Abstract

Adolescents are a high-risk population for developing tuberculosis (TB) disease, unfortunately adolescent TB remains to be neglected. Clinical manifestations of TB are usually chronic and nonspecific that could be mimicking other disease. Unrecognized TB disease will lead to misdiagnosis, delayed, and inappropriate management. A 15-year-old female adolescent, admitted to the hospital due to severe anemia, loss of body weight accompanied with recurrent fever and tend to be easily tired. She was through investigation for hematologic disorder with normal results. She was studying in a Muslim boarding school with overcrowded environment. History of contact with TB patient was unclear. Tuberculosis diagnosed based on positive genXpert result, detected sensitive to rifampicin Mycobacterium tuberculosis although acid-fast bacilli sputum smear and culture yielded results were negative. Worsening of the chest X-ray were obtained, initially showed infiltrate of the lung and then revealed bronchogenic spread. Lymph nodes enlargement of the neck-proven TB from fine-needle aspiration biopsy. Anti-TB drugs were started, and after the treatment, there were clinical improvement. TB among adolescents against many unique challenges such as difficulty in case detection, wider potential transmissions and problem on adherence; hence, this age group should be identified as a primary issue in the community.

Keywords: Adolescence, anemia, boarding school, tuberculosis, unrecognized tuberculosis

Introduction

Adolescence is against some unique challenges regarding case detection and management of tuberculosis (TB). Some studies found adolescent as a high-risk population for developing TB disease and requires increased attention for case detection, management of TB, unfortunately, TB among adolescents remain neglected.[1,2]

There were limited data published of TB incidence among adolescence. A previous study estimated 1.78 million adolescents and young adults aged 10–24 years developed TB during 2012 worldwide.[2] Even though adolescent age is 10–19 years, study in Nigeria reported increasing trend TB children aged <15 years from 2011 to 2014.[3]

Clinical presentations of adolescents TB usually chronic and nonspecific. Unrecognized TB clinical presentation, such as severe anemia could delay the diagnosis and leading to misdiagnosis, delayed, and inappropriate management. A previous study investigated anemia in 31.9% of TB cases, mostly benign anemia.[4]

Boarding school was investigated as one of the high-risk factors for TB transmission in China.[5] Moslem boarding school students in Indonesia also reported facing high-risk TB transmission due to overcrowded environment and poor ventilation.[6]
A 15-year-old female adolescent suffered from severe anemia (4 g/dL). She was admitted for investigation for hematological disorder with normal results, and blood transfusion was commenced. She studied in a very crowded boarding school for 3 years until to date. Loss of body weight was noted about 16 kg in the last 8 months accompanied by recurrent fever in the last 1 year and tend to be easily tired without complaining of cough and night sweat. Contact history to adults TB patient was unclear. Bacillus Calmette–Guérin (BCG) vaccine was performed when she was 1 month old. Lumps on the neck were complained since 8 months ago. Physical examination found lymph node enlargement, palpable 3–4 cm in diameter, multiple, soft, bilateral and non-tender. Chest investigation was normal. Liver and spleen enlargement were found. Sputum acid-fast bacilli (AFB) smear and culture yielded negative. GenXpert detected *Mycobacterium tuberculosis* sensitive to rifampicin. Worsening of the chest X-ray appearance was noted which showed initially as infiltrate of the lung and then revealed bronchogenic spread [Figure 1]. Fine needle aspiration biopsy of the neck nodes enlargement confirmed TB. Anti-TB drugs (rifampicin, isoniazid, pyrazinamide, and ethambutol) were started with clinical improvement.

**DISCUSSION**

This patient admitted to the hospital due to severe anemia as an unusual of TB clinical presentation accompanied with other nonspecific clinical presentations. Adolescence is a phase of life between childhood and adulthood. A study in Nigeria showed increased trend of TB disease in children during 2011 (5.9%) to 2014 (7.6%) and previous study from Kenya showed that the prevalence of TB particularly in adolescence was 6-fold higher than that reported to the national TB program.

Even though she was BCG vaccinated, the efficacy of BCG vaccine has been reported to be lower in country with high burden TB due to high exposure of TB. A systematic review reported that BCG vaccine protective efficacy against severe TB was 60%–80%.

TB clinical presentations are usually chronic and nonspecific that could be masking other disease. Unrecognized TB leading to misdiagnosis, delayed, and inappropriate management. This case showed 8 months delayed of TB diagnosis, from the first time complained of anemia until anti-TB drugs were started. Anemia is common in TB mostly caused by suppression of erythropoiesis by inflammatory mediators but mostly in benign form. Nutritional deficiency can deepen the severity of anemia.

In West Java, it is common for an adolescent to study in a boarding school. These boarding students face a high risk of TB transmission caused by overcrowded and poor ventilation environment. The patient was studying in a boarding school for 3 years and shared a 30 m square dorm of poor ventilation with other 44 students. Social risk factors for TB include crowded and low social economy status. Close contact and long duration contact will also increase TB transmission.

TB during adolescence presents unique challenges. Usually mycobacterium confirmation was found in adolescence TB patients compared to young children that will widen the possibility of TB transmission in population. In this case, she had negative AFB sputum smear and culture, genXpert test showed positive result of *M. tuberculosis* that remained sensitive to rifampicin; however, we did not perform non-*M. tuberculosis* test. A study from South Africa showed positive smear sputum were only found in 58.2% of 15–19 year olds TB patients.

Chest X-ray of this patient tended to get worse and revealed bronchogenic spread. In high burden country, adolescents mostly formed post-primary TB. Post-primary TB (bronchogenic TB) is usually asymptomatic, that spread as lobular pneumonia. Usually, the lesion will regress spontaneously, but some caseation necrosis coughed out through the necrotic bronchi could form cavities.

Even though the negative results of AFB smear sputum and culture yielded; however, the positive result of GenXpert and bronchogenic spread of chest X-ray could widen the possibility of TB transmission in her school. Good knowledge about TB preventive is necessary to decreased TB transmission. A study from Indonesia noted 54.6% students had good knowledge about TB prevention. This positive TB preventive behavior is expected to decrease TB transmission in boarding school.

Adolescence age group face unique problem to adherence due to stigmatized by the environment. The previous study reported about 15% of adolescence did not complete the treatment course. Hence, it was needed to educate the patient and her family about the importance of having anti-TB drugs properly and to complete the course of anti TB drugs to reveal good outcome from the anti TB drugs and to prevent multiple drugs resistant TB.

After treated with anti TB drugs, clinical improvement was obtained. Body weight gain was noted and no more complains of recurrent fever and tiredness.

**CONCLUSION**

Adolescence is a crucial TB population that is usually neglected. TB can be mimicking other diseases, therefore,
unusual clinical presentations should always be considered as TB in high burden country after excluding other disease.

Declaration of patient consent
The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest
There are no conflicts of interest.

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