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Comparison of Respiratory Function of Treated Tuberculosis Patients Among Smokers And Non-Smokers

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I. Introduction:

A significant global public health issue is tuberculosis (TB). India is responsible for almost one-fourth of the world burden. In India, there were 28 lakh cases and 4.8 lakh deaths from tuberculosis in 2020 (1). Even with effective anti-tuberculosis medication, the healing process can cause a number of sequelae, including fibrosis, cavitations, bronchiectasis, bulla, and calcification. This may result in a number of symptoms and a change in pulmonary function. These individuals typically exhibit symptoms like haemoptysis, dyspnoea, coughing up sputum, wheezing, fever, and dyspnoea(2). With spirometry, the functional state of the lungs is assessed. Lung function has been shown to decline as a result of smoking by numerous ways. Smoking is a major risk factor that affects the respiratory and cardiovascular systems specifically, which can result in a variety of respiratory problems or exacerbate respiratory symptoms(3). The purpose of this study is to determine whether there is any correlation between the effects of smoking on lung function or exercise capacity and the effects of tuberculosis sequelae(4).

Aims and Objectives:

To compare the respiratory function among the treated pulmonary tuberculosis patients with sequelae among smokers and non-smokers by spriometric values and six-minute walk test.

II. Materials and Methods:

This is a prospective cross-sectional study conducted in Siddhartha Medical College, Vijayawada from 2021 June to 2022 December. 100 patients attending OPD were selected into the study. Patients who were previously treated as sputum positive tuberculosis and completed treatment according to the guidelines of RNTCP, patients with sputum smears for AFB negative at present and patients with chest x-ray showing tuberculosis sequeale were included in the study. Informed written consent is obtained from all the patients included in the study. Detailed history of the patients was obtained regarding the symptoms, previous anti tubercular treatment history, smoking history. Spirometry and six minute walk test were conducted in the same day. Patients were grouped into two groups as smokers and non-smokers. Severity of smoking was assessed using 'Smoking Index' (SI). It is defined as the number of beedi or cigarettes smoked per day that is multiplied by duration of smoking in years. Smokers were categorized as- mild smokers (SI <100), moderate smokers (SI 100-300), and heavy smokers (SI >300). Lung functions were measured with the Minispiro II winspiro PRO 5.7 spirometer. The classification of the spirometric values as normal, obstructive, restrictive and mixed was done based on the ratio of FEV1/FVCas recommended by the American Thoracic Society The study abides by the guidelines laid by the declaration of Helsinki. Data were entered into excel sheets and statistical analysis was done using Microsoft excel 2013.

III. Results:

Among the 100 patients included in the study, 50 were smokers and 50 were non-smokers. 86% of them were males and 14% were females. Mean age group of the patients was 56.2 $\mp$ 8.6 years. 48% of the patients belonged to the age group 51-60. 36% of the patients used category II ATT and the remaining 64% used category I ATT.

Among non-smokers, 48% used category I ATT, while 16% used category II ATT. Among smokers, 26% used category II ATT, while 10% used category I ATT. The difference in the data between both the populations is statistically significant with $p<0.05$.

Spirometry comparison between both the groups:

Parameter	ATT	N	Mean	Std. Deviation	P value
FVC	CAT I	63	2.20	0.54	
	CAT II	37	1.78	0.53	<0.0001
FEV1	CAT I	63	1.63	0.46	
	CAT II	37	1.04	0.44	<0.0001
FEV1_FVC	CAT I	63	75.32	13.97	
	CAT II	37	60.50	11.41	<0.0001
PEF	CAT I	63	3.3694	1.27693	
	CAT II	37	2.1122	1.14051	<0.0001
6 MWT DISTANCE	CAT I	63	363.76	34.87	
	CAT II	37	309.46	37.79	<0.0001

Comparison of six-minute walk test among smokers and non-smokers:
The mean distance walked by smokers was 308.2 meters, whereas the mean distance walked by non-smokers was 386.3 meters. The difference is statistically significant with $p< 0.02$.

IV. Discussion:

In addition to being linked to lung cancer risk, pulmonary TB causes a number of long-term lung problems, including pulmonary fibrosis, bronchiectasis, aspergilloma, airway stenosis, and chronic airflow restriction. These aftereffects frequently result in problems such hemoptysis, pulmonary hypertension, cor pulmonale, and recurrent respiratory infections. They also interfere with the patients' regular daily activities, which lowers their quality of life, increases their financial burden, and has a severe psychological impact(5).

According to the literature, the most frequent symptoms among patients with post-tuberculosis sequelae were cough (86%), dyspnea (66%), and sputum production (86%). In our investigation, these symptoms were most frequently detected among patients with post-tuberculosis sequelae(6).

In their study of functional evaluation in patients with tuberculosis sequelae, F.C. Di Naso et al (7). came to the conclusion that patients receiving many treatments (CAT II ATT) had significantly worse FVC and FEV1 values than those receiving only one therapy (CAT I ATT). Compared to 13.3% of patients with CAT I ATT, 75% of patients with CAT II ATT experienced severe respiratory distress. Patients with CAT II ATT had significant impairment in 83.7% of instances, while patients with CAT I ATT had radiological abnormalities with minimal involvement in 46.7% of cases. The group that received numerous treatments had a higher prevalence of mixed ventilatory abnormalities. This is consistent with the findings of our investigation. It can be concluded that smoking reduces healing, negatively impacts lung function, and interferes with six-minute walk tests.

V. Conclusion:

Post ATT, non-smokers have a better lung function and six-minute walk test results as compared to the smokers.

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