

# **‘Pneumonia in the immunocompromised’ versus ‘Pulmonary tuberculosis’ in HIV positive patients; which is which? Experience in an HIV treatment centre in Nigeria.**

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## **Abstract.**

*Infected individuals with HIV are very susceptible to respiratory infections from different organisms.*

*All HIV positive patients admitted with the diagnosis of ‘pneumonia in the immunocompromised’ were investigated for pulmonary tuberculosis with sputum genexpert test and recruited into the study over a 60 months period. The mean age was  $41.12 \pm 13.08$  years, with the majority (40.0%) of the patients in the 31-40 years age group. Cough was the commonest symptom (100%), followed by fever (94.0%), weight loss (88.0%) and night sweats (54.0%). Anaemia was present in 82.0% of the patients. Thirty percent (30.0%) of the subjects were positive for pulmonary tuberculosis by the sputum GeneXpert investigation, and the commonest radiological finding was patchy consolidation in 50.0% of study patients.*

*Bacterial pneumonia in HIV patients with lower respiratory symptoms is still commoner than pulmonary tuberculosis and its treatment should be optimised while investigating other pathologies.*

**Keywords.** HIV, Tuberculosis, Pneumonia, Patients.

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## **I. Introduction**

Respiratory pathologies are one of the common presentations in patients with human immunodeficiency virus (HIV) infection. Infected individuals with HIV are more susceptible to respiratory infections due to defects in both cellular and humoral immunity. The most common causes of bacterial pneumonia in HIV-infected patients are *Streptococcus pneumoniae* and *Haemophilus influenzae* (1). However, more unusual bacteria can also cause pneumonia (2). The annual incidence of bacterial pneumonia in HIV-seropositive patients ranges from 5.5 to 29 per 100, compared with 0.7 to 10 per 100 in HIV-seronegative patients (2-4). The annual incidence of bacterial pneumonia in HIV-seropositive patients ranges from 5.5 to 29 per 100, compared with 0.7 to 10 per 100 in HIV-seronegative patients (2-4).

Most respiratory infections are minor, especially upper respiratory tract infections. However, the symptoms may be severe enough to warrant hospitalization and provision of inpatient care, particularly when the lung parenchyma of the lower respiratory tract is involved in a pneumonic process. In such cases, tuberculosis is usually also the commonest differential diagnosis that most health care providers are generally most anxious about, and they expend considerable time and scarce resources trying to exclude it due to its known association with HIV infection (5-8).

Sputum GeneXpert investigation (9) is a polymerase chain reaction (PCR) procedure that gives a very high positive diagnostic yield and confirmation in cases of tuberculosis infection (10,11). This is because it can identify positive cases where standard and time-consuming investigations such as sputum microscopy for acid and alcohol fast bacilli (AAFB), chest radiography, and even histology might not be able to detect, due to the low concentration of the organism that may be available for testing. It is one of the favoured investigations recommended by the world health organisation (WHO) for the diagnosis of tuberculosis (11).

This study aimed to investigate and characterize all admitted HIV positive adults presenting with symptoms of pneumonia and ascertain the proportion that had tuberculosis and determine if there are any peculiarities to these patients.

## **II. Methodology**

This is a prospective cross-sectional study conducted on adult HIV positive patients at Irrua Specialist Teaching Hospital (ISTH), Irrua, Edo State, Nigeria, over a 60-month period. ISTH is a tertiary health institution in the south-south region of Nigeria. It also offers tertiary health care (including HIV treatment) to the neighbouring states of Delta, Ondo, and Kogi.

All HIV positive patients admitted with the diagnosis of pneumonia in the immunocompromised to rule out pulmonary tuberculosis were included and recruited into the study.

The sociodemographic data and the presenting symptoms of pneumonia and/or pulmonary tuberculosis were ascertained from the patients. Sputum GeneXpert and other supportive investigations such as chest radiography and complete blood count were done for the patients

The data was analysed using the SPSS software version 25. Continuous variables were presented as means and standard deviation, while categorical variables were presented as frequencies and percentages.

The study was approved by the ISTH health research ethics committee and was conducted following the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments. Informed consent was obtained from all study participants. Participants were at liberty to withdraw from the study at any stage without prejudice to their management.

### III. Results

A total of 500 patients were recruited over a 5-year period spanning January 2017 to December 2021. These were all adult HIV positive patients diagnosed and managed for a diagnosis of `pneumonia in the immunocompromised` on the medical wards of the ISTH.

