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## Clinical presentation of tuberculosis in adolescents as seen at National Hospital Abuja, Nigeria

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**Abstract Background:** Adolescents with tuberculosis (TB) form a significant proportion of childhood TB cases presenting with specific clinical patterns.

**Objective:** To describe the clinical presentation of tuberculosis in adolescent at National Hospital Abuja (NHA), Nigeria.

**Subjects and method:** This is a descriptive and retrospective study of adolescents aged 10- 15 years seen at the department of Paediatrics NHA Nigeria from August 2009 to July 2013.

**Result:** Thirty- six adolescents diagnosed with tuberculosis were reviewed. Adolescent TB accounted for 18.8%(36/192) of total cases of children aged 0-15years seen at the Department of Paediatrics Respiratory Clinic during the study period. The mean (SD) age was 12.3(1.76) years. Twenty seven patients (75.0%) were females and 9(25.0%) were males. Thirty (83.3%) were of lower socioeconomic class. History of contact with a case of TB was obtained in 17(47.2%). The commonest symptoms identified in these adolescents were; cough 27(75.0%), weight loss 22 (61.1%), fever 18(50.0%), sputum 14(38.9%), body swelling 7(19.4%), hemoptysis 2(5.6%); while signs were underweight, pyrexia and chest findings. Nine (25.0%) had associated retroviral disease. Thirty four (94.4%) presented at time of diagnosis with

clinical symptoms while 2(5.6%) were asymptomatic; identified during contact tracing as latent TB infection (LTBI). Abnormal chest radiograph findings were; wide-spread lung infiltrate in 10(27.8%), hilar opacities 7(19.4%), cavitory lesions 4(11.1%), pleural Effusion 3(8.3%) and military opacities 1(2.7%). AFB was isolated in 5(13.9%), while 23(63.9%) had a raised ESR above 30mm/hr. Twenty seven (75.0%) of the adolescents completed treatment for tuberculosis, 7(19.4%) were lost to follow up and 2(5.6%) died while 4(11.1%) had re-treatment for TB from relapse. Clinical presentations were pulmonary TB (PTB) 22(61.1%), and extrapulmonary TB 12(33.3%); distributed as TB adenitis 4(11.1%), TBM 3(8.3%), Pericardial TB 3(8.3%), Miliary TB 1(2.8%) and Spinal TB 1(2.8). Of the nine with HIV- TB coinfection, the clinical presentation were; PTB 5(55.6%), and extrapulmonary 4(44.4%).

**Conclusion:** The patterns of TB in adolescents are admixture as seen in younger children and adult from clinical and radiological characteristic findings. TB remains a preventable disease condition and is curable with early appropriate treatment

**Key words:** Adolescent tuberculosis, clinical pattern.

### Introduction

The adolescent person whose age is between 10 -19 years, has been described generally to be a healthy group compared to the general population, despite their known high risk behavior<sup>1</sup>. The adolescent who is also a young person suffers from TB along with other mem-

bers of the general population<sup>2,3</sup>. In 2012, WHO estimates that 8.6 million incident cases of TB were reported with 530,000 new case of TB being children less than 15 years and 74,000 child deaths from the disease<sup>2</sup>. These estimate were higher than the report published in the preceding year reflecting that more TB cases were being notified among children globally<sup>2</sup>. Over 30

million Nigerians (approximately 22 percent) are between the ages of 10-19.<sup>4</sup> The adolescents and Young people represent a high risk sexual behavior groups that are highly vulnerable to HIV /AIDs infection and consequently at risk of TB, in the dual pandemic<sup>5</sup>.

