

Original Research Article

Clinical Assessment and Patterns of Lung Function Impairment in Post-Tubercular Obstructive Airway Disease Patients: A Prospective, Single center, Observational Study.Aamir Shokat¹, Shokat Ali Bohra^{2*}, Jitesh Aggarwal², Mahendra Kumar Bainara³¹ Senior Resident, Department of Respiratory Medicine, RNT Medical College, Udaipur, Rajasthan, India² Assistant Professor, Department of Internal Medicine, AIIMS, Udaipur, Rajasthan, India³ Professor and Head, Department of Respiratory Medicine, RNT Medical college, Udaipur, Rajasthan, India

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Abstract

Background: Following the completion of treatment with ATT in patients of Pulmonary Tuberculosis, some patients develop varieties of lung function impairment i.e., obstructive, restrictive or mixed patterns. The impairment in lung function can be assessed by spirometry. The aim of the study is to evaluate the patterns of lung function impairment in treated patients of pulmonary tuberculosis and clinical assessment of Post-tuberculosis obstructive airway disease. **Materials and Methods:** Hospital-based prospective, observational, cross-sectional study conducted in 130 Patients of Post-Tuberculosis admitted at TB & Chest Hospital (Bari) in the period between April 2019 to September 2019. Selected Post Tuberculosis patients were assessed based on spirometry and then patient with obstructive airway disease (OAD) were assessed particularly in terms of demographic data, symptomatology, Degree of Airflow Obstruction (FEV1% Pred.), Chest X-ray findings and duration since last Anti-tuberculosis treatment taken. **Result:** Spirometric assessment of post-TB cases showed that obstructive pattern was predominant type present in 40% cases whereas restrictive and mixed pattern were present in 25% and 20% of Post TB cases, respectively. Only 15% patient had normal pattern. Maximum no. of Post-Tubercular OAD patients were male & were between 5th to 6th decade of age. Among Post-Tubercular OAD patients dyspnoea (94%) was the most common symptom and majority of patients (48%) were having Severe airflow limitation i.e. GOLD-3 severity stage with mean FEV1 = 43.88(±15.45). Hyperinflation on chest X-ray was present in around half no. of cases (53.8%) of Post-Tubercular OAD patients with flattening of diaphragm seen in around 30% cases. Cardiomegaly on chest x-ray were also present in 17.3% cases of Post-Tb OAD. It was also observed that majority of Post-Tubercular OAD patients (40.38%) have taken ATT between 0-10 years back and only 10% patients had taken ATT beyond 30 years back. **Conclusion:** Prior history of Tuberculosis has an important role in the development of obstructive airway disease and for many persons with tuberculosis, microbiological cure may be the beginning, not the end, of their illness. Therefore, even after completion of treatment with Anti-tubercular drugs, these patients need to be followed up for evaluation of development of obstructive airway disease.

Keywords: Lung Function Impairment, Post-Tubercular Patients, Obstructive Airway Disease.

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Introduction

Chronic obstructive pulmonary disease (COPD) and tuberculosis are among the world's first ten most prevalent diseases, the main burden of the latter being in the developing countries, in the form of pulmonary tuberculosis. In the global burden of disease, COPD and tuberculosis have been ranked as sixth and eighth respectively, in terms of disability and death in low- and middle-income communities' worldwide.[1] However, the treatment outcome of pulmonary TB (PTB) has generally improved through numerous collaborative efforts with over 60 million people successfully treated in the past 20 years. This figure, however, has been largely based on microbiological cure as well as completion of prescribed medications.[2] There is minimal consideration on the possible functional impairment of the lungs which can result from the disease and its treatment.[2] Treated post tubercular patients are left with permanent changes in lung anatomy and are at higher risk to develop

pulmonary sequel such as broncho vascular distortion, bronchiectasis, emphysematous changes, and fibrotic bands.[2-5] Post tubercular impairment can manifest as obstructive airway disease, mixed defect, or as pure restrictive defect.[6] Post tuberculosis airway impairment has emerged as a distinct clinical entity, which is almost indistinguishable from other forms. Pulmonary functional impairment as a complication of tuberculosis manifests in various patterns but mainly as airflow limitation.[7-8] The degree of airflow limitation can be assessed by spirometry and stratified in accordance with the Global Initiative for Chronic Obstructive Pulmonary Disease (GOLD). [9]

