

Obstructive lung disease as a complication in post pulmonary TB

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Abstract. The case of post TB is a problem that arises in the community. Pulmonary tuberculosis (TB) can affect lung function. Therefore, we evaluated impaired pulmonary function in subjects with diagnosed prior pulmonary TB. A Case Series study, pulmonary function test was performed in subjects with a history of pulmonary tuberculosis; aged ≥ 18 years were included. Exclusion criteria was a subject who had asthma, obesity, abnormal thorax and smoking history. We measured FEV₁ and FVC to evaluate pulmonary function. Airflow obstruction was FEV₁/FVC% < 75 and restriction was FVC < 80% according to Indonesia's pneumomobile project. This study was obtained from 23 patients with post pulmonary TB, 5 subjects (23%) had airflow obstruction with FEV₁/FVC% value < 75%, 15 subjects (71.4%) had abnormalities restriction with FVC value < 80% and 3 subjects (5.6%) had normal lung function. Obstructive lung disease is one of the complications of impaired lung function in post pulmonary TB.

1. Introduction

Former TB or post TB case is a problem that often arises in the community, especially in countries with high pulmonary TB prevalence. A large number of people recovered after fully undergoing TB treatment, but some patients had clinically symptomatic shortness of breath, especially during the move. Radiology shows the minimal appearance of post TB (fibrotic and calcification) and pulmonary function that shows airway obstruction which is not reversible.[1,2] This group of patients is in the category of post TB obstruction syndrome with symptoms and signs similar to Chronic Obstructive Pulmonary Disease (COPD).

Pulmonary tuberculosis (TB) can affect lung function. Therefore, we evaluated impaired pulmonary function in subjects with diagnosed prior pulmonary TB.

2. Methods

This research was a case series study design where the subject is the former patient who was treated and completed pulmonary TB treatment in a Respiratory Center Hospital Medan. The pulmonary function test was in subjects with a history of pulmonary tuberculosis; aged > 18 years.



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Exclusion criteria were subjects who had asthma, obesity, abnormal thorax and smoking history. We then measured FEV1 and FVC to evaluate pulmonary function. The pulmonary function test was performed using *Vitalograph*, 6000 Alpha (England) spirometer. Daily calibration was before measuring pulmonary function. Patient data; including age, sex, weight, height and medication history, were collected before pulmonary function test. Pulmonary function test was performed by a trained technician with the patients in standing postures. Each patient performed at least three acceptable forced expiratory maneuvers, which fulfilled the criteria of repeatability. The normal pulmonary function should have FEV1 $\geq 80\%$, FVC $\geq 80\%$ and FEV1/FVC $\geq 75\%$ of predicted values. For abnormal pulmonary function, an obstructive defect was FEV1/FVC $< 75\%$, a restrictive defect as an FEV1/FVC ratio $\geq 75\%$ and FVC $< 80\%$ and a mixed defect as FEV1/FVC $< 75\%$ and FVC $< 80\%$ of predicted values according to Indonesia's pneumomobile project.

All subjects approved the informed consent beforehand. This study was approved by the Ethics Committee of Faculty of Medicine, University of Sumatera Utara.

3. Result

There were 23 participants in the study (Table 1). Females constituted 74% (17/23) of the study participants. Mean age of participants were 36.81 years old. The mean FEV1%, FVC% and FEV1/FVC% were 65.67%, 69.29% and 78.67% respectively.

Table 1. Clinical characteristic of participants.

Characteristic		
Sex	Male	6 (26.0%)
	Female	17 (74.0%)
Age	Mean (SD)	36.81 (13.92)
	Median (Min-Max)	36 (18 - 73)
FEV1 % pred.	Mean (SD)	65.67 (17.32)
	Median (Min-Max)	69 (15 - 89)
FVC % pred.	Mean (SD)	69.29 (14.07)
	Median (Min-Max)	71 (31 - 88)
FEV1/FVC (%)	Mean (SD)	78.67 (11.69)
	Median (Min-Max)	82 (40 - 96)

This study was obtained from 23 patients with post pulmonary TB, 1 (5%) patients had airflow obstruction only with FEV1/FVC% value $< 75\%$, 11 (47%) patients had abnormalities restriction with FVC value $< 80\%$, 4 (18%) patients had mixed obstruction and restriction and 7 (30%) had normal lung function.

