Original Article

Incidence And Pattern Of Tuberculosis In HIV Infected Adult In Lagos Nigeria

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Summary
A cross sectional study to determine the incidence and pattern of TB infection among newly registered HIV patients at HIV treatment centre in Lagos. Consecutive patients registering for care during the 3 month study period were screened for TB infection using symptoms, sputum smear for acid and alcohol fast bacilli and chest X-ray after informed consent. Study related information was collected on case record form designed for the study. Data analysis was with SPPS for windows version 20.0

One hundred and sixty out of 621 patients enrolled during the study were diagnosed to have TB infection – an incidence of 25.8%. Majority of the patients were females (60.1%), aged 20-39 years (43.7%) and 44.6% were underweight. The mean CD4 cell count was 236±194.7 cells/mm3. The most common symptoms among the patient was chronic cough alone (44.3%) and chronic cough + prolonged fever (29.1%). Majority of the patients had pulmonary TB (97.5%) and of category I (66.5%) and were sputum smear positive cases (71.6%). Sputum smear for AAFB had a higher case pick up rate (72.0%) compared to 54.0% by chest x-ray, however the difference was not statistically significant. Further analysis also showed that cases detection rate decreases with decreasing CD4 count for both sputum smear (p < 0.01) and chest x-ray (p = 0.001). All HIV positive patients should be screened for TB using both sputum smear and chest x-ray since none has a significantly higher pick up rate than the other and no symptoms is specific for TB in HIV positive individuals.

Keywords: HIV/AIDS, TB, Co-infection, Incidence

Introduction
The resurgence of tuberculosis (TB) incidence and mortality reported in many regions of the world in the past ten years, especially in sub-Saharan Africa, has been traced to the spread of HIV/AIDS. More than 80% of the world’s estimated 9 million TB cases, live in sub-Saharan Africa and Asia. Annual global death rate from TB for the same year was estimated at 2 million 

Similarly, the bulk of the global estimate of people living with HIV/AIDS, are in sub-Saharan Africa. The two combine to form a deadly synergy in co-infected individuals and in countries and populations with a high prevalence of both infections.

TB is also a leading cause of death among people living with HIV (PLWH), with 11 to
60% of deaths among PLWH in sub-Saharan Africa attributable to TB\(^3\).

Whereas HIV can be described as a behavioural epidemic which can to some extent be controlled through behaviour change, TB is mainly an airborne infection. Virtually everybody is susceptible to TB infection. TB infection can remain latent for many years in infected persons, held in check by a competent immune system. However, in HIV infected persons, recent TB infection can rapidly progress to active disease, and latent TB infection can become activated by a failing immune system. Thus, unless a concerted effort is made to control TB and HIV in Nigeria, the epidemic of TB will get out of hand, and morbidity and mortality from TB will increase among PLWH in Nigeria.

Active case detection especially among at-risk individuals and prompt treat of cases is the recommended strategy. The Nigerian National TB control is still utilizing the opportunistic case finding approach.

The study was conducted to determine incidence and pattern of tuberculosis in HIV infected adult in Lagos Nigeria.

**Methods**

**Study Setting:** A large HIV treatment Centre at the Nigerian Institute of Medical Research, Lagos Nigeria. The Centre currently provides comprehensive HIV care, treatment and support for adult, children and pregnant women. Although the Centre receives referrals from the six south western states of Nigeria and the adjoining zones of south south, north central and south east, majority of the patients (>65%) are resident in Lagos. A few patients (0.25%) come from the neighboring West African Countries. All services are provided free to the patients. Patients are enrolled into the HIV treatment programme following a HIV status determination at the HIV Counseling and Testing (HCT) Centre, Nigerian Institute of Medical Research, or other Government approved HCT centres. The status of the patients is further confirmed at the Human Virology Laboratory (HVL) with Western blot before commencement of antiretroviral drugs.

TB positive patients are treated at the DOTs Centre, a few minutes’ walk from the HIV treatment Centre, making the Centre one of the centers providing integrated TB/HIV services. A National TB Reference Laboratory provides all TB diagnostic services except X-ray.

**Study Design:** A cross sectional descriptive study, with intent to treat, over a three months period.

**Study population:** The study population consisted of adult HIV 1-seropositive male and female patients, aged 18 years and above, registering for HIV treatment and care at Centre, during the study period.

