

## Original Research Article

# Evaluation of respiratory impairment and health related quality of life in pulmonary tuberculosis sequelae patients

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**Received:** 05 January 2018

**Accepted:** 02 February 2018

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### ABSTRACT

**Background:** Pulmonary tuberculosis is a common disease that can result in residual anatomical and functional changes despite microbiological cure. But the ideal method to identify and evaluate persons with pulmonary impairment after tuberculosis and its impact on population health are unknown. Hence the study was conducted with the aim of the present study was to Evaluate the respiratory and cardiac impairment and to assess the health related quality of life in pulmonary tuberculosis sequelae patients.

**Methods:** This observational study was conducted on 200 patients randomly at the Institute of thoracic medicine at Chetpet and Rajiv Gandhi government general hospital, Chennai during a period of 6 months from April 2013 to October 2013. All patients were investigated for sputum for acid fast *Bacillus*, chest skiagram, spirometry, electrocardiogram, echo, six minute walk test and St. George respiratory questionnaire.

**Results:** In this study, spirometry abnormalities were present in 81% of patients. No significant correlation observed between smoking index and pulmonary function abnormality (0.145). However, moderate correlation was seen between radiology and pulmonary function abnormality (0.307). 98% of the patients showed diminished exercise capacity. The prevalence of cor pulmonale was increased with the degree of radiological impairment progress from grade 1 to 3 with a moderate correlation (0.385). No significant correlation (0.198) was noticed between the parameters smoking index and exercise capacity. The overall SGRQ scores mean (SD) were  $54 \pm 11.5$ ,  $41.7 \pm 24.7$ ,  $28.9 \pm 19.6$  and  $37.0 \pm 19.1$  for the symptom, activity, impact and overall scales respectively. No significant relationship was noticed between smoking index and SGRQ total score ( $p=0.512$ ).

**Conclusions:** The present study confirms that there is significant functional limitation in pulmonary sequelae, addressing the need of pulmonary rehabilitation for better quality of life. Smoking cessation therapy all can improve their quality of life after pulmonary impairment. Cardiac evaluation must be done in all post tuberculosis patients to rule out cor pulmonale.

**Keywords:** Pulmonary tuberculosis sequelae, SGRQ total score, Radiological score

### INTRODUCTION

Pulmonary tuberculosis sequela is defined as a pathological state caused by many patho-anatomical changes during the healing process of pulmonary tuberculosis that needs clinical treatment for many of its symptoms. Tissue remodeling that follows granulomatous

inflammation may proceed on to functional deterioration even after microbiological resolution.<sup>1</sup>

Despite microbiological cure, pulmonary tuberculosis is associated with extensive residual lung damage, that can be a predictor for disability permanently after the tissue destruction, leading to increased susceptibility to all

opportunistic infections, finally causing impairment in their quality of life.<sup>2</sup> Pulmonary impairment adds to the unmeasured burden of TB in microbiologically cured patients than can lead to chronic impairment and excess mortality varying from mild to severe.<sup>2</sup>

There are currently no recommendations for impairment evaluation or other follow up for patients completing therapy for tuberculosis (ATS 2003).<sup>3</sup> Both the ideal method to identify and evaluate persons with pulmonary impairment after tuberculosis and its impact on population health are also unknown.

Hence this study aims to evaluate respiratory and cardiac impairment and health related quality of life in patients with sequelae of pulmonary tuberculosis who are attending with significant respiratory symptoms.

**METHODS**

This observational study was conducted on 200 patients at the Institute of thoracic medicine at Chetpet and Rajiv Gandhi government general hospital, Chennai during a period of 6 months from April 2013 to October 2013. All the patients attending OPD department in the Institute of thoracic medicine and RGGGH with radiological features suggestive of pulmonary tuberculosis sequelae were selected for the study. Patients were selected randomly.

**Selection criteria**

*Inclusion criteria*

Patients of both sexes of age more than 18 years, patients with significant respiratory symptoms, who had fully completed pulmonary TB course, patients whose two sputum smears, were negative were included in the study.

*Exclusion criteria*

Patients with history of extrapulmonary TB, asthma, interstitial lung disease, pneumoconiosis, heart disease, disability in locomotion, sputum positive for TB, uncooperative and who are not willing to participate in the study were excluded.

**Data collection methods**

Proforma was designed and ethical committee clearance was obtained. The nature and purpose of the study was explained in detail to all the study patients and written informed consent was obtained from all of them included in the study. Data collection was done as per the proforma made and the questionnaires used.

**Study procedure**

All the patients involved in the study were subjected to the following investigations. Sputum

for acid fast *Bacillus*, chest skiagram, spirometry, electrocardiogram, echo, six minute walk test and St. George respiratory questionnarre.

