

## Research Article

# The Pattern of Presentation and Prevalence of Tuberculosis in HIV-Seropositive Patients Seen at Benin City, Nigeria

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**Background.** The emergence of Human immunodeficiency virus (HIV), led to the rise in the incidence and prevalence of tuberculosis (TB) worldwide. However, the trend is being reversed recently due to the widespread use of effective Anti-Retrovirals. Immunosuppression induced by HIV infection modified the clinical presentation of TB, resulting in atypical signs and symptoms, and a more frequent extrapulmonary presentation. This study was undertaken to determine the pattern of presentation and prevalence of TB in HIV seropositive patients seen in Benin City, Nigeria, from January to April, 2007. **Method.** The study was done using 330 HIV positive patients (123 males and 207 females). A designed questionnaire was used as a diagnostic instrument. **Results.** The prevalence of TB HIV was found to be 33.9%. It was found to be commoner in females, commonest in the age group 30–39 years. Pulmonary TB was the commonest type of TB found (78.6%). This was followed by TB adenitis (12.5%). The incidence of extrapulmonary TB was 21.4%. There was a high incidence of atypical chest X-ray features and high frequency of negative sputum smears. **Conclusions.** The overall prevalence rate of TB in HIV (33.9%), and the extrapulmonary presentation of TB are high. Some investigation results were found to be atypical in those with both infections. Physicians should be aware of this pattern of presentation and the atypical findings on investigation for early diagnosis and treatment.

## 1. Introduction

The effect of HIV on the global TB pandemic is very significant. Before HIV infection was discovered, the prevalence of TB had witnessed a progressive decline, and the pattern of presentation was mostly pulmonary. The control measures against tuberculosis, BCG vaccination, anti-TB chemotherapy, and improvement in living conditions with less overcrowding and better nutrition, had succeeded in producing this decline. However, all these gains were reversed by HIV infection.

An individual who is HIV-positive has 10 times increased risk of developing TB compared to an HIV-negative person [1]; the life time risk is 50% for an HIV-positive person and 5–10% for an HIV-negative person [2].

The presentation of TB in HIV-negative patients conforms with the known clinical features and investigation findings of TB infection. However, in patients who are HIV-positive with depressed immunity (low CD4 count), the pattern of presentation is a deviation from the normal, both in clinical features and investigation findings. Also here, there is a rise in the extrapulmonary presentation of TB. The presentation in patients with HIV who have normal CD4 count is similar to that of HIV-negative patients.

We undertook this study to determine the pattern of presentation of TB in HIV infection and to ascertain the prevalence of TB in HIV-seropositive patients seen at Benin city, Nigeria. We believe this will help physicians to develop a high index of suspicion and quickly recognize these cases.

It will also add to the pool of local data on patients presenting with this dreaded diseases.

## 2. Materials and Methods

**2.1. Study Setting.** The study was done at University of Benin Teaching Hospital (UBTH). It is a second generation teaching hospital located at Ugbowo, Benin City, Edo state, Nigeria. It has a bed capacity of 479 beds and caters for all categories of patients. It is a federal government designated centre of excellence for the management of HIV/AIDS.

The patients for the study were recruited from the HIV clinic. This clinic handles all cases of HIV infection either diagnosed in UBTH or referred from other centres. The clinic is run by medical officers under supervision by consultant physicians. UBTH caters for the tertiary health care needs of patients from Edo, Delta, Ekiti, Kogi, Bayelsa, and Ondo states of Nigeria.

**2.2. Sample Size.** In a sampled year (2005), 2000 patients with HIV infection presented at the HIV clinic.

The sample size was calculated using the formula below for estimated population size of less than 10,000 [3]

$$nf = \frac{n}{1 + (n/N)}, \quad (1)$$

where  $nf$  = The desired sample size when population is less than 10,000.  $n$  = the desired sample size when the population is more than 10,000.  $N$  = the estimate of the population size.

To calculate  $n$ , this formula was used as follows:

$$n = \frac{z^2 Pq}{d^2}, \quad (2)$$

where  $n$  = the desired sample size when the population is greater than 10,000.  $Z$  = the standard normal deviates usually set at 1.96.  $P$  = the proportion in the normal population estimated to have a particular characteristic.  $q = 1.0 - P$ .  $d$  = the degree of accuracy desired usually set at 0.05.

