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Spirometric evaluation of respiratory complications of new pulmonary TB patients after completion of antitubercular treatment

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Abstract---Introduction-Tuberculosis is a major public health problem of all times globally. TB Infects about one fourth of global population. To evaluate and assess the detailed information about the prevalence of abnormal lung function on spirometry of such patients this study was conducted. Material and Methods- Between Nov2017 to Oct2019, we prospectively evaluated all the patients who were diagnosed as case of pulmonary TB after completing full course of ATT at tertiary care hospital RMCH Bareilly. Results-Out of 210 patients (122)58.09% were males and (88)41.9% were females. Majority of patients lies within age group of (20-60 yrs) 163(77.6%).Smoking history were present in 70(33.3%) of patients. About 84(40%) of patients have BMI <18.5 and 97(46.2%) patients had BMI between 18.5- 24.9 and rest patients had BMI >25. After completing ATT the most common symptoms that patient had SOB 201(95.7%) followed by Dry Cough 121(57.6%) and Expectoration 38(18%). Out of 210 patients 172(81.9%) of patients have abnormal lung function. Conclusion- We found that out of all the symptomatic post TB patients, 172(81.9%) had abnormal lung function and among them majority of patients had Restrictive pattern i.e. 118(56.2%), 27(12.8%)

had mixed pattern and 7(3.3%) had obstructive pattern on spirometry. The key to prevent and reduce the incidence of post tubercular respiratory function impairment is early diagnosis and adequate and regular treatment of TB in order to minimize residual lung damage.

Keywords---anti tubercular treatment, spirometry, post tubercular airway disease.

Introduction

Tuberculosis is a major public health problem of all times globally. TB Infects about one fourth of global population. Although India has a impactful burden of TB and COPD, we presume that smoking/Biomass fuel exposure is the major risk for developing airway disorder but pulmonary tuberculosis which healed mainly by fibrosis left an individual with permanent airway abnormality. In Indian scenario most of the time patient presents late to health care facility for proper evaluation and treatment , till then there is development of extensive pulmonary lesions that may lead to development of extensive airway disease or other complications like corpulmonale which leads to reduced quality of life. To evaluate and assess the detailed information about the prevalence of abnormal lung function on spirometry and persistence of symptoms like breathlessness, cough and expectoration in patients who had completed course of anti tubercular treatment this study was conducted.

Material & Methods

This prospective study aimed to evaluate pulmonary function impairment on spirometry in all those patients who had completed full course of Anti tubercular treatment during a period of 2 years starting from Nov 2017 to Oct 2019 in department of Respiratory medicine at tertiary care hospital RMCH, Bareilly.

Methods

All cases were thoroughly subjected to the following protocols-

1. Detailed medical history and through clinical examination.
2. All necessary investigations including (CXR, Sputum analysis, CBC, LFT, and KFT) and other investigations were considered as per requirement.
3. Spirometry was performed of all those patients who had completed full course of ATT.

The data was collected and spirometry was performed and interpreted according to the ATS/ERS guidelines using computerized spirometer, MIR spirolab 3 with flow transducer.

Following algorithms were used in determining different lung function impairment like restrictive or obstructive patterns on spirometry. The results were analysed and categorized in four groups as follows :-

1. Normal - FEV1/FVC ratio of >70% and an FVC of >80% predicted
2. Obstruction- defined as an FEV1/FVC ratio of <70% and an FVC of >80% predicted
3. Mixed-combined defects were FVC of <80% predicted and an FEV1/FVC ratio of <70%
4. Restriction- as an FEV1/FVC ratio of >70% with an FVC of <80% predicted.

Inclusion criteria

All patients diagnosed and treated as a case of new pulmonary tuberculosis according to NTEP guidelines. Patients who completed their treatment and become sputum smear negative at the end of treatment, presenting to OPD/IPD with symptoms within 6 months of completing treatment were included in the study.

Exclusion criteria

- Pregnant and lactating women
- History of asthma, ILD, immunosuppressive disorder, Diabetes, Cardiac, Renal and hepatic insufficiency.
- History of Recurrent pulmonary tuberculosis, EPTB and MDR-TB patients.
- Patients with history of Breathlessness of more than one year.

Results

Total 210 patients were enrolled in our study. Out of 210 patients (122)58.09% were males and (88)41.9% were females. Among 210 patients mostly lies within age group of (20-60 yrs) 163(77.6%).Smoking history were present in 70(33.3%) of patients. About 40% of patients have BMI <18.5 and 97(46.2%) patients had BMI between 18.5-24.9 and rest patients had BMI >25. After completing ATT majority of patients have symptoms like SOB 201(95.7%),Dry Cough 121(57.6%),Expectoration 38(18%). Out of 210 patients 172(81.9%) of patients have abnormal lung function. Out of 210 patients 111(52.8%) of patients presented with <8 weeks of symptoms before initiation of ATT and among them 46(21.9%) of patients had restricted pattern on spirometry and 99(47.2%) of patients presented with >8 weeks of symptoms before initiation of ATT and among them 72(34.2%) of patients had restricted pattern on spirometry.

