

**STUDY OF PULMONARY FUNCTION IMPAIRMENT BY SPIROMETRY IN POST PULMONARY TUBERCULOSIS**K. Sailaja<sup>1</sup>, H. Nagasreedhar Rao<sup>2</sup>**HOW TO CITE THIS ARTICLE:**

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**ABSTRACT:** Often pulmonary Tuberculosis patients declared cured will have residual respiratory disability due to impaired pulmonary function that will have impact on their daily activities.

**OBJECTIVES:** To study pulmonary function impairment in treated pulmonary tuberculosis patients.

**DESIGN:** Prospective observational study-conducted from Jan 2014 to Dec 2014. **METHODOLOGY:**

Adult patients treated for pulmonary Tuberculosis under DOTS or Daily regimen and declared cured and presenting with dyspnea are studied. History regarding smoking, bronchial asthma, Interstitial lung disease, occupational exposure are taken and if present are excluded from the study. History and clinical features suggestive of reactivation of Tuberculosis if present also excluded from the study.

Simple spirometry done to all selected patients. Pre and post bronchodilator FEV<sub>1</sub>, FVC, FEV<sub>1</sub>/FVC recorded.

**RESULTS:** 56 patients satisfying the criteria are included in the study. In 62.5%

Obstructive, 16.07% Restrictive and 21.42% Mixed abnormality detected. **CONCLUSIONS:**

Obstructive, Restrictive and mixed type pattern are seen in treated pulmonary Tuberculosis patients but Obstructive pattern of various degree is more common.

**KEYWORDS:** Tuberculosis, Pulmonary Function Test, Obstructive, Restrictive, Mixed.

**INTRODUCTION:** Pulmonary Tuberculosis patients who have taken complete course of Anti tuberculosis treatment (ATT) and cured,<sup>1</sup> with sputum negative for Acid Fast Bacilli (AFB) and X ray chest showing inactive lesions are frequently left with respiratory disability due to impairment in pulmonary function and present to pulmonary medicine department with dyspnea.

As India accounts for 26% of Global Tuberculosis burden,<sup>2</sup> post Tuberculosis pulmonary impairment may cause significant morbidity and economic loss. Tuberculosis affects lung function due to fibrosis, cavitation, bronchiectasis, pleural thickening etc. causing restrictive abnormality but obstructive abnormality also described.<sup>3,4,5</sup> Post tubercular impairment can manifest as obstructive airway disease, mixed defect, or as pure restrictive defect.<sup>5</sup> Post pulmonary tuberculosis observed to be an aetiological factor for COPD,<sup>5-8</sup> and previous tuberculosis considered as risk factor for COPD.<sup>7-11</sup>

**METHODOLOGY:** Carried out in Pulmonary Medicine Department from Jan 2014 to Dec 2014 Kurnool Medical College Kurnool.

**Inclusion Criteria:**

1. Adult > 18 years age.
2. Pulmonary tuberculosis patients who has taken full course of ATT.
3. Presenting with Dyspnea, cough.
4. Sputum AFB – Negative .
5. X ray chest – normal, or showing inactive lesions, sequelae of TB like fibrosis, cavity, calcifications, bronchiectatic changes.
6. Non smoker.

## Exclusion Criteria:

1. Smoker – present and past.
2. Bronchial Asthma.
3. X ray chest – suggestive of active lesions.
4. Sputum AFB –Positive.
5. History and clinical features suggestive of active pulmonary tuberculosis.
6. Interstitial lung diseases.
7. Cardiac diseases.
8. Anemia.
9. History of occupational lung diseases.

Data regarding age, gender, diagnosis, time of completion of anti TB treatment, smoking history, occupational history were recorded. X ray chest, sputum AFB, ECG, Hb%done.

56 patients satisfying the criteria are subjected to the spirometry after taking consent. 38 were males and 18 were females (Table: 1). The age of patients was ranging from 21 years to 70 years. 41(73.21%) cases occurring in less than 50 years. (Table: 2) Spirometry was done when patient came with the complaints of dyspnea. The duration of interval between completion of ATT and development of dyspnea is variable ranging from 1 month to 10 years, in 40(71.42%) occurring within 5 years of completion of treatment (Table: 5).

Spirometry was done. The technique explained to the patient and three attempts were recorded and the best of three considered if the variation between two readings is less. FEV<sub>1</sub>, FVC, FEV<sub>1</sub>/FVC recorded. Salbutamol inhaler given and waited for 30 min. Post bronchodilator test recorded. The reversibility In FEV<sub>1</sub> more than 12% or 200ml were excluded. The readings are classified as obstructive, restrictive and mixed. Obstructive pattern again divided into mild, moderate & severe.

**RESULTS:** Total 56 patients are taken into the study.

	No. cases	Percentage
Male	38	67.85
Female	18	32.14
<b>Total</b>	<b>56</b>	

**Table 1: Sex wise distribution of patients**

Among total cases 38(67.85%)are males and 18(32.14%) are females.

Age	Number of patients	Percentage
21--30	16	28.57
31--40	11	19.64
41--50	14	25.00
51--60	11	19.64
61--70	4	7.14

**Table 2: Age wise distribution of cases**

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Among 56 cases 41(73.21%)cases are less than 50 years.