The younger child, under five have been shown to be at greater risk of TB especially in the presence of malnutrition and lower family socioeconomic background<sup>6,7</sup>. Childhood TB cases proportions in countries vary from 3- 40percent<sup>2</sup>. Nigeria is among the 22 high burden nations with TB, accounting for 80percent of the world TB cases. An estimated 1.1 million (13percent) of the 8.6 million people who developed TB in 2012 were HIV positive with 75 percent in the African region<sup>2</sup>. This ancient and still ongoing TB scourge is caused by the mycobacterium tuberculosis complex, with high and low prevalence worldwide despite available measures that highlight how to address and control the disease.<sup>8</sup> <sup>9</sup>The young person will be at risk of TB infection when in contact with a case of TB disease who is actively coughing, especially when he is immune compromised, is homeless or lives in congested camps, prison or jail, or nursing home and have risky behaviors such as intravenous drug use<sup>2,3</sup>.

There are few reports that have focused on TB burden in the adolescent. In the United States, adolescents comprised approximately one-third of the pediatric cases reported from 1994 to 2010<sup>3</sup>. The younger child, particularly the under-fives play little role in the transmission of TB because they more often have negative smears; they rarely have cavitory disease; they often have little or no cough; and when cough is present, it is generally not forceful enough to expel aerosolized bacilli efficiently.<sup>10</sup> In contrast, the 10- to 19-year age group presents a different spectrum of disease manifestations, including adult-type disease, from which respiratory samples can be more readily obtained<sup>2</sup>. The Stop TB Partnership goals include reducing the global burden of TB (prevalence and mortality) by 50 per cent in 2015 compared with 1990 levels and eliminating TB as a public health problem by 2050<sup>11</sup>. In order to achieve this goal, the adolescent though largely a subset of the paediatric age group but differ remarkably from the younger child should be viewed differently since preventive measure for TB differ for the child and the adult. The study aims to describe the clinical presentation and outcome of adolescent tuberculosis at National Hospital Abuja (NHA), Nigeria.

## Subjects and Method

This is a retrospective, descriptive study, conducted at the Paediatric Respiratory Clinic of National Hospital Abuja. The clinic is held once weekly with average attendance of 15 patients seen per week. The case folders of adolescents aged 10- 15 years seen at the clinic from August 2009 to July 2013 who were diagnosed with tuberculosis were retrieved.

*The protocol for diagnosis of tuberculosis in the clinic were based on:*

Bacteriological identification of mycobacterium tuberculosis complex by direct smear microscopy performed using auramine-rhodamine and confirmed with Kinyoun stain on clinical specimen in a patient with suggestive symptoms and signs or

Clinical diagnoses based on a combination of symptoms and signs in the presence of any one or more of the following; a tuberculin skin test (TST)  $\geq 10$  mm for patients that are HIV negative or  $\geq 5$  mm in HIV positive patients, a history of contact with suspected tuberculosis patient, radiological and/ or histo-pathological finding from lymph node biopsy suggestive of TB. Such clinical features include a history of cough lasting for two weeks or more, sputum with or without haemoptysis, prolonged fever for which patient has been treated with antibiotics with no improvement, weight loss or malnutrition and poor appetite. Other symptoms include convulsions, loss of consciousness, swelling in the back or any other part of the body. Signs recorded were also retrieved including laboratory test results, treatment given with duration and outcome. Cultures were not done on any of the specimens. Only children aged less than 16 years were seen at the paediatric respiratory clinic as part of the hospital policy, while those 16 years and above were attended to by the adult physicians.

A proforma was used to extract information relating to patient demography, clinical symptoms and signs, history of contact, pattern of TB, radiological features, treatment and outcome (completion of treatment, lost to follow up or retreatment for TB). All the patients were under care by the authors and case folders retrieved were analyzed after approval was obtained from the institutional review board of the National Hospital Abuja. Data were analyzed using Microsoft excel 2010 and mean (SD), percentages and tables were generated.

## Results

A total of 52 adolescents aged 0-15 years diagnosed with tuberculosis were documented in the paediatrics respiratory clinic record, but only 36 case folders with adequate information retrieved from the hospital medical records were analyzed during the period August 2009 to July 2013. This gives a prevalence rate of 18.8% (36/192). The mean (SD) age was 12.3(1.76). 75.0% of the adolescents were females while 83.3% were of lower socioeconomic group as shown in table 1.

