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Original Research Article

Clinico-physiological profile of patients of pulmonary impairment after tuberculosis at a tertiary care centre

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ABSTRACT

Background: Pulmonary tuberculosis (TB) is a unique infectious disease that more often results in permanent structural changes in the lung parenchyma. It is by virtue of these changes that the patients even after bacteriological cure continue to suffer the after effects of the disease. Objective of study was to assess the clinico-physiological profile of patients of pulmonary impairment after tuberculosis (PIAT) attending S. N. Medical College, Agra, Uttar Pradesh, India.
Methods: Over the time period of 2 years, 350 patients of healed pulmonary tuberculosis were identified and studied about their clinico-physiological profile. This profile included age, sex, category of treatment, pulmonary function test pattern, exercising capacity, exercise tolerance and quality of life.
Results: It was found that majority of the patients were males, >60 years of age and had taken Category-II treatment. Most of the patients were having an obstructive pattern on PFT, poor exercise tolerance and exercise capacity and a poor quality of life.
Conclusions: Patients of healed pulmonary TB continue to experience respiratory symptoms owing to the permanent anatomical changes in the lung conferred by the disease.

Keywords: Healed Pulmonary TB, PIAT, Pulmonary impairment

INTRODUCTION

Pulmonary TB survivors frequently experience structural and functional lung sequels that vary in severity that have recently been more completely described.[1] Pulmonary tuberculosis (TB) can cause parenchymal destruction by up-regulation of several proteases and dysregulation of protease control.[2] The histopathological abnormalities after treatment for pulmonary TB include fibrosis, bronchiectasis, and bronchial stenosis, all of which can cause pulmonary function abnormalities.[3,4]

Pulmonary impairment after tuberculosis was recently described as a non-fatal negative health effect.[5-7] Pulmonary impairment after tuberculosis (PIAT) refers to chronic pulmonary function loss that occurs in persons who have achieved microbiologic cure of pulmonary tuberculosis. Levels of impairment were determined in previous studies via spirometry using American Medical Association's Guide to Evaluations on Permanent Impairment (fifth edition).[8] Impairment was scaled none, mild, moderate, or severe. In India, the burden of tuberculosis is very high due to a multiplicity of causes such as overcrowding, poor hygiene conditions and lack of orientation towards role of early diagnosis and treatment of the disease. Patients approach the physician very late after onset of the disease when the pulmonary impairment has established itself to a great extent. In this

study, we enrolled all those patients who were adequately treated for pulmonary tuberculosis and were declared as cured but still continued having symptoms pertaining to respiratory system.

METHODS

From September 2015 to September 2017, i.e., over the time period of 2 years, 350 patients of healed pulmonary tuberculosis attending S.N. Medical College, Agra were identified and studied about their clinico-physiological profile. This profile included age, sex, category of treatment, pulmonary function test pattern, exercising capacity, exercise tolerance and quality of life. Participants gave written informed consent, and patient anonymity was preserved using ethical committee approved protocols.

Patients enrolled in the study were either those who came to the hospital having adequately treated previously or those who were diagnosed as active pulmonary TB cases and went on to complete the treatment and declared as cured according to RNTCP guidelines. In either case, confirmation of healed pulmonary TB was done by getting sputum smear and culture bacteriologically negative. All the patients had some degree of respiratory discomfort and symptoms which were not compliant with their routine life. Patients excluded from the study were those with other significant comorbidities such as cor-pulmonale, diabetes mellitus, COPD, bronchial asthma or pulmonary impairment not as a result of TB.

Various tools were used for calculation of parameters as described below:

- PFT was done using P. K. Morgan's Spiro 232 pulmonary system in the department of TB and Respiratory Medicine at S. N. Medical College, Agra.
- Exercising capacity was measured using the 6-minute walk test distance.
- Exercise tolerance was measured using the modified Borg's scale.
- Quality of life was measured using the validated Hindi version of the Saint George's Respiratory Questionnaire.

The study was a periodic, longitudinal and observational study aimed at assessing the overall functional status of patients of healed pulmonary TB and to understand the various limitations whether functional, social or behavioural that they face in their daily life.

RESULTS

Total 374 patients gave consent to participate in our study over the time period of 2 years. About 11 patients were found culture positive and 13 patients dropout during the study so not included for final evaluation. Following results were obtained regarding the clinico-physiological profile of 350 patients of pulmonary impairment after tuberculosis.

The majority of the patients were >60 years of age (40.86%) closely followed by age group 40-59 years (39.43%) and last 20-39 years age group (19.71%). The majority of the patients were male (60.29%) and the remaining were female (39.71%).

Table 1: Demographic parameters of patients.