The mean age was  $41.12 \pm 13.08$  years, with the majority (40.0%) of the patients in the 31-40 years age group. There were 320 females and 180 males, resulting in a female to male ratio of 1.8:1. Most of the patients (24.0%) were either artisans or traders and the majority (70.0%) had a primary level of education. Table 1 summarises the sociodemographic characteristics of the study patients

Cough was the commonest symptom (100%), followed by fever (94.0%), weight loss (88.0%) and night sweats (54.0%). Anaemia was present in 410 (82.0%) of the patients. Thirty percent (30.0%) of the subjects were positive for pulmonary tuberculosis by the sputum GeneXpert investigation, and the commonest radiological finding was patchy consolidation in 50.0% of study patients. Table 2 summarises the clinical characteristics of the study patients

**Table 1 : Sociodemographic characteristics of study population**

Characteristics	Frequency (%) (N = 500)
<b>Gender</b>	
Male	180 (36.0)
Female	320 (64.0)
<b>Age group</b>	
11-20	20 (4.0)
21-30	80 (16.0)
31-40	200 (40.0)
41-50	90 (18.0)
51-60	70 (14.0)
> 60	40 (8.0)
<b>Mean <math>\pm</math> SD</b>	<b>41.12<math>\pm</math>13.08</b>
<b>Marital status</b>	
Married	320 (64.0)
Unmarried	180 (36.0)
<b>Occupation</b>	
Unemployed	80 (16.0)
Civil Servant	70 (14.0)
Student	50(10.0)
Trader/Business	120 (24.0)
Farmers	40 (8.0)
Drivers/Transporters	20 (4.0)

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Artisan	120 (24.0)
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<b>Level of education</b>	
Primary	350 (70.0)
Secondary	100 (20.0)
Tertiary	50 (10.0)

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**Table 2. Clinical characteristics of the study population**

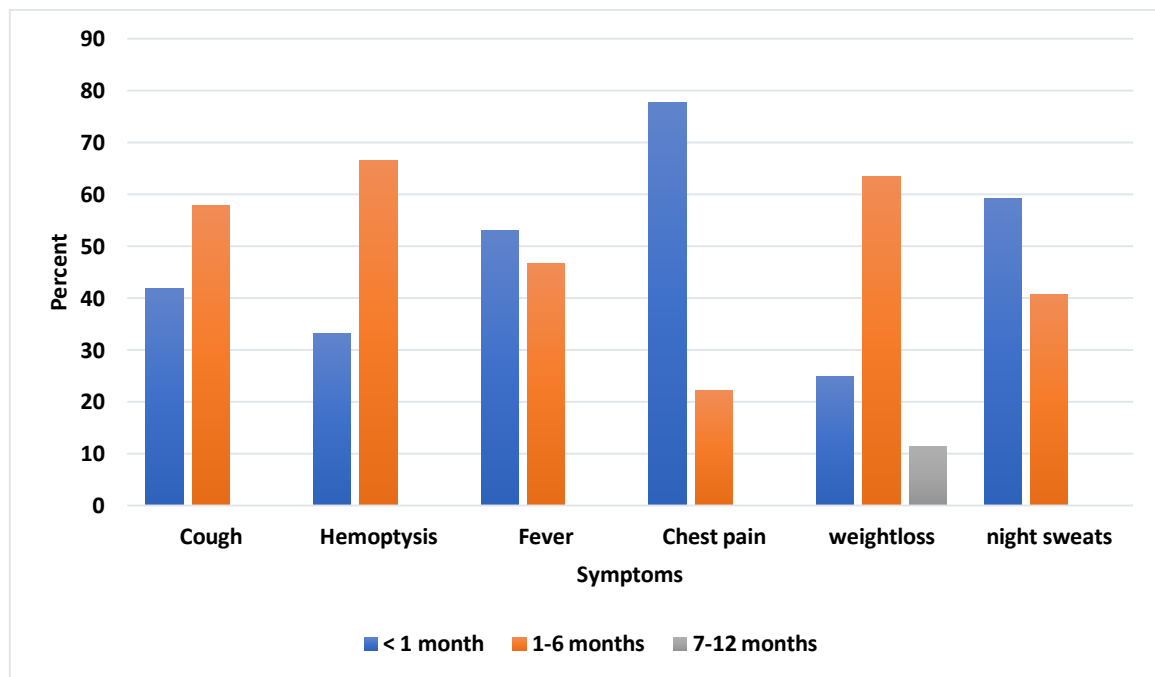
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<b>Clinical findings</b>	<b>Frequency (%)</b>
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<b>Symptoms</b>	
Cough	500 (100.0)
Haemoptysis	60 (12.0)
Fever	470 (94.0)
Chest pain	90 (18.0)
Weight loss	440 (88.0)
Night sweats	270 (54.0)
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Anaemia	410 (82.0)
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<b>Chest radiograph</b>	
Normal	150 (30.0)
Patchy consolidation	250 (50.0)
Fibrosis	25 (5.0)
Pleural effusion	75 (15.0)
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<b>Sputum GeneXpert</b>	
Positive	150 (30.0)
Negative	350 (70.0)
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<b>Duration of HIV diagnosis</b>	
< 1 year	270 (54.0)
1-5 years	120 (24.0)
> 5years	119 (22.0)
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<b>Duration on HAART</b>	
< 1 year	310 (62.0)
1-5 years	130 (26.0)
> 5 years	60 (12.0)
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<b>Treatment outcomes</b>	
Discharged	340 (68.0)
DAMA	70 (14.0)
Death	90 (18.0)

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*DAMA, discharge against medical advice; HAART, highly active antiretroviral therapy*

The duration of most symptoms was less than 6 months, except for weight loss which was upto 12 months in some of the study patients.