**Table 1:** Socio-demographic characteristic of the study population

Variable	N	%
<i>Sex</i>		
Male	9	25.0
Female	27	75.0
<i>Socioeconomic status</i>		
High social class	6	16.7
Lower social class	30	83.3

34 patients (94.4%) were diagnosed after they presented with clinical symptoms while 2(5.6%) were identified through contact tracing as asymptomatic (latent TB cases). 17(47.2%) adolescents had a history of contact with a person with suspected TB while 9(25.0%) had associated retroviral disease. Thirty two (88.9%) had a history of BCG given within one month of life. The most common symptoms identified were cough, weight loss and fever, while major signs were underweight, pyrexia and chest findings (respiratory distress, tachpnoea, crepitations, decreased percussion note and chest expansion); table 2.

Acid- alcohol fast bacillus (AFB) was isolated in 5 (13.9%) and 23 (63.9%) had a raised ESR above 30mm/hr, Abnormal chest radiograph findings were; wide-spread lung infiltrate 10 (27.8%), hilar opacities 7(19.4%), cavitary lesions 4(11.1%), pleural effusion 3(8.3%) and miliary opacities 1(2.8%). Twenty seven (75.0%) of the adolescents completed treatment for tuberculosis, 7(19.4%) were lost to follow up and 2(5.6%) died., while 4(11.1%) had re-treatment for TB due to relapse.

**Table 2:** Common symptoms and signs identified in adolescent TB

Symptoms	N	%
Cough	27	75.0
Weight loss	22	61.1
Fever	18	50.0
Sputum	14	38.9
Body Swelling (various sites)	7	19.4
Headache	3	8.3
Hemoptysis	2	5.6
Swelling in the back	1	2.8
<i>Signs</i>		
Underweight $\leq 80\%$	24	66.7
Pyrexia	17	47.2
Pallor	16	44.4
Chest findings	15	41.7
Hepatomegaly	11	30.6
Lymphadenopathy	7	19.4
Gibbus (thoracolumbar)	2	5.6
Neck stiffness	1	2.8

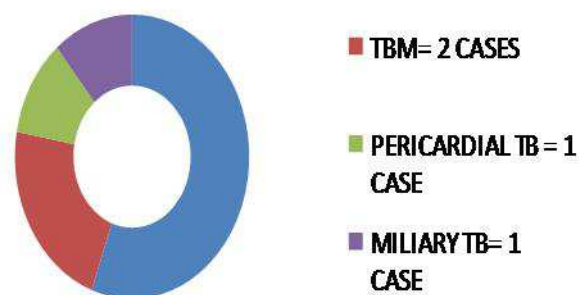
The clinical presentations of TB were; (%) pulmonary TB (PTB) 22(61.1) and extra-pulmonary TB 14 (38.9%); table 3

**Table 3:** Clinical presentation of TB in the adolescents

Variable	N	%
Latent TB	2	5.6
Pulmonary TB	22	61.1
Smear positive	5	13.9
Smear negative	17	47.2
Extrapulmonary TB	12	38.9
TB adenitis	4	11.1
TB meningitis	3	8.3
TB pericarditis	3	8.3
Tb spinal	1	2.8
Miliary TB	1	2.8

Of the nine cases with HIV-TB co- infection, 5(55.6%) presented pulmonary disease while remaining 4 had extra- pulmonary diseases; namely TBM 2; pericardial TB and miliary TB one each; in Chart 1