Parameter	No. of patients	Percentage
Age		
20-39	69	19.71
40-59	138	39.43
>60	143	40.86
Sex		
Male	211	60.29
Female	139	39.71
Category of treatment		
I	106	30.29
II	222	63.43
IV	22	6.29
PFT pattern		
Normal	113	32.29
Obstructive	127	36.29
Restrictive	53	15.14
Mixed	57	16.29
6-MWT Distance (m)		
<250	59	16.86
251 to 349	238	68.00
>350	53	15.14
Modified Borg's score		
<4	64	18.29
4 to 7	184	52.57
>7	102	29.14
SGRQ score		
<10	52	14.86
10 to 15	201	57.43
>15	97	27.71

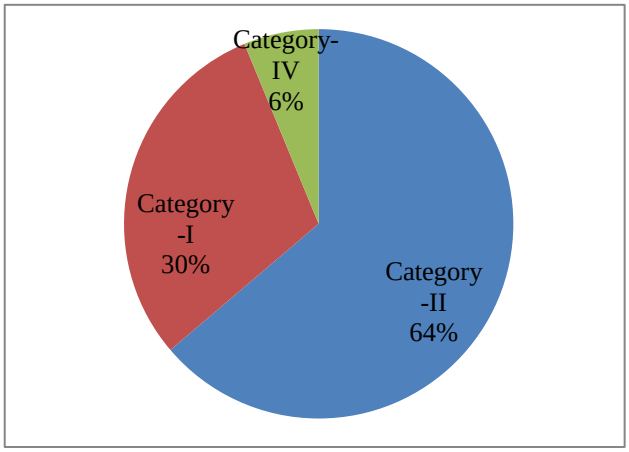

Figure 1: Category wise distribution of patients.

Category-II treatment was the most prominent taken by the patients (63.43%) followed by Category-I (30.29%) and Category-IV (6.29%) respectively (Figure 1).

The most common pattern of PFT observed was obstructive (36.29%) closely followed by normal (32.29%), mixed (16.29%) and restrictive (15.14%) in that order (Figure 2).

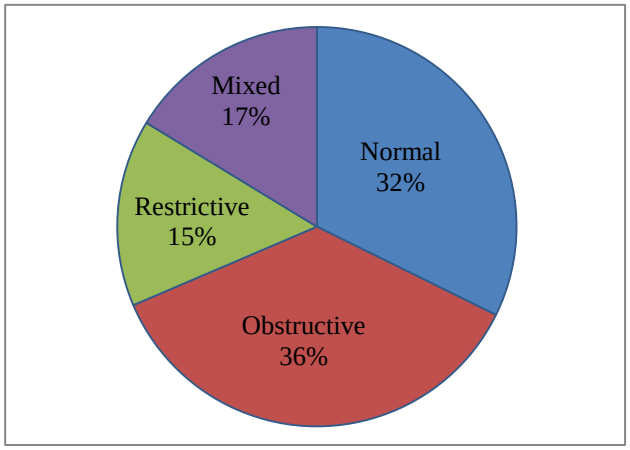

Figure 2: Spiromety pattern.

The 6-minute walk distance of the majority of patients lied between 251-349 metres (68%). The rest were almost equally divided between <250 metres (16.86%) and >350 metres (15.14%) (Figure 3).

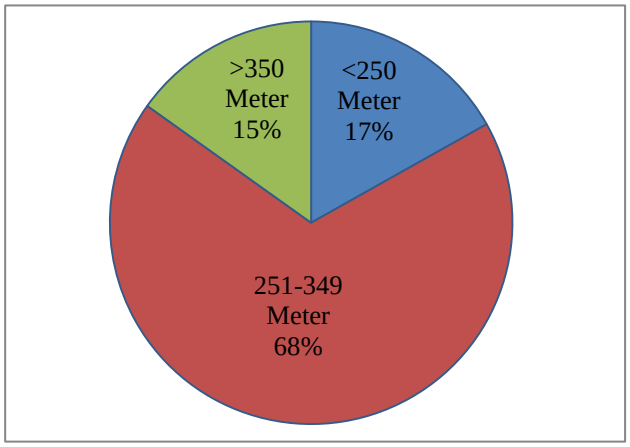

Figure 3: 6-minute walk distance.

The majority of patients had a fair exercise tolerance as indicated by the Modified Borg's score of 4-7 in most patients (52.57%). However, a significant proportion of patients had a poor exercise tolerance (Modified Borg's score >7 in 29.14%). A few had a good Modified Borg's score of <4 (18.29%) (Figure 4).

The quality of life index was predominated by a poor quality of life as indicated by SGRQ score 10-15 (57.43%), followed by very poor quality (27.71%) and then by a fair quality of life in the minority of patients (14.86%) (Figure 5).