From the data available at the HIV clinic of University of Benin Teaching Hospital, the prevalence of TB in HIV-positive patients was estimated to be about 35 percent.

So  $P = 35\%$  or 0.35.

Therefore

$$n = \frac{(1.96)^2 \times 0.35 \times 0.65}{(0.05)^2}, \quad (3)$$

$$n = 349.$$

Then,

$$nf = \frac{349}{1 + (349/2000)}, \quad (4)$$

$$nf = 297.$$

The calculated sample size was 297. This was rounded off to 300, and 10% of this number was added for attrition. Thus a total sample size of 330 patients was used.

**2.3. Sampling Method.** All consecutive HIV-positive patients aged 18 years and above, who presented at the HIV clinic within the study period and who met the selection criteria, were recruited into the study until the sample size of 330 was met.

**2.4. Selection Criteria.** Inclusion criteria.

- (1) All HIV-positive patients aged 18 years and above who presented at the HIV clinic within the study period.
- (2) All patients who consented to participate in the study.

Exclusion criteria.

- (1) All HIV-negative patients.
- (2) Patients who did not consent to join the study.
- (3) All HIV-positive patients below age 18 years.

## 3. Method of Data Collection

All subjects that met the inclusion criteria were clinically assessed. That involved detailed history taking and a physical examination after obtaining informed consent from the subject. A designed questionnaire was used as the study instrument.

The above information with the subject's biodata and the results of the following investigations were entered into the questionnaire.

- (a) Full blood count and Erythrocyte Sedimentation Rate (FBC + ESR).
- (b) Chest radiograph.
- (c) Sputum acid and alcohol fast bacilli (AAFB).
- (d) CD4 count.

**3.1. Method of Data Analysis.** The microsoft excel computer software was used to record the data. The statistical package for social sciences (SPSS) version 13.0 was used to analyse them. Frequency tables were drawn to show the distribution of data within variables. Contingency tables were drawn to compare two discrete variables.

## 4. Results

A total of 330 patients were recruited in the study. The ages of the respondents ranged between 19 and 74 years. The mean age was 37.2 years. Of all the 330 patients studied, 123 (37.3%) were males. The remaining 207 patients (62.7%) were females.

Among the patients with HIV coinfecting with TB, 64 of them were females while the remaining 48 are males, giving a male to female sex ratio of 1 : 1.3.

The prevalence of HIV with TB coinfection is highest among the age group 30–39 years (43 cases), followed by the age group 40–49 years (32 cases). The lowest prevalence of coinfection is seen in age groups less than 20 years (2 cases) and more than 60 years (4 cases).

TABLE 1: The prevalence of TB in the study population.

TB coinfection	Frequency	Percentages
Absent	218	66.1%
Present	112	33.9%
Total	330	100%

TABLE 2: Distribution of the types of TB found in the study population.

Types of TB	Frequency	Percentages
Pulmonary TB	88	78.6%
TB adenitis	14	12.5%
Abdominal TB	7	6.3%
Disseminated TB	3	2.7%
Total	112	100%

TABLE 3: Distribution of presenting symptoms of TB among all the respondents.

Symptom	Frequency	Percentage
Weight loss	191	79.6%
Fever	159	66.3%
Cough	140	58.3%
Sputum production	115	47.9%
Night sweat	75	31.3%
Haemoptysis	29	12.1%
Difficulty with breathing	26	10.8%

A total of 35 patients (10.6%) in the study population had no formal education. Those with primary education were 111 (33.6%) and secondary education was the largest group with 123 patients (37.3%). A total of 59 patients (17.9%) had tertiary education, while only 2 patients (0.6%) had post-graduate education.

The prevalence of TB in HIV-seropositive patients seen at University of Benin Teaching Hospital found in this study was 33.9%. A total of 112 patients out of 330 patients had TB (Table 1).

The commonest presentation was pulmonary TB, with 88 patients (78.6%) out of the 112 patients with both infections. The least common was disseminated TB (3 patients (2.7%)). Fourteen patients (12.5%) were found to have tuberculous adenitis, while 7 patients (6.3%) had abdominal TB (Table 2).

The most common symptom presented by the respondents was weight loss with 191 respondents (79.6%). This was followed by fever which occurred in 159 respondents (66.3%). Cough was found in 140 respondents (58.3%). Sputum production occurred in 115 respondents (47.9%). A total of 75 patients had night sweat (31.3%). Haemoptysis was found in 29 respondents (12.1%), while difficulty with breathing was found in 26 respondents (10.8%) (Table 3).