Material and methods

This was a prospective, observational, cross-sectional study, carried out over a period of 6 months at TB & Chest Hospital (Bari) under the Department of Respiratory Medicine, R.N.T. Medical College, Udaipur (Rajasthan). A total of 130 adult cases of Post-tuberculosis, belonging to both the genders, admitted at TB & Chest Hospital (Bari), during the study, were included after confirming to the inclusion and exclusion criterion. Patients between the age of 40-80 years of both the genders who had history of pulmonary tuberculosis and were completely cured with ATT and having radiological evidence of typical post TB lesions on their latest chest radiographs and were bacteriologically negative on recent sputum AFB and

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sputum CBNAAT results were included in the study. Patients with Presence of any other Respiratory or systemic illness, presence of any clinical features leading to a probability of active pulmonary TB meant exclusion, patients with contra-indication to spirometry and who were not able to perform spirometry and those showing more than 12% and 200-ml reversibility in the post-bronchodilator FEV1 were also excluded. Approval of the institutional ethics committee was obtained, and a written informed consent was taken from every patient included in this study. A detailed history and clinical examination (including general, respiratory, and other systemic examinations) findings were recorded for each patient. Chest radiography and other relevant investigations were carried out in

each patient. For selected Post-tuberculosis patients (satisfying inclusion and exclusion criteria) spirometry was being performed and the frequency of various patterns of lung function impairment was obtained and then patients with Post-tuberculosis obstructive airway pattern were assessed separately in terms of demographic data, symptomatology, Degree of Airflow Obstruction (FEV1% Pred.), Chest X-ray findings and duration since last Anti-tuberculosis treatment taken. For the diagnosis and assessment of COPD, spirometry is the gold standard as it is the most reproducible and objective measurement of airflow limitation. The presence of a Post-bronchodilator FEV1/FVC < 0.70 confirms the presence of persistent airflow limitation. [10] (Table-1)

Table 1: Classification of Airflow limitation Severity in COPD

Classification of Airflow limitation Severity in COPD (Based on POST-Bronchodilator FEV1) in patients with FEV1/FVC ration <0.70:		
GOLD 1	MILD	FEV1 ≥ 80% predicted
GOLD 2	MODERATE	FEV1 ≤ 50% to < 80% predicted
GOLD 3	SEVERE	FEV1 ≤ 30% to < 50% predicted
GOLD 4	VERY SEVERE	FEV1 < 30%

Results

For the final analysis of data, 130 patients of Post-tuberculosis were selected. Then these patients of Post-tuberculosis obstructive airway disease were assessed separately in terms of demographic data, symptomatology, Degree of Airflow Obstruction (FEV1% Pred.), Chest X-ray findings and duration since last Anti-tuberculosis treatment taken. Out of these 130, Majority of Post-Tubercular OAD patients belonged to age 51-60 (44.2%) with mean age 56.73 (SD=8.16). Majority of patients were males. Male to female ratio in

Post-tubercular OAD group was 2:1. The patterns of pulmonary function impairment in patients of post-tuberculosis observed in this study suggest that the most common ventilatory defect occurs after completion of ATT course in patients of post-tuberculosis is obstructive ventilatory pattern (Figure-1). Hence, such patients should be evaluated timely for early diagnosis and treatment of Post-TB Obstructive airway disease to prevent further damage in lung function.