**Chart 1:** TB pattern in adolescent with retroviral disease



## Discussion

The study describes the clinical characteristics of adolescent TB at the National Hospital Abuja. Adolescent TB accounted for 18.8 percent of cases of TB seen during the study period. The female was at greater risk of TB in this report. Studies have documented that the prevalence of TB in children is higher in girl until between the age 10 and 16 years<sup>12</sup>. The gender disparity becomes evidence after fifteen years with a rising rate amongst male up till adulthood<sup>12</sup>. Majority of the cases had active disease. This may be the reason why the prevalence was higher in the female since the progression from infection to active disease is more rapid in the female gender early in life and the reverse at older age<sup>12,13</sup>. The young girl has been shown to have a threefold higher to acquire HIV infection when compared to the male of same age. This risk factor for HIV may also contribute to early active disease progression<sup>10</sup>. Other factors that have been known to account for considerable variability in the outcome of *M. tuberculosis* infection include malnutrition, poor socioeconomic status and immune suppression such as caused by HIV<sup>4,5,14-16</sup>. Over 60 percent of the study populations were undernourished with weights 80 percent or less for age and sex. Malnutrition interferes with the cell mediated immunity (CMI) response and therefore contributes to much of the increased frequency of TB in impoverished patients<sup>16</sup>. The TB rates were highest in the adolescent of lower socioeconomic status. The historical association of TB with low socioeconomic status and poverty had long been established<sup>14,15</sup>. HIV/AIDS-TB co- infection co-existed in twenty five percent of the adolescents. The dual disease burdens are known to adversely affect the outcome of each other. HIV impairs the host cellular immunity to contain TB infection and verse visa. The combination with HIV co-infection, dramatically compromises host resistance to TB, leading to high disease prevalence in affected endemic populations that include the adolescent. With the current over half a million adolescent infected with TB as at 2012,<sup>2</sup> the risk for increasing prevalence of multidrug-resistant (MDR) and extensively drug-resistant (XDR) MTB strains<sup>17</sup> and the more recent occurrence of TDR (totally drug-resistant) MTB strains, which are virtually untreatable<sup>18</sup> becomes a challenge to all for early detection and treatment of all cases of TB.

Evidence of late presentation in 94.4 percent of the adolescents studied was the presence of clinical symptoms at time of diagnosis. Such adolescents' patients would have already contributed to infection transmission especially as they cough with sputum production in the presence of AFP positive status acting as reservoir of infection to contacts. Late diagnosis results from this lack of early clinical suspicion of the disease. Cough was the commonest symptom in the adolescent while 38.9 percent were able to produce sputum, unlike the younger child who most times cannot expectorate voluntarily. Cough as a significant symptom was also found to be specific in a report by Marais et al<sup>19</sup> in which a persistent, non-remitting cough was reported in 15/16 (93.8%) children under 13 years with tuberculosis and in 2/135 (1.5%) children and young adolescents, without tuberculosis, indicating a specificity of 98.5% (135/137)<sup>19</sup>. The use of well-defined symptoms, even in resource limited settings offer some value in the diagnosis of childhood and adolescent pulmonary tuberculosis. Sputum production with acid-alcohol fast bacillus (AFB) smear positivity is risk factors for transmission of infection among the adolescents and among his peers due to the high social interaction associated with this age group. Close to 14 percent were bacteriological confirmed cases of TB in the present report. Contact with person with suspected TB is an important factor for acquiring the infection seen in up to 47.2 percent of the adolescents. Early case finding from screening of contacts of adolescents and adult cases of active cases remains a strategy for the prevention and control of TB. This also includes the use of isoniazid prophylaxis especially in under five children exposed to contacts of active disease and HIV positive persons. All adolescents with a contact history must be evaluated with a TST for LTBI. Two cases were found to have LTBI in this review and treated. The practice of LTBI treatment for TB contacts with a TST size of 10mm and above help reduce progression to disease. This routine use of isoniazid preventive therapy (IPT) is an effective and cost-effective intervention among child household contacts.

The use of Bacillus Calmette –Guerin (BCG) vaccine was high among the adolescents. The BCG vaccine have been shown to have from zero to 80 percent effectiveness in preventing tuberculosis for a duration of 15 years; however, its protective effect appears to vary according to geography and the laboratory in which the vaccine strain was grown<sup>20,21</sup>. A 1994 systematic review found that the BCG reduces the risk of getting TB by about 50%; (relative risk (RR) of TB of 0.49 (95% confidence interval [CI], 0.34 to 0.70) for vaccine recipients compared with non-recipients (protective effect of 51%), and a protective effect from tuberculous deaths of 71% (RR, 0.29; 95% CI, 0.16 to 0.53), and a protective effect for meningitis of 64% (OR, 0.36; 95% CI, 0.18 to 0.70)<sup>22</sup>. BCG is effective against rare forms of severe childhood TB meningitis and miliary disease, however, the variation in protection against common pulmonary TB that BCG offers has generally been disappointing in trials conducted in the developing world<sup>23,24</sup>. This protection of BCG for children from severe forms of TB in