Among the TB-coinfected patients, 108 respondents (96.4%) had weight loss, 96 respondents (85.7%) had fever, while 94 respondents (83.9%) had cough. Sputum production occurred in 88 respondents (78.6%), night sweat

TABLE 4: Distribution of the presenting symptoms of TB in HIV patients affected by active TB.

Symptoms	Frequency	Percentage
Weight loss	108	96.4%
Fever	96	85.7%
Cough	94	83.9%
Sputum production	88	78.6%
Night sweat	72	64.3%
Haemoptysis	28	25.0%
Difficulty with breathing	23	20.5%

TABLE 5: Distribution of the chest examination findings in HIV patients affected by active TB.

Chest examination findings	Frequency	Percentages
Crepitations	90	80.4%
Dull percussion note	46	41.1%
No findings	20	17.9%
Dyspnea	19	17.0%

TABLE 6: Relationship between BMI and TB coinfection in the Study population.

TB coinfection	Frequency	Percentage	Mean bmi
Absent	218	66.1%	23.79 kg/m <sup>2</sup>
Present	112	33.9%	21.21 kg/m <sup>2</sup>
Total	330	100%	

TABLE 7: Distribution of the chest X-ray findings in HIV-infected patients with pulmonary TB.

Chest X-ray findings	Frequency	Percentages
Typical	16	18.2%
Atypical	72	81.8%
Total	88	100%

occurred in 72 respondents (64.3%), haemoptysis occurred in 28 respondents (25.0%), while difficulty with breathing occurred in 23 respondents (20.5%) (Table 4).

In the TB coinfecting population, 64 patients (57.1%) were found to be febrile, 65 patients (58.0%) were pale, 4 patients (3.6%) had finger clubbing, lymphadenopathy was found in 32 patients (28.6%), while 10 patients (8.9%) had no significant physical finding.

A total of 19 patients (17.0%) had dyspnea, 46 patients (41.1%) had dull percussion note, while 90 patients (80.4%) had crepitations. In 20 patients (17.9%), there was no significant chest finding (Table 5).

The mean body mass index (BMI) of patients without TB was 23.79 kg/m<sup>2</sup>, while the mean BMI of patients with TB coinfection was 21.21 kg/m<sup>2</sup>  $T$ -test = 4.509,  $P$  value < 0.0001. There was a significant relationship between low BMI and TB coinfection (Table 6).

Out of the 88 patients with PTB, 16 of them (18.2%) had Typical chest X-ray findings of TB, the remaining 72 patients (81.8%) had Atypical chest X-ray findings (Table 7).

TABLE 8: The Mean CD4 count of both TB and non TB-infected HIV population.

TB Coinfection	Frequency	Mean CD4 count
Absent	218	276.3945 cells/mm <sup>3</sup>
Present	112	150.5625 cells/mm <sup>3</sup>
Total	330	

TABLE 9: Distribution of the Ziehl nelson stain results of HIV patients affected by active pulmonary TB.

Ziehl nelson stain	Frequency	Percentages
Negative	65	73.9%
Positive	23	26.1%
Total	88	100%

A total of 181 patients (54.8%) were found to have CD4 count less than 201 and 104 patients (31.5%) had CD4 count between 201–499. The remaining 45 patients (13.6%) had CD4 count 500 and above.

The mean CD4 count of the TB-coinfected population was 150.6 cells/mm<sup>3</sup>, while the mean CD4 count of the patients without TB coinfection was 276.4 cells/mm<sup>3</sup> (Table 8).

The mean ESR of the study population was 73.37 mm/hr. The range of the ESR in the non TB co-infected population was 15–65 mm/hr, while that of the TB-coinfected population was 105–165 mm/hr (Figure 1).

Of the 88 patients found to have PTB, 65 of them (73.9%) had negative-sputum smears, while the remaining 23 patients (26.1%) had sputum-positive smears (Table 9).

A total of 11 patients (20.4%) out of the 54 patients who had been ill for less than 6 months had TB. 72 patients (36%) out of the 200 patients whose duration of illness was between 6 months and 1 year also had TB. 29 patients (38.2%) out of the 76 patients whose duration of illness was above 1 year and 2 years had TB too (Table 10).