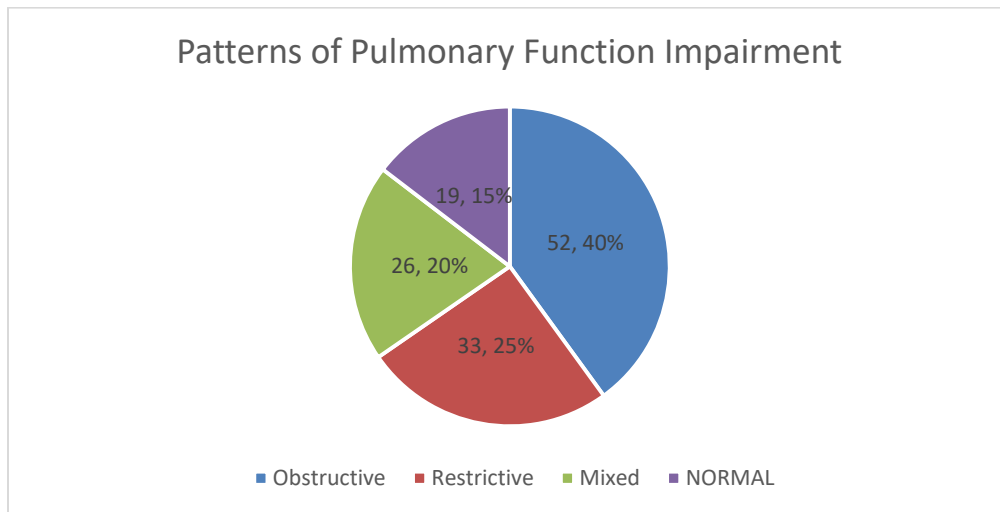


Fig 1: Patterns of Pulmonary Function Impairment

Hyperinflation on chest X-ray was present in around half no. of cases (53.8%) of Post-Tubercular OAD patients with flattening of diaphragm (Lower lobe involvement) seen in around 30% cases overall (17/52). Cardiomegaly was present in 17.3% patients of Post-Tubercular OAD. Dyspnoea was the most common symptom among patients of Post-Tubercular OAD (94.23%) followed by cough (90.38%). Majority of patients of Post-Tubercular OAD (48.07%) were having severe airflow limitation GOLD-3 (Severe) STAGE with mean FEV1 of 43.88(SD=15.45).

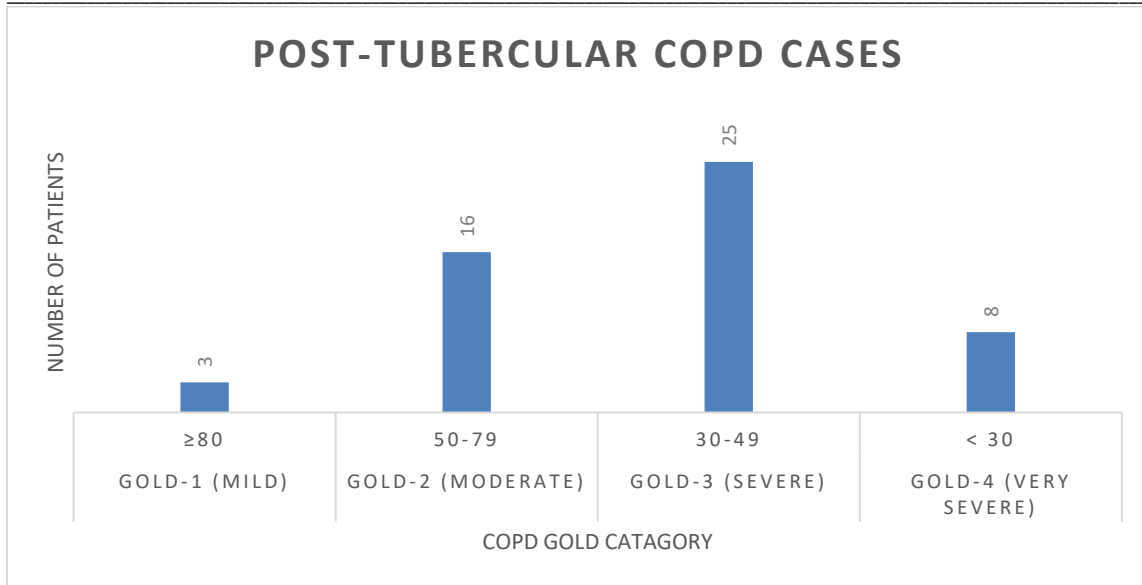


Fig 2: Distribution of patients according to Severity of COPD (Gold Guidelines)

Majority of patients with Post-Tubercular OAD (40.38%) have taken ATT between 0-10 years back and only 9.6% patients had taken ATT beyond 30 years back. All patients of Post-Tubercular OAD with very severe airflow limitation (5) have taken ATT between 0-20 years back. (Table-2)

Table 2: Comparison of FEV1 % predicted with duration since ATT taken by the cases.