**Figure 1. symptom duration of study patients**

#### **IV. Discussion**

There are more females (64.0%) in the population studied than males (36%). This is not surprising as previous studies in this centre and elsewhere have always shown a greater prevalence of HIV infection amongst females compared to males in Nigeria and other parts of the world (12,13). This may not be unconnected to the general susceptibility of females more than males to acquiring HIV infection.

Most of the patients in this study are younger adults between the ages of 31-40 years old (40%), while older and extremely young adults are less affected. This may not be unrelated to the lifestyle choices that the matured adult population are likely to make compared to other age groups (13).

This is also reflected in the occupations of most of the patients in this study. About 48.0% of the patients are either artisans or petty traders who are low-income earners and who are more likely to be exposed to risk factors for respiratory tract infections (14). Several studies done previously in other climes among patients with HIV have found people who inject drugs, inner-city inhabitants, smokers, and persons from resource-limited countries to have the highest risk for bacterial pneumonia (14,15) and respiratory tract infections (6,7,8).

#### **Symptomatology**

The main symptom in the study patients was cough which was present in all of them. This is what was obtained in similar studies as well (16-19).

Chest pain, however, occurs in only 12.0% of the patients (mostly in 77.8% of the patients with symptoms starting in less than one month of presentation). This may not be unconnected to the poor inflammatory response in patients with impaired immune functions, such as those with HIV infection (9,10,11).

Similarly, haemoptysis occurs in only 12.0% of the patients, and this occurred after 1 month of the onset of symptoms in those affected (66.7%). Haemoptysis is a common symptom of pulmonary tuberculosis in Nigeria, largely due to the late presentation of most patients allowing for the development of cavitory lesions in the pulmonary parenchyma while the patient is seeking out different treatment options before coming to the hospital (6). Its low prevalence in this study can also be an indirect indication of the overrating of pulmonary tuberculosis in patients diagnosed with pneumonia in the immunocompromised by some health care providers and expending scarce resources investigating it.

Weight loss, is, however, a prominent symptom amongst our patients occurring in 88.0% of them. This is particularly common in those patients whose symptoms duration is more than 1 month (63.6% in those whose symptoms are between 1- 6 months). The baseline HIV infection associated with suboptimal weight gain and maintenance in most patients may be partly responsible for this.

#### **HIV diagnosis**

In this study, the longer the interval between the diagnosis of HIV infection and the onset of the respiratory symptoms, the less likely for the patients to have respiratory infection. Fifty-four (54.0%) of the patients were diagnosed as HIV positive less than 1 year ago, while only 22.0% of those that were diagnosed

more than 5 years ago had respiratory infections. This may be because of antiretroviral medications in patients with long-standing HIV infection duration. This is also a justification for concerted efforts to be made for HIV patients to be commenced and maintained on antiretroviral medications as soon as possible (20).

Similarly, 62.0% of the patients started the highly active antiretroviral therapy (HAART) less than 1 year ago while only 12.0% of those that have been on it for more than 5 years are admitted and managed for pneumonia. It appears therefore that recent diagnosis and shorter duration on HAART predispose to respiratory tract infection in HIV positive patients perhaps because of a weak immune system prior to commencement of HAART (20,21).

### **Respiratory investigations.**

In this study, the Sputum GeneXpert investigation was negative in 70.0% of the patients and only positive in the remaining 30.0%. This demonstrates the limitations of relying only on clinical diagnosis without the backup of laboratory investigations, particularly when it comes to the diagnosis of pulmonary tuberculosis in HIV seropositive patients (3,4).

Similarly, chest radiography shows consolidative changes in only 50.0% of the patients, despite the sometimes-florid symptoms. This is, however, not unexpected because radiologic findings can often lag clinical signs, especially in cases of atypical pneumonia (22-23).

Anaemia was present in 82.0% of the study population and was only absent in 18%. This may be due to the higher number of females in the study since female HIV patients are more prone to symptomatic anaemia with any chronic illness perhaps due to the lower baseline haemoglobin value and the monthly menstrual cycles (12). Also, the virus itself and some drugs in HAART combinations like zidovudine may contribute to anaemia.

### **Clinical Outcome**

Overall, the clinical outcome of these patients is comparable to other serious pathologies affecting patients with HIV infection. The majority (68.0%) of the patients were treated and discharged with conventional antibiotics while there was 18.0% mortality, largely due to poverty (since out-of-pocket payment for health care in Africa adversely affects the clinical outcome of patients with low socioeconomic status) and severe clinical presentation (24-26).

## **V. Conclusion**

It appears reasonable to consider bacterial pneumonia in HIV patients with lower respiratory symptoms of pneumonia as such and treat accordingly before expending energy and scarce resources on pulmonary tuberculosis, which is associated with HIV infection but may not be as common as anticipated in hospitalised inpatients.

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