Table 2. Distribution of lung function.

Lung Function	No(%)
Obstructive only	1(5%)
Restrictive only	11(47%)
Obstructive and Restrictive	4(18%)
Normal	7(30%)

Numbers of subjects with restriction mild, moderate, severe and very severe were 9 (60%), 3 (20%), 2 (14%) and 1 (6%) patient respectively. The most severity of restriction subjects were mild 9 (60%).

Table 3. Distribution severity of restriction.

Severity	No(%)
Mild	9(60%)
Moderate	3(20%)

Severe	2(14%)
Very Severe	1(16%)

The numbers of subjects with obstruction mild, moderate, severe and very severe were 0 (0%), 3 (60%), 1 (20%) and 1 (20%) patient respectively. The most severity of obstruction subjects were moderate 3 (60%).

Table 4. Distribution severity of obstruction.

Severity	No(%)
Mild	0(0%)
Moderate	3(60%)
Severe	1(20%)
Very Severe	1(20%)

4. Discussion

The pulmonary functions of all subjects were analyzed. From all research, subjects obtained the number of females is the majority, i.e., 17 people (28.60%). It is due to exclusion criteria of post TB patients with a history of smoking so that the male patients become fewer. Several previous studies explained that the male sex has a very high prevalence of pulmonary function decline, especially in the age group above 40 years. Patients in this study had a mean age <40 years old, so that the lung function decline was still early in this subjects study.[3,4]

From other study results stated that post TB patients had a risk for decreased lung function even though the patients had no smoking history and did not have radiologically active lesions. These results may provide information that many factors can lead to decreased lung function, not only regard TB disease itself but also smoking habits as a supporting factor that will lead to decreased lung function.[3-5]

Between 48.7% and 76% of patients had pulmonary function abnormalities after completing pulmonary TB treatment. Several studies have shown that abnormalities could be obstructive, restrictive or mixed defects. The impairment in pulmonary function after completing pulmonary TB treatment is related to long-term respiratory symptoms which affect the quality of life. The prevalence of abnormal lung functions of any type in this study was 70%, and the prevalence of individual patterns of impairment were 22%, 65% and 17% for obstructive, restrictive and mixed patterns of lung disease respectively. These findings indicate a huge burden of post-treatment pulmonary function abnormalities in patients with pulmonary tuberculosis. There were also the majority of the patients with obstructive and restrictive abnormalities had mild to very severe severity. The findings of the present study are similar to those done elsewhere. For instance, in a study by Pasipanodya, et al. (2007) in USA, the prevalence of abnormal lung functions of any type was 59 %, and the prevalence of individual subtypes of impairment for obstructive, restrictive and mixed were 15%, 31% and 13 % respectively.[6,7]

A syndrome associated with pulmonary TB is known as obstruction syndrome or syndrome obstruction post TB (SOPT). The incidence of obstruction syndromes in pulmonary TB varies between 16% - 50%. Pathogenesis of SOPT is very complex; Due to the destruction of lung tissue by the TB process. Another possibility is due to TB infection, caused by individual immunological reactions resulting in a broad, nonspecific inflammatory reaction due to the involvement of neutrophils in the active macrophage lung parenchyma. This chronic inflammation causes the process of proteolysis and the oxidation increases. It will destroy the alveoli matrix, occur chronic lung damage and result in impaired lung function. The histopathological abnormalities after treatment for pulmonary TB include fibrosis, bronchiectasis, and bronchial stenosis, all of which can cause pulmonary function abnormalities.[1-3]

From Manji M, et al. have shown that patients who presented with recurrent tuberculosis had a 2.8 fold higher likelihood of developing abnormal lung functions at the end of treatment than those with the first episode of TB.[4]

5. Conclusion

Obstructive lung disease is one of the complications of impaired lung function in post pulmonary TB.

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