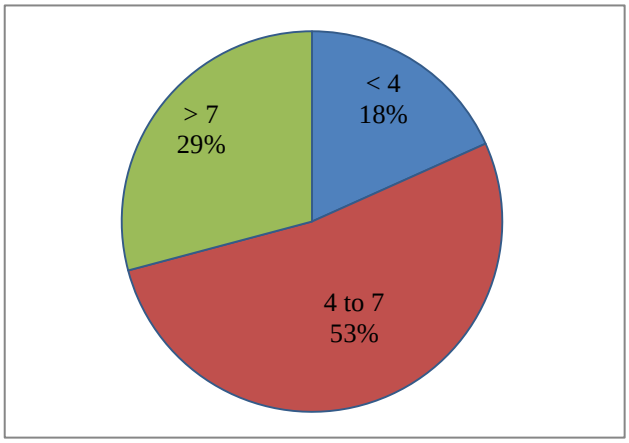

Figure 4: Modified Borg's score.

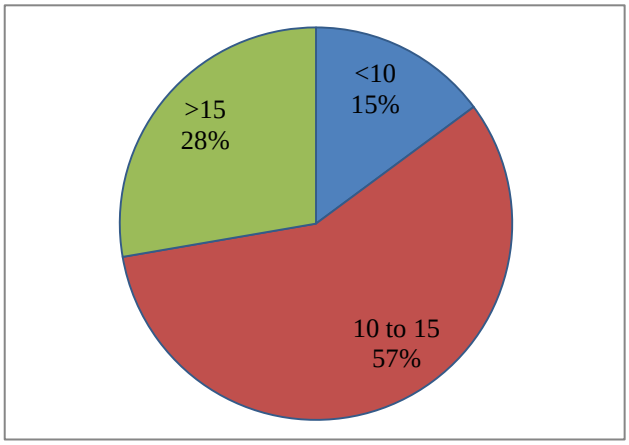

Figure 5: SGRQ score.

DISCUSSION

Patients with pulmonary tuberculosis (PTB) often develop impairment in pulmonary function due to anatomical changes secondary to the illness. Histopathological findings resulting from tuberculosis include the formation of caseating granuloma, tissue liquefaction, and cavity formation.[9] When these occur in the lung, many survivors experience permanent anatomic changes. These result in pulmonary sequelae that are characterized by bronchial and parenchymal structural changes, including broncho-vascular distortion, bronchiectasis, emphysematous changes, and fibrotic bands. These changes cause symptoms like breathlessness, cough with expectoration, recurrent infections and chest pain, and thus deteriorate the quality of life of the patients. While these changes remain after a microbiological cure, the further evaluation of persons after tuberculosis is not recommended.[9]

Studies of pulmonary function in individuals with pulmonary tuberculosis demonstrated variable patterns and severity of impairment.[10-15] Patients of PIAT also

suffer from impaired pulmonary function. Pulmonary function studies can show restrictive, obstructive, or mixed patterns and range from normal to severe impairment.[10-15]

In a previous study done in South Africa by Cole G et al, it was found that FEV_1, FVC and FEV_1/FVC all values were decreased in patients of healed pulmonary TB.[16] Similar results were found in our study, although different patterns were observed. Similar results were found by Bhola Singh et al, in their study on patients of healed pulmonary TB where they found obstructive impairment to be the most prevalent.[17]

In previous studies, it was found that patients of both active as well as healed pulmonary TB suffer a modest decline in pulmonary function, exercise capacity, exercise tolerance and quality of life.[18-20] The great inflammatory component causes major injuries that trigger fibroblastic reaction, fibrosis and chest wall retraction, compromising pulmonary expansion, which translates into a clinically and functionally moderate restrictive pattern and dyspnea during exercise.[19] Involvement of lung airways and parenchyma by inflammation, effusion, cavitation and fibrosis in these diseases leads to reduced compliance and increased elastic recoil, neuro-mechanical dissociation, ventilation-perfusion derangement and cardiovascular limitations. Due to continuing airway and parenchymal inflammation and destruction, there is gradual increase in breathlessness on exertion and reduction in functional exercise capacity. Obliteration of the normal architecture of the lungs increases work of breathing and makes them more prone to infections. Increased secretions due to recurrent infections and on-going inflammation impair gas exchange resulting in hypoxia and free radical injury during rest and activity. Early fatigue constrains patients to go out into the community lest they get breathless which makes them socially isolated and depressed. Functional disability and repeated hospitalisations reduces their efficiency at home and at work-place and is associated with an increased expense and health care utilisation, resulting in socio-economic burden.[20]

CONCLUSION

The patients of pulmonary TB continue to suffer from the various sequelae of the disease even after taking complete treatment. These post tubercular limitations are a source of permanent distress and social withdrawal for the patients. These issues thus should be addressed and the survivors of pulmonary TB should be kept in a regular follow-up. This can help in reducing the burden on the health services as hospital admission rates can be lowered by timely interventions to control exacerbations of pulmonary impairment.

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Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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