Chi-square = 5.416, *P* value = 0.067. This relationship was not statistically significant.

## 5. Discussion

The commonest type of TB found among HIV patients affected by TB was pulmonary TB accounting for 78.6% of cases, while extrapulmonary TB accounted for 21.4%. This agrees with the study by Peters et al. [4] who demonstrated that 88% of the cases were found to have pulmonary TB, while 12% had extrapulmonary TB. We found tuberculous adenitis as the most common type of extrapulmonary TB. However, other related studies have shown that tuberculosis of the spine (Potts disease) [5] and disseminated TB were the commonest [6]. The diagnosis of extrapulmonary TB is, however, usually difficult even in centres with sophisticated diagnostic facilities, as it usually requires biopsies and culture of various body fluids. Thus, the relatively low prevalence of extrapulmonary TB found in this study could be attributed to the unavailability of the culture medium for mycobacterium tuberculosis in our environment, hence under diagnosis.

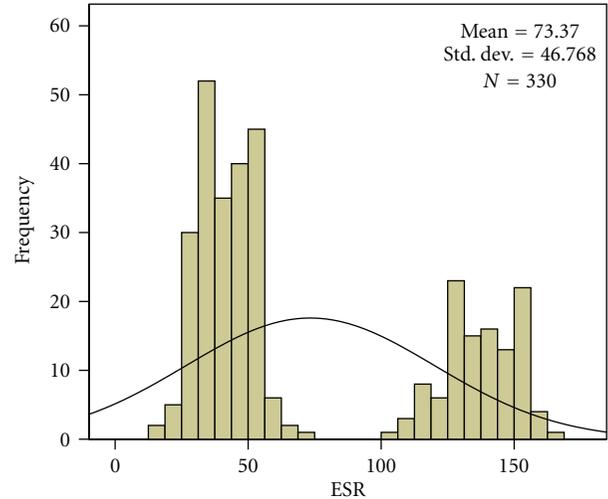


FIGURE 1: Histogram on the distribution of erythrocyte sedimentation rate (ESR) in the study population.

The prevalence of TB in HIV-seropositive patients seen at University of Benin Teaching Hospital found in this study was 33.9%. Local data are not available for comparison. However, this is comparable to the global prevalence of TB in HIV infection (33.3%) [7].

The largest number of respondents was in the age groups 30–39 years (39.1%) and 40–49 years (28.2%). This is similar to what was found in the work done by Ekott [8] These age groups: 30–39 years and 40–49 years form an important part of the active labour force, and thus the nation's economy will be affected adversely.

There were more female respondents (62.7%) than males (37.3%) in this study. The female : male ratio is 1.7 : 1. This is similar to what was found in the studies done by Egbagbe et al. [8] and Ampofo [9].

The most common presenting symptom of TB among those with TB coinfection was weight loss, accounting for 96.4% of all responses in TB patients. This is similar to what was found by Ekott et al. [10] This is expected as TB which is a chronic debilitating disease is coexisting with another debilitating disease (HIV). In the non TB coinfecting HIV patients, 46 were found to have cough, 27 had sputum production, and three patients had difficulty with breathing. Also one patient had haemoptysis, and three patients had night sweat. This may probably be due to presence of other comorbid conditions in these non TB-coinfected patients.

The mean body mass index (BMI) of TB-coinfected patients (21.21 kg/m<sup>2</sup>), was found to be less than that of the non TB-coinfected patients (23.79 kg/m<sup>2</sup>), (Table 6). This is expected as the coexistence of the two debilitating diseases will ultimately affect the BMI negatively.

On general examination, most of the patients with TB-coinfection were febrile and pale. This is in keeping with the pathophysiology of TB and HIV. Finger clubbing was observed in 3.6% of the TB-coinfected patients. In two related studies, 8.2% of clinical cases presenting with finger clubbing was found by Peters et al. [4] and 12% by Ekott in their

TABLE 10: Relationship between duration of HIV infection and TB infection.

Duration	TB-absent frequency	TB-absent percentage	TB-present frequency	TB-present percentage
<6 months	43	79.6%	11	20.4%
6months–1 year	128	64.0%	72	36.0%
>1 year–2 years	47	61.8%	29	38.2%
Total	218		112	

respective studies [10]. This low percentage shows that the presence of finger clubbing is not very important in the diagnosis of TB. In the non TB-coinfected HIV patients, two patients were found to have finger clubbing, and 14 patients had lymphadenopathy. This may be due to presence of other comorbid conditions in these non TB-coinfected patients.