the first years of life, however doesn't prevent pulmonary TB, which is prevalent in the adolescents and adults, who mostly spread the infection. A BCG that will prevent progression of latent TB to active disease would be desirable; hence a vaccine that is more effective and safe against TB remains a task. The possible role of a booster or replacement in the ongoing BCG trials may in future provide the solution to TB infection in the population that includes adolescents<sup>25</sup>.

The patterns of TB in adolescents seen are a mixture of childhood forms and adult patterns in their clinical, radiological and microbiological findings. Most of the childhood TB forms seen were smear negative PTB similar to the finding reported by Cruz AT et al.<sup>3</sup> For the extra-pulmonary forms, hilar lymphadenopathy was commonest followed by tuberculous meningitis and pericarditis occurring in equal proportion. A similar pattern was also identified in the adolescent with retroviral disease.

Imaging studies such as chest radiograph plays a significant role in childhood TB diagnosis. A normal radiographic study does not however rule out TB<sup>26</sup>. Abnormal chest radiograph findings were mostly widespread lung infiltrate (27.8 percent), hilar opacities (19.4percent), cavitary lesions (11.1percent), pleural effusion (8.3percent) and miliary opacities (2.7percent). Traditionally, the two radiological patterns of TB manifestations that have been described are the primary TB and reactivation (post-primary) TB which relate to the patient immunity<sup>27</sup>. The present study shows a mixed form of both primary disease and reactivation TB, though primary pattern was more predominant. Children and the immunocompromised persons usually present with features of primary TB which includes; parenchymal infiltrates or consolidation within the lung parenchyma, involving any pulmonary lobe or segment, hilar lymph node with or without atelectasis and unilateral pleural effusion on the same side of the primary focus of the TB<sup>28</sup>. In Reactivation TB, apical consolidations involving the upper lobe or superior segment of lower lobe are commonly seen with other features of cavitation, solitary nodules and military picture in some cases<sup>28</sup>. The primary forms of TB were mostly those of hilar lymph node enlargement, (52.8 percent). Marias et al<sup>29</sup> reported that up to 90- 95 percent of primary Tb in children are hilar lymph node enlargement which could be unilateral or bilateral and widespread in up to 70 percent.

Completion of treatment in TB is a significant part of disease control, as this stops transmission of infection from an active case to contacts. A 75percent complete treatment rate in the present report was slightly lower than the reported 85percent national figure (Nigeria 2009 –2013)<sup>30</sup>. A loss to follow up or default from treatment and poor compliance are risk factors for continuing infection transmission in the community with risk for resistance development and drug resistance TB. Lost to follow up rate was 19.4percent; which is lower than earlier report by Jiya et al (36.5%) from Sokoto in north-west of Nigeria<sup>5</sup>. The Directly Observed Therapy (DOT)

strategy aim to improve treatment compliance and completion for the patients through a reliable supervisor of patients and accurate record keeping. TB treatment in the adolescent can be a challenge resulting from the diverse behavioral, social and economic demography associated with the development of the adolescent. This can lead to treatment discontinuation, resulting in perpetuation of TB transmission in the community and appearance of resistant strains. Death rate among the adolescent was 5.6 percent; similar to the overall TB deaths of five percent for 2010 (Nigeria)<sup>31</sup>.

## Conclusion

Tuberculosis remains a significant public health problem, particularly in resource limited settings like Nigeria. Late presentation was high in majority of adolescent as they were symptomatic already before presentation for diagnosis. A mixed pattern of disease was seen in the adolescent for a disease condition that remains preventable and treatable.

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