**Case detection:** All consecutive ambulant adults presenting for treatment during the three month, who were registered and signed the informed consent for testing, treatment and care for HIV were included in the study and screened for TB at baseline. All subjects were interviewed at recruitment using a case report form. Confirmation of HIV status for the subjects was by licensed double ELISA and Western Blot. Sputum smear microscopy for acid-and-alcohol-fast bacilli was done for all subjects with productive cough and those who could produce some
sputum by following instructions. Chest radiography was done for all subjects, and was interpreted by qualified radiologists. CD4 cell count was also performed for all patients at baseline.

**Sputum smears microscopy for acid-alcohol-fast bacilli:** Three sputum smears were collected from each subject for the purpose of TB diagnosis: a ‘spot’ specimen on the day of pre-assessment, an early morning specimen the next day, and a second ‘spot’ specimen when the subject returns to the clinic with the early morning specimen. Each subject’s specimens were processed in one batch. For this, a direct smear of each sputum specimen was made on a clean microscope slide, and stained for acid-and alcohol-fast bacilli using the Ziehl-Neelsen procedure. The dried slides were then examined under the oil immersion objective of an Olympus light microscope. Sputum specimens were stored in a refrigerator without preservative for a maximum of 72 hours, if they could not be processed immediately after collection of the three specimens.

**Data collection:** A case report forms designed for the study were used for data collection. Information on socio-demographic characteristics and key TB symptoms were recorded in this forms. Results of physical anthropometric measurements and CD4 cell counts were also recorded here as well as sputum and chest x-ray results.

**Informed consent:** All patients registering at the Centre underwent an initial group counseling, during which informed consent procedure was introduced. During individual pre-assessment which followed group counseling, all subjects were guided through a detailed informed consent, which all signed.

**Results**

A total of 623 HIV positive adult who gave their consent were enrolled into the study. Two participants with missing TB results were excluded from analysis. Majority of the patients were female (60.1%). The ages of the participants ranged from 18 to 89 years, with a mean of 36.1± 8.32 years. Majority of the patients (65.9%) were between the age group 20 – 39 Years. Married participants were in the majority (54.4%). Others were either single (26.4%), divorced/separated (10.8%) or windowed (8.4%). The majority of the respondents (74.0%) was either unemployed (16.5%), in school (5.7%) or engaged in a non-skilled job (51.9%). The body mass index of the patients ranged from 10.2 to 37.4 with a mean of 22.2±4.9. The majority of the patients (80.9%) was either underweight (36.3%) or had normal weight (44.6%). The CD 4+ lymphocyte counts ranged from 4 to 1331 with a mean of 236.1±194.7. The majority of the patients (51.3%) had baseline CD 4 lymphocyte counts of less than 200. Others either had CD4 cells count of 200-499 (39.3%) or 500 and above (9.4%).

Of the 619 HIV positive adults with complete TB results, 160 were found to be TB positive by either chest x-ray, sputum AAFB or both; an incidence of 25.8%.

Among the participants confirmed to have TB, their presenting symptoms are shown in table one below. Of the 158 patients that were diagnosed TB positive, only 5(3.2%)
had no symptom. The commonest symptom among the patients was cough alone (44.3%). All three symptoms were present in only 8.9% of the 158 patients.

Table 1: Presenting symptoms among HIV patients co-infected with TB.

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Number of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronic cough + Weight loss + prolonged fever</td>
<td>14 (8.9)</td>
</tr>
<tr>
<td>Chronic cough + Weight loss alone</td>
<td>46 (29.1)</td>
</tr>
<tr>
<td>Chronic cough + Prolonged fever alone</td>
<td>23 (14.6)</td>
</tr>
<tr>
<td>Chronic cough alone</td>
<td>70 (44.3)</td>
</tr>
<tr>
<td>No symptom</td>
<td>5 (3.2)</td>
</tr>
</tbody>
</table>

While pulmonary TB was the diagnosis in majority of the cases (97.5%), 4 patients ( ) only had extra pulmonary TB. Among the 154 patients with pulmonary TB, 113 (71.6%) and 41 (26.6%) had sputum smear positive and negative TB respectively. Among the 158 TB patients, positive x-ray findings were seen in only 80 (50.6%) patients. Majority of the patients had category I TB (66.5%), 18.4% and 15.2% respectively had either category II or category III TB.

