05) (Tables 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.

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		

5. DISCUSSION

It was the prevailing opinion, in the past that pulmonary tuberculosis almost always originated

Table 4. Bivariate logistic regression of lower lung field tuberculosis among patients with pulmonary tuberculosis

Gender	Odds ratio	95% ci	p-value
Male	1	-	
female	1.3		>0.05
HIV status			
Negative	1	-	
Positive	8.5	4.7-155	<0.05
Diabetes status			
Non-diabetic	1		
Diabetics	2.0	0.8-4.9	>0.05

In this study, we observed an incidence of 12.8%. The variation in the reported incidences may be explained by the variation in the terms and definitions used; for example, basal, lower lobe or lower lung field tuberculosis [13]. HIV/AIDS epidemic has also caused an increase in the incidence of lower lung field tuberculosis [2,3,4]. Majority of the studies done worldwide, including this study, show a female predominance. This may be explained in the hypothesis that females have costal type of respiration which results in poor aeration of lower lobe and higher chances of tuberculosis [2,3,4].

In our study, majority of the patients with lower lung field tuberculosis (57.9%) were in the age group of 25 – 34 years which was followed by the 35 – 60 years age group (23.7%). All other studies had reported similar figures [3,6,13]. The incidence of lower lung field tuberculosis was clearly higher in females than in males in the 25 - 34 years age group. The higher incidence may be due to pregnancies and other social factors [13,14].

The radiological presentation of tuberculosis in HIV infected persons is known to depend on the level of immunodeficiency. Increasing cases of mid and lower lung zone tuberculosis are encountered as the immunodeficiency progress [4,5]. In our study, 26 (46.4%) out of the 56 HIV infected pulmonary tuberculosis patients were 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% [5,6,13]. The diabetic patients had more incidence of lower lung yield tuberculosis, though

from the apices. In 1886, however, lower lung field tuberculosis was first reported [11]. A review of the literature shows that the incidence of lower zone tuberculosis varies widely [12,13].

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 [4,5,13,15].

The observation of bilateral disease being commoner (74.6%) in our study seem unique and at variance with other studies [4,6,13,15]. 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 [13,15]. 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 guidelines [16].

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.

6. 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.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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