**Statistical analysis**

The collected data was analysed using the softwares Microsoft excel. Significance of correlation between variables was assessed using p value. A correlation was considered to be statistically significant if its p value was less than 0.05. The strength of correlation between variables was assessed by pearson correlation as follows:

Pearson correlation- >0.5- strong correlation, 0.3 to 0.5- moderate correlation, 0.3- weak correlation.

**RESULTS**

In the present observational study, 200 patients with pulmonary tuberculosis sequelae were selected randomly to evaluate respiratory and cardiac impairment and their health-related quality of life. Table 1 presents the demographic data of the study participants. Majority (66%) were presented in the 5th decade followed by 14% in the 4<sup>th</sup> decade and 12% in the 6<sup>th</sup> decade. Males (61.5%) were more affected than females (38.5%). Out of 200, 53 were smokers. Of them 62.3% had moderate smoking index, 35.8% had severe smoking and 1.9% had mild smoking index.

**Table 1: Characteristics of study participants.**

Characteristics	No	Percentage (%)
<b>Age group (in years)</b>		
20-30	8	4.0
30-40	10	4.0
40-50	48	14.0
50-60	110	66.0
60-70	24	12.0
<b>Sex</b>		
Male	123	61.5
Female	77	38.5

**Table 2: Prevalence of smoking index.**

Smoking index	No	Percentage (%)
<100	1	1.9
100-300	33	62.3
>300	19	35.8

In this study, spirometry abnormalities were present in 81% of patients, majority had mixed (39.5%) pattern followed by obstruction (23.5%) and restriction (18%). Normal pattern was found in 19% as shown in Table 3.

Table 4 presents correlation of gender distribution, smoking index and radiological score with pulmonary function abnormality. Predominant abnormality was the mixed pattern in all the cases. No significant correlation

observed between smoking index and pulmonary function abnormality (0.145). However, moderate correlation was seen between radiology and pulmonary function abnormality (0.307).

**Table 3: Patterns of pulmonary function abnormality.**

PFT	Number	Percentage (%)
Mixed	79	39.5
Normal	38	19.0
Obstruction	47	23.5
Restriction	36	18.0

**Table 4: Comparison between sex, smoking index and radiology in relation to pulmonary function changes.**

Sex	Pulmonary function abnormality				
	Mixed	Normal	Obstruction	Restriction	
Male	51	22	24	26	123
Female	28	16	23	10	77
Total	79	38	47	36	200
Smoking index					
< 100	0	1	0	0	1
100-300	17	7	3	6	33
>300	8	1	6	4	19
Total	25	9	9	10	53
Radiological score					
I	12	17	28	5	24
II	17	21	12	11	62
III	50	0	7	20	90
Total	79	38	47	36	200

As shown in Table 5, among the 200 study participants, 38 (19%) presented with corpulmonale. Of them 10 were smokers (p=0.865). The prevalence of corpulmonale was increased with the degree of radiological impairment progress from grade 1 to 3 with a moderate correlation (0.385).

**Table 5: Comparison radiological grading with corpulmonale.**

Radiological score	Corpulmonale		Total
	Yes	No	
I	5	57	62
II	13	48	61
III	20	57	77
Total	38	162	200

The values in Table 6 reveal that quality of life worsens with increase in radiological severity. Moderate correlation was observed between these parameters (0.301).

Frequency of exercise capacity was assessed by 6 minutes walking distance (6MWD) in all patients. 98% of the patients showed diminished exercise capacity. Majority of them had (41.5%) mild impairment followed by moderate 39.5% and severe 17% impairment (Table 7).

**Table 6: Comparison between radiological scoring and quality of life.**

Radiological score	SGRQ total score				
	<25	25-50	50-75	>75	
I	15	29	13	5	62
II	26	22	11	2	61
III	20	38	14	5	77
Total	61	89	38	12	200

**Table 7: Frequency of exercise capacity.**

6MWD	Numbers (n=200)	Percentage (%)
<25	34	17.0
25 - 50	79	39.5
50 - 75	83	41.5
>75	4	2.0

**Table 8: Comparison 6MWD and corpulmonale.**

6MWD	Corpulmonale		Total
	Yes	No	
<25	10	24	34
25-50	17	62	79
50-75	11	72	83
>75	0	4	4
Total	38	162	200

Table 8 showed a significant correlation between exercise impairment and presence of corpulmonale. As the exercise capacity increases from mild to severe impairment, incidence of corpulmonale increased from 13.25% to 29.41% (moderate correlation-0.362). No significant correlation (0.198) was noticed between the parameters smoking index and exercise capacity (Table 9).