Table 2 shows the distribution of sputum AAFB results by chest x-ray findings among the 158 HIV positive TB patients. Though sputum AAFB pick up rate for TB patients were higher (71.6%) compared to X-ray pick up (50.6%) rate, the difference was not statistically significant.

Table 2: Distribution of sputum AAFB results by chest X-ray findings the patients

<table>
<thead>
<tr>
<th>Sputum smear result</th>
<th>Positive finding (%)</th>
<th>Negative finding (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAFB Positive</td>
<td>55 (34.8)</td>
<td>58 (36.7)</td>
</tr>
<tr>
<td>AAFB Negative</td>
<td>25 (15.8)</td>
<td>20 (12.7)</td>
</tr>
<tr>
<td>Total</td>
<td>80 (50.6)</td>
<td>78 (49.4)</td>
</tr>
</tbody>
</table>

Chi square test: 0.61; Degree of freedom: 1; p value 0.43

The result of Tb diagnostic rate by CD4 cell count among the TB patients is shown in table 3. The AAFB positive rate of 86.3% among the patient with CD4 of 200 and above was significantly higher (<0.01) than the AAFB positive rate of 63.6% among patients with Cd4 cell count less than 200. Chest x-ray positivity rate was also significantly (p<0.001) lower in patients with CD4 cell count less than 200 cells (40.2%) compared to 72.5% rate among those with CD4 cell count above 200 cells.

Table 3: Relationship between TB diagnostic methods and CD4 count of the patients.

<table>
<thead>
<tr>
<th>TB diagnostic method</th>
<th>CD4 Cells Count</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;200(%)</td>
<td>≥200 (%)</td>
</tr>
<tr>
<td>Sputum smear result</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AAFB Positive</td>
<td>68 (63.6)</td>
<td>44 (86.3)</td>
</tr>
<tr>
<td>AAFB Negative</td>
<td>39 (36.4)</td>
<td>7 (13.7)</td>
</tr>
<tr>
<td>Chest X-ray findings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>43 (40.2)</td>
<td>37 (72.5)</td>
</tr>
<tr>
<td>Negative</td>
<td>64 (59.8)</td>
<td>14 (27.5)</td>
</tr>
</tbody>
</table>
Discussion
This cross sectional study of clinical tuberculosis among HIV infected adults making their first contact with the HIV treatment Centre has attempted to estimate the proportion of TB disease among new clients over a 3 months period. It has also been used to put into operation early diagnosis and treatment of TB among HIV positive adults through a proactive approach. Responses to questions on symptoms and signs of TB among the adult living with HIV infection were used as an adjunct to sputum smear and chest X-ray.

Comparison of Sputum smear (SS) and Chest X-Ray (CXR) in the diagnosis of TB in these subjects shows that SS has a higher case detection rate than CXR, however the difference was not statistically significant (P=0.43). Also, no single symptom or sign was diagnostic of TB in these subjects. Thus high-lightening the need to use multiple diagnostic approaches to improve yield especially in immune compromised individuals.4

Using this approach, a TB rate of 25.8% was found. Projecting with this rate, an estimated 25,800 new cases of TB disease would be expected to occur in 100,000 HIV Positive adults per quarter. If this scenario is true, the current TB burden in Nigeria is grossly underestimated.

These findings are similar to previous reports of a 27% TB/HIV co- infection rate in Nigeria5. This highlights the need for active case findings in HIV positive persons using multiple diagnostic approaches.

Another important finding in this study is the decreasing TB infection pick up rate with reducing CD4 count using sputum smear and chest X-ray. This is an expected finding since clinical features in TB are the result of body immune response to TB infection. With failing immune function the body’s response to TB in terms of chest x-ray findings and sputum AAFB tends to be weakened5.

Conclusion
There is an urgent need for the screening of all HIV positive patients using both sputum smear and chest x-ray since none has a significantly higher pick up rate than the other and no symptoms is specific for TB in HIV positive individuals. The study also highlights the importance of early and active case finding approach rather than low case yielding passive case finding approach currently in use in the country.

It recommended that the current case management of TB/HIV co-infection should move from passive case finding approach to active case finding. All HIV positive individuals should be screened for TB using multiple case detection approaches of symptom based questionnaire, chest x-ray, sputum smear microscopy and culture.

References
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