Years	≥80	50-79	30-49	<30	Total Number of cases
0-10	0	7 (13.5%)	9 (17.3%)	5 (9.6%)	21
11-20	3 (5.8%)	4 (7.6%)	2 (3.8%)	3 (5.8%)	12
21-30	0	2 (3.8%)	12 (23.1%)	0	14
31-40	0	3 (5.7%)	2 (3.8%)	0	5
Total	3	16	25	8	52

Discussion

In present study the maximum number of patients of Post-tuberculosis (52) were having obstructive ventilatory defect on spirometry i.e., 40%. Similar results were recorded in the study of Inam Baig et al [11](2010) and Agarwal et al[12](2017), they found that obstructive ventilatory defect was the most common pulmonary function impairment in patients with treated pulmonary tuberculosis. In present study, male to female ratio in Post-Tubercular COPD group was 2:1. Male to female ratio are comparable with the study by Inam Baig et al[11](2010) and Ozkaya et al [14](2016). In present study, among Post-Tubercular OAD patient's dyspnoea (94%) was the most common symptom. Verma SK et al[6](2009) in their study at Lucknow also found that incidence of dyspnoea was the most common. This may be due MTB infection makes some permanent change in lung parenchyma and bronchi leading to frequent symptoms. Inam Baig et al[11] (2010) in their study considered the chronic exertional dyspnoea as the main evidence for the development of COPD in Post-tuberculosis patients. This may be due to airway involvement in Post-Tuberculosis patient there is more parenchymal involvement. Cavitation, extensive fibrosis, emphysematous changes, bulla formation, lung scarring & destroyed lung in Post-Tuberculosis patient also contribute to the worsening of dyspnoea. In present study, majority of patients of Post-Tubercular OAD(48.07%) were having severe airflow limitation GOLD-3 (Severe) STAGE with mean FEV1 of 43.88(SD=15.45).The results were comparable with the study by Bairwa R et al[15](2016) in

which mean FEV1 % predicted in Post-Tubercular COPD group was 40.11(SD=17.21). Menezes et al[16] (2007) in his study suggested that the association between TB and airflow obstruction was significant and strong. The association of TB with FEV1 values (mean difference 0.35 mL) was stronger than for FVC (0.25 mL) and, as a result, the FEV1/FVC ratio showed a marked reduction, characterized by an obstructive pattern. We hypothesized that lower FEV1 values were present in patients of Post-TB COPD because increased severity of obstruction was a result of both TB sequel and chronic inflammation. In present study, Hyperinflation on chest X-ray was present in 53.8% of Post-Tubercular OAD patients with flattening of diaphragm (Lower lobe involvement) seen in around 30% cases. Though hyperinflation is the common finding in COPD but in this study substantial number of Post-tuberculosis patients were found to have hyperinflation as a common finding on their chest radiograph. Jianmin et al[17](2018) in his study reported association of previous PTB with higher prevalence of lower lung emphysema and more severe emphysema of both lungs, characterized by more extensive centrilobular emphysema, and higher prevalence of pan lobular emphysema and bullae. In present study, majority of Post-Tubercular COPD patients (40.38%) had taken ATT between 0-10 years back as well the patient with very severe airflow obstruction had also taken ATT during the same duration i.e., 0-10 years back. This was comparable with the reports from the study by Bairwa R et al[15](2016) in which majority of Post-Tubercular COPD patients i.e., 45% had also taken ATT

between 0-10 years back. They noted that recent infection (0-10 years) has more severe airflow obstruction compared to that of long duration (>10 years). In contrast the study conducted by Inam Baig et al [11] (2010) found that 65% of those patients showing an obstructive ventilatory defect had been treated more than 10 years earlier. An earlier study Willcox PA[18] et al(1989) revealed that the obstructive changes become pronounced after 10 years of follow-up in treated cases and co-related with the residual scarring on chest radiograph regardless of the findings on original chest radiographs. The probable reason for recent infection having more severe airflow obstruction could be that with the long duration tubercular lesions heal and patients are improved from obstructive pathology to some extent.

Conclusion

Our study findings suggests that only a microbiological cure is not enough protective against substantial pulmonary sequelae of pulmonary tuberculosis. It supports recommendations of aggressive treatment of TB or other case preventing strategies like screening with PFTs for COPD worldwide, and indicate that, for many persons with tuberculosis, microbiological cure is the beginning, not the end, of their illness.

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Conflict of Interest: Nil

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