Demographic Variables		Frequency
Gender	Male	122(58.09%)
	Female	88(41.9%)
Smoking	Smoker	70(33.3%)
	Non smoker	140(66.6%)
BMI	<18.5	84(40%)
	18.5-24.9	97(46.2%)
	25-34.9	29(13.8%)

Table-1 Demographic determinants of new pulmonary TB patients after completion of anti-tubercular treatment

AGE	Frequency
<20 yrs	25 (11.9%)
21 – 40 yrs	67 (31.9%)
41-60 yrs	96 (45.7%)
>60 yrs	22 (10.4%)

Table-2 Age Distribution of enrolled patients

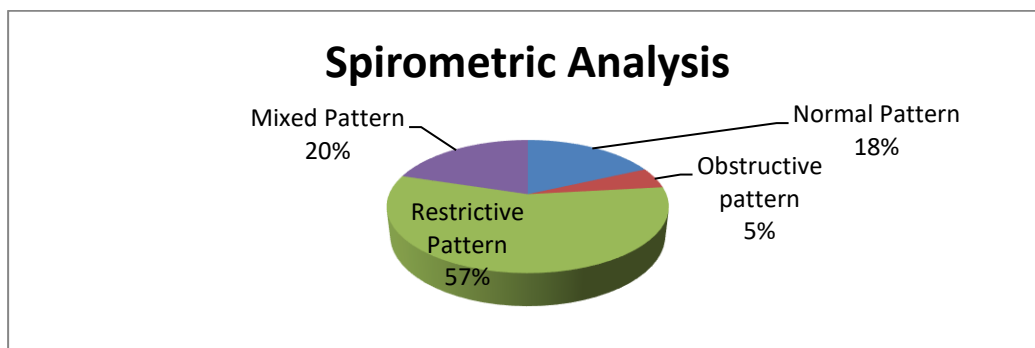


Figure-1 Spirometric analysis of enrolled patients

Spirometric Variables	Frequency
Normal	38(18.1%)
Obstruction	11(5.23%)
Restriction	118(56.2%)
Mixed	43(20.47%)

Table-3 Spirometric data Interpretation of enrolled patients

Duration of illness before initiation of ATT	Normal spiromerty	Obstructive pattern	Restrictive pattern	Mixed pattern
< 8 Weeks	28(13.3%)	4(1.9%)	46(21.9%)	16(7.6%)
> 8 Weeks	10(4.7%)	07(3.3%)	72(34.2%)	27(12.8%)
Total	38(18%)	11(5.2%)	118(56.2%)	43(20.4%)

Table-4 Comparing Spirometric Analysis of enrolled patients with duration of illness before ATT initiation

Sypmtoms	Frequency
Shortness of breath	201(95.7%)
Cough	121(57.6%)
Expectoration	38(18%)
Hemoptysis	19(09%)
Loss of appetite	13(06%)
Fever	12(5.7%)

Table-5 Symptoms profile of enrolled patients after completing full course of ATT

Discussion

Post tubercular obstructive airway disease is entity that is well known to us but it is not routinely counselled or treated. Sometimes such patients also complaints of cough and other symptoms and among them few patients were wrongly started with ATT which further leads to worsening of such cases. So in present study we evaluated the clinical and spirometric profile of such patients. In our study we found that majority of the patient lies within age group of 40 to 60 years that is 96(45.7%) of patients. The similar results of age group between 40 to 60 years were observed by choi cj et al (2019), Patil et al (2018), Andre FS Amaral et al (2015), Avradip santra et al (2017) and Kurt J. Daniel et al (2019).

In our study we observe that male gender is having preponderance and similar observations were noted by Patil et al⁸(2019), Jayasri Halen Gali et al⁸(2019), Avradip santra et al⁸(2017) and Kurt J. Daniel et al⁸(2019) as 60%, 59.4%, 84.06 % and 56% respectively while slight female preponderance were observed by Andre FS Amaral et al⁸(2015). Another important observation in our study that 40% of patients are underweight with BMI of less than 18.5 and 46.2 % of patients having normal BMI while 13.8% had BMI of more than 25 the similar results were observed by Kurt J.Daniel et al⁸(2019) and Tatenda M Nyagura et al⁸(2016) as average BMI of (20+-4) and (21.7+-4) respectively.

In our study we found that in 111(52.8%) of patients had less than 8 weeks of duration of illness before initiation of ATT while 99(47.2%) of patients had more than 8 weeks of duration of illness before commencing of ATT. It is an important finding which we get in our study that in patients with <8 weeks of duration of illness before commencing of ATT had comparatively lower risk of developing respiratory function impairment as compared to the group of patients who had longer duration of symptoms before commencing ATT.

In our study we performed spirometric evaluation of lung function who had completed full course of ATT. We observed restrictive pattern as a major abnormality in 118(56.2%) of patients while obstructive pattern was found in 11(5.2 %) of the patients and mixed airway impairment was found in 43(20.4%) of patients. The similar results were observed by SK verma et al¹⁰ (2009), Milan Radovie et al¹¹, (2016), Kurt J.Daniel et al⁸(2019) but on the contrary Patil et al⁸(2018), Jayasri Halen Gali et al⁸(2019) observed obstructive pattern as a major airway impairment lung function defect. while Avradip santra et al⁸(2017) observed mixed pattern as major lung function impairment in their study.

Another important observation we found in our study as shortness of breath as most common post tubercular symptom in 201(95.7%) of patients followed by cough in 121(57.6 %) and expectoration in 38(18%) of the patients. Similar observations were noted by Patil et al⁸(2018) while cough as a major symptoms in patients who had completed ATT course were noted by Jayasri Halen Gali et al⁸(2019) in 58.6% of patients.

Conclusion

Approximately half of the patients had duration of symptoms more than eight weeks before the diagnosis and had probably more residual lesion in their lungs thereby leading to of high pulmonary function impairment in this group of patients. Out of all the symptomatic post TB patients, 82% had abnormal result on the spirometry with 56% Restriction followed by mixed pattern 20.4% and 5.2% had obstructive pattern.

Therapy like bronchodilators along with the pulmonary rehabilitation may be helpful in patients with a history of smoking and having obstruction or with mixed ventilatory defect on spirometry post tuberculosis treatment. The key to prevent and reduce the incidence of post tubercular respiratory function impairment is early diagnosis and adequate and regular treatment of TB in order to minimize residual lung damage.

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