All HIV-coinfected Pulmonary TB (PTB) patients had significant chest examination finding. The most common chest examination finding in the TB-coinfected population was crepitations, accounting for 80.4% of the respondents. This is different from what was found by others where dull percussion note was the commonest [4, 8].

Most of the patients with PTB coinfection (81.8%) had atypical chest X-ray features (Table 7). Atypical chest X-ray features refers to presence of normal chest X-ray or the presence of lesions (cavities, infiltrates) on the lower lobe of the lungs. This finding is in line with the pathophysiology of HIV in TB, as the presence of HIV in TB decreases the immune status to a level that the usual pattern of immune response to TB infection is no longer preserved.

The mean CD4 count of the TB-coinfected population ( $150.5625 \text{ cells/mm}^3$ ) was significantly lower than that of the non TB-coinfected ones ( $276.3945 \text{ cells/mm}^3$ ) (Table 8). This is in keeping with the known pathophysiology of HIV and TB as the decreasing immune status (due to HIV infection) increases susceptibility to TB.

The mean erythrocyte sedimentation rate (ESR) of TB-coinfected patients was significantly higher than that of those without TB infection. Though the ESR was raised in HIV infection, it was grossly raised in TB-coinfection. This is expected, because ESR which is mildly raised in most inflammatory conditions is grossly raised in TB infection. This is similar to what was found in the study done by Dosumu in Iwo, Nigeria [11].

Majority of the patients coinfecting with PTB had negative sputum smears (73.9%), (Table 9). Also as earlier stated, most of these PTB-coinfected patients had low CD4 count. The reason for this high frequency of negative sputum smears is unclear. However, the knowledge that gross reduction of immunity in HIV alters the usual pattern of presentation of comorbid conditions due to altered pattern of immune response may partly explain it.

Majority of the HIV patients affected with TB (72) were ill for a period of 6 months–1 year, a smaller number (29) had the duration of their illness to be more than 1 year–2 years, and a much smaller number (11) had been ill for less than 6 months. The relationship between the duration of illness and TB is however not significant (Table 10). This is in contrast to

expectation that as the duration of HIV infection increases, the immune status decreases with increased susceptibility to TB infection. However, this may not be the true situation, as the duration of illness as given by the patients may not be accurate. This is because many patients are unaware of the time they were infected, there may have been a delay in making the diagnosis, while some may have been patronizing the traditional healers before coming to the hospital.

The above findings illustrate that TB is common in HIV patients, and this worsens their clinical status. The presentation of TB in HIV infection is mostly atypical making diagnosis difficult. Given the unavailability of facilities for culture of mycobacterium tuberculosis and the long duration required for it, diagnosis of TB in HIV infection therefore depends on high index of suspicion and grossly elevated ESR. In the developing world, confirmation is sometimes retrospective depending on clinical response to trial of anti TB chemotherapy.

## 6. conclusion

The prevalence of tuberculosis in HIV-seropositive patients seen at University of Benin Teaching Hospital found in this study was 33.9%. The commonest type of tuberculosis in HIV infection found in this study was pulmonary tuberculosis.

Chest X-ray and sputum smear were atypical in most of the cases and therefore could be misleading in diagnosis.

Markedly elevated ESR remained a constant useful finding in making a diagnosis of TB.

The TB-coinfected patients generally presented worse clinical cases than the non TB-coinfected patients.

## Limitation of Study

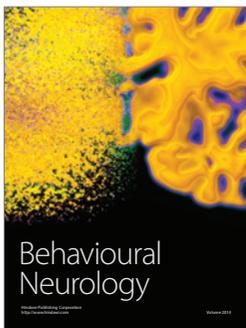
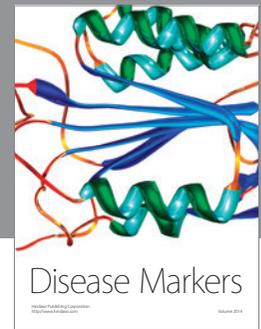
The unavailability of culture medium for the culture of tubercle bacilli, which is the gold standard for diagnosis of TB, was a very strong limitation.

## Acknowledgment

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