Health related quality life was assessed by using SGRQ scales in the study population. Higher scores represent worse health related quality of life. In this study no impairment was seen in 30.5%, followed by mild (44.5%), moderate (19%) and severe impairment in 6% population respectively. The overall SGRQ scores mean (SD) were 54±11.5, 41.7±24.7, 28.9±19.6 and 37.0±19.1 for the symptom, activity, impact and overall scales respectively (Table 10).

Table 11 shows the correlation of SGRQ scores with sex, FEV%, radiological score and corpulmonale. Poor significance was observed between all the parameters.

Correlation between smoking index and SGRQ total scores was not shown any statistically significant relationship between them (p=0.512) (Table 12).

**DISCUSSION**

Pulmonary tuberculosis can be recognized as a chronic disease showing a very significant impact on wellbeing of

the individual. If not diagnosed in early stages, it leads to severe damage to pulmonary system and develops pulmonary TB sequelae thereby affecting the quality of life.

The present study aimed to evaluate the respiratory and cardiac impairment and the health-related quality of life in pulmonary tuberculosis sequelae patients. A total of 200 patients meeting the requirements of eligibility criteria were included in the study. Majority of the patients were under the age group of 50-60 years (66%). Male preponderance was noticed in the study (61.5%).

Spirometry abnormalities were present in 81% of our patients, majority had mixed (39%) pattern followed by obstruction (24%) and restriction (18%). Out of 200 patients, 53 were smokers. Among them pulmonary function impairment was present in significant proportion of the patients and mixed pattern abnormality was seen in the majority. However, there is no significant correlation between smoking and pulmonary function abnormality in the present study. This was in accordance with the findings of pasipanodya et al and Di Naso et al.<sup>4</sup>

In our study, radiologically, 5 (31%) showed grade I abnormality, 13 (30.5%) with grade II abnormality and 20 (38.5%) presented with grade III abnormality. This is in contrary to the findings of Ramos et al in which grade I abnormality was seen in 14, grade II in 13 and grade III in 10 out of 37 patients.<sup>5</sup> Radiological severity was correlated well with pulmonary function abnormalities showing (moderate correlation-0.307), cor pulmonale (moderate correlation-0.385) and health related quality of life (correlation-0.301). This means that patient who had marked radiological impairment have greater risk of pulmonary impairment, cardiac impairment and reduced quality of life.

In this study, significant cardiac impairment, in the form of cor pulmonale was seen in 19% of individuals. Similar observations were also made by Banureka et al study.<sup>6</sup> There was also statistically significant correlation between cor pulmonale and exercise capacity.

Exercise capacity was impaired in 98% of the patients. Majority of them had (41.5%) mild impairment followed by Moderate 39.5% and Severe 17% impairment. Results of this study matches with Di Naso et al study, where there is significant limitation of functional activity in post tuberculosis sequelae patients.<sup>4</sup>

The SGRQ scores were higher in the present study population that significantly leads to impairment in their quality of life. The scores obtained from the study population were compared with mean normal values of the general population as per the recommendation in SGRQ manual.

The symptom, activity and impact mean scores in the studied population was 54, 41 and 28, which was high

when compared to general population scores of 12, 9 and 2. These findings were similar to Pasipanodya et al and Banureka et al studies.<sup>2,6</sup> However, Mean scores for symptom, activity, impact and overall scores in the present study were higher than the Banureka et al study.<sup>6</sup>

Limitations of the study: Like any other retrospective study, accuracy of data collected is questionable. Selection bias could have happened as patients represented in this study, all belong to a single tertiary institute. Since the sample size is small this may not represent the exact nature of the disease in general population. Confounding factors like smoking can be excluded for better results.

Radiological assessment in the previous studies on pulmonary TB sequelae was done using Wilcox grading of chest X-ray, similar method was also used in the present study. Better results could have been obtained if CT chest was taken and individual radiological features were taken for correlation.<sup>7</sup>

## CONCLUSION

The present study concludes that there is significant functional limitation in pulmonary sequelae, addressing the need of pulmonary rehabilitation for better quality of life. It should be addressed as a part of the RNTCP programme. This will reduce their frequent hospital visits and use of symptomatic medicines post treatment which will definitely improve their quality of life. Programme managers under RNTCP have a responsibility to identify and address the long term impact on tuberculosis even after patients have completed treatment and presenting in the later part of life with sequelae.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the institutional ethics committee*

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**Cite this article as:** Meyyappan D, Chockalingam P. Evaluation of respiratory impairment and health related quality of life in pulmonary tuberculosis sequelae patients. *Int J Adv Med* 2018;5:276-80.