Type of impairment	Number of cases	Percentage
Obstructive	35	62.5
Restrictive	9	16.07
Mixed	12	21.42

**Table 3: Type of Pulmonary Impairment**

Among 56 cases 35 (62.5%)showed Obstructive pattern, 9 (16.07%)cases showed Restrictive pattern and 12 (21.42%)cases showed mixed pattern abnormality.

Degree of Obstruction	Number of Cases	Percentage
Mild	12	34.28
Moderate	18	51.42
Severe	5	14.28

**Table 4: Severity of Obstruction**

Among 35 cases of Obstruction 12(34.28%)showed mild, 18(51.42%)cases showed Moderate, 5(14.28%)cases showed severe obstruction.

Interval of treatment Completion and Dyspnea Development	No. of Cases	Percentage
< 1 year	11	19.64
1 to 2 years	13	23.21
2 to 3 years	8	14.28
3 to 4 years	4	7.14
4 to 5 years	4	7.14
5 to 10 years	16	28.57

**Table 5: Depicts the interval of treatment completion and dyspnea development**

Among 56 cases 40(71.42%) developed dyspnea within 5 years of stopping Anti tuberculosis treatment.

**DISCUSSION:** Anti tuberculosis treatment improves lung function in pulmonary tuberculosis patients but a proportion of patients left with residual pulmonary impairment.<sup>5,12,13,14,15</sup> These patients come to Pulmonary medicine department with dyspnea. Simple spirometry was done to study the type of pulmonary impairment in selected patients.

All 3 types of pulmonary function impairment occurred in the study group indicating the cause for the dyspnea may be any one of it. In this study the pattern of Pulmonary function impairment is seen as 62.5% obstructive, 16.07restrictive and 21.42% mixed (Table :3).

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In our study obstructive defect is more commonly seen (62.5%) in consistent with previous studies.<sup>12,16,17,18</sup> Among 35 cases of Obstruction 12(34.28%) showed mild, 18(51.42%) cases showed Moderate, 5(14.28%) cases showed severe obstruction (Table :4).

According GOLD workshop summary chronic bronchitis and emphysema can occur as complication of pulmonary tuberculosis.<sup>6,19</sup> A study performed to assess the impact of Pulmonary tuberculosis as prevalence of COPD found that the prevalence of COPD increases to 3.7 to 5% by including participants with past history of TB treatment.<sup>20</sup> Pulmonary function impairment as a complications of TB manifest as various pattern but mainly as airflow limitation.<sup>9,21</sup> In PLATINO study spirometric indices compared many subjects with and without diagnosis of Tuberculosis. With Tuberculosis performed less well although relative difference tend to be greater for FEV<sub>1</sub> than FVC<sup>16</sup>. History of TB was clearly associated with more severe grades of obstruction.

In our study restrictive defect is seen in 16.07% cases. Some studies found restrictive lung disease as most common followed by obstructive defect.<sup>14,15</sup> Another study found that after 15 years follow up of patients there was a higher decline in FVC than FEV<sub>1</sub><sup>22</sup> Extensive disease may produce restrictive changes due to lung parenchymal destruction. In 21.42% cases both obstructive and Restrictive(mixed) pattern is seen, 73.21% cases occurred in less than 50 years (Table:2) economically earning members<sup>2</sup> indicating that it may cause significant loss of the income to the families. Post pulmonary impairment causes significant loss in income as more number of pulmonary tuberculosis cases notified in 2012 are between 15–44yr age, economically earning members.<sup>2</sup> In 71.42% of cases Dyspnea developed within 5 years of stopping of ATT (Table :5). The loss of lung function was highest within 6 months of diagnosis of pulmonary tuberculosis and stabilized after 12 months when loss is considered as chronic.<sup>16</sup>

Anti tuberculosis treatment improves lung function in pulmonary tuberculosis patients but a proportion of patients left with residual pulmonary impairment,<sup>5,12,13,14,15</sup> due to parenchymal fibrosis, cavitation, bronchiectasis, pleural thickening etc. Nefadov & Popova attributed that the main cause of better lung function was resolution of fresh inflammatory changes and that of worse lung function was cicatricial transformation of lung tissue.<sup>23,24</sup> Similar to smoking TB increases activity of matrix metallo proteinase enzymes contributing to pulmonary damage.<sup>25</sup> Pulmonary dysfunction was found by Nefadov & Simirnova as functional changes in lung tissue by hyperinflation and restriction, change in elasticity, disorders of bronchial patency, and disorders of gas exchange.<sup>14</sup>

Post tubercular pulmonary impairment emerges as distinct entity<sup>26,27</sup> in various pattern but mainly as airflow limitation,<sup>10</sup> and previous Tuberculosis is considered as risk factor for COPD<sup>7-11</sup> Further research required to understand the mechanism of development of obstructive defect in pulmonary tuberculosis.

**LIMITATIONS:** Sample size is small and only those who attended the pulmonary medicine department are taken into the study so may not reflect the total treated patients in community. Not correlated with original chest radiograph or sputum AFB at the time of starting Anti tuberculosis treatment.

**CONCLUSION:** Pulmonary tuberculosis causes significant impairment of lung function of all three types but mainly as obstructive abnormality due to lung destruction and inflammation. So early diagnosis and treatment of Tuberculosis decreases the post tuberculosis impairment. As previous

Tuberculosis is considered a risk factor for COPD by controlling tuberculosis the prevalence of COPD also can be reduced.

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