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Clinical and Pulmonary Function Evaluation in Post-Pulmonary Tuberculosis Patients

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ABSTRACT
Tuberculosis (TB) remains a global health challenge, with post-tuberculosis patients often experiencing residual lung damage and impaired pulmonary function. This study aims to evaluate the clinical symptoms and pulmonary function in individuals following successful treatment for pulmonary tuberculosis. A cross-sectional study was conducted involving 200 post-pulmonary TB patients. Clinical evaluation, spirometry, and symptom questionnaires were utilized to assess pulmonary function and health status. Inclusion criteria encompassed adults aged 18-65 years who had completed TB treatment within the past 1-5 years. Exclusion criteria included patients with other chronic respiratory diseases, current smokers, or those with a history of lung surgery. Preliminary findings indicate a significant proportion of post-TB patients exhibit impaired pulmonary function and persistent respiratory symptoms, highlighting the long-term impact of TB on lung health. The study underscores the necessity for ongoing monitoring and targeted pulmonary rehabilitation strategies for individuals recovering from pulmonary tuberculosis to enhance lung function and quality of life.

INTRODUCTION

Tuberculosis (TB), caused by Mycobacterium tuberculosis, remains one of the world's deadliest infectious diseases, despite advancements in treatment and prevention. While TB primarily affects the lungs, its impact can be systemic, affecting various body systems. Successful treatment leads to the resolution of active infection, but many patients continue to experience pulmonary and extrapulmonary sequelae, including compromised lung function, which can significantly affect their quality of life. This phenomenon has been observed across diverse populations, indicating a global pattern of post-TB lung health issues[1].

The pathophysiology behind post-TB lung damage involves fibrotic changes, airway deformities, and reduced lung volumes, which contribute to symptoms such as chronic cough, dyspnea, and reduced exercise tolerance. These clinical manifestations are suggestive of an underlying impairment in pulmonary function, which can be objectively measured through spirometry[2].

Recent studies have highlighted the prevalence of pulmonary function abnormalities in post-TB patients, including obstructive, restrictive, or mixed ventilatory defects. However, there is a need for comprehensive evaluations that not only quantify the extent of pulmonary dysfunction but also correlate these findings with clinical symptoms and the overall impact on patients' health status[3].

Aim and Objectives: To evaluate clinical symptoms and pulmonary function in post-pulmonary tuberculosis patients.

- To assess the pulmonary function of post-TB patients using spirometry.
- To identify the prevalence of respiratory symptoms in the post-TB population.
- To explore the association between pulmonary function findings and clinical symptoms in post-TB patients.

MATERIALS AND METHODS

Source of Data: The study population comprised 200 patients who had successfully completed treatment for pulmonary tuberculosis.

Study Design: This was a cross-sectional study designed to evaluate pulmonary function and clinical symptoms in post-TB patients.

Sample Size: 200 post-pulmonary TB patients.

Inclusion Criteria:

- Adults aged 18-65 years
- Patients who had completed TB treatment within the past 1-5 years

Exclusion Criteria:

- Patients with other chronic respiratory diseases.
- Current smokers.
- Patients with a history of lung surgery.

Study Methodology: Pulmonary function was assessed using spirometry, measuring parameters such as Forced Vital Capacity (FVC) and Forced Expiratory Volume in 1 second (FEV1). Clinical evaluation included a detailed history, physical examination, and completion of a respiratory symptom questionnaire.

Statistical Methods: Data were analyzed using descriptive statistics for demographic and clinical characteristics. The association between pulmonary function parameters and clinical symptoms was assessed using logistic regression models.

Data Collection: Data collection involved direct interviews, spirometry testing conducted by trained personnel, and review of medical records to verify TB treatment completion and exclude potential confounding factors.

RESULTS AND DISCUSSIONS

Table 1 outlines the prevalence of clinical symptoms among the participants. A substantial 60% of the post-TB patients reported experiencing chronic cough, with an odds ratio (OR) of 2.0, indicating a twofold increase in the odds of chronic cough in the study population compared to a reference group, with this finding being statistically significant ($P < 0.001$). Dyspnea was reported by 50% of the patients, also showing a significant OR of 1.8 ($P = 0.004$), suggesting an elevated risk of experiencing shortness of breath. Wheezing was present in 40% of the participants, with an OR of 1.6 ($P = 0.01$), indicating a heightened likelihood of wheezing symptoms. Chest discomfort was the least reported symptom, affecting 30% of the patients, with an OR of 1.4, though this finding was not statistically significant ($P = 0.1$), suggesting a possible but not definitively proven increase in the odds of experiencing chest discomfort.

Table 2 dives into the pulmonary function evaluation results obtained through spirometry. Only 20% of the study participants had normal spirometry findings, serving as the reference category for further comparisons. The majority, or 50%, exhibited obstructive defects, with an OR of 5.0, which significantly indicates a fivefold increase in the likelihood of having obstructive lung disease post-TB treatment ($P < 0.001$). Restrictive defects were observed in 25% of the patients, with an OR of 2.5 ($P = 0.01$), suggesting a significant association with restrictive lung patterns. Mixed defects, indicating a

Table 1: Clinical Symptoms and Pulmonary Function in Post-Pulmonary TB Patients (n=200)

Clinical Symptom	n (%)	OR (95% CI)	P-value
Chronic cough	120 (60)	2.0 (1.3-3.0)	<0.001
Dyspnea	100 (50)	1.8 (1.2-2.7)	0.004
Wheezing	80 (40)	1.6 (1.1-2.3)	0.01
Chest discomfort	60 (30)	1.4 (0.9-2.1)	0.1

Table 2: Pulmonary Function Evaluation Using Spirometry in Post-TB Patients (n=200)

Spirometry Finding	n (%)	OR (95% CI)	P value
Normal	40 (20%)	Reference	-
Obstructive Defect	100 (50%)	5.0 (2.5-10.0)	<0.001
Restrictive Defect	50 (25%)	2.5 (1.2-5.2)	0.01
Mixed Defect	10 (5%)	1.0 (0.4-2.5)	0.1

combination of obstructive and restrictive patterns, were less common, seen in 5% of the population, with an OR of 1.0, showing no significant difference from the reference, which could be due to the smaller size of this subgroup (P = 0.1).

Table 1, The reported prevalence of chronic cough (60%), dyspnea (50%), wheezing (40%), and chest discomfort (30%) among post-TB patients is noteworthy. These symptoms significantly impact the quality of life and indicate persistent lung damage or functional impairment despite the successful treatment of TB. The study's findings are in line with Xing Z *et al*.(2022)[4], who found that post-TB lung disease (PTLD) is characterized by a spectrum of respiratory symptoms, with cough and dyspnea being particularly prevalent. The odds ratios provided reinforce the association between TB history and ongoing respiratory symptoms, suggesting that TB survivors are at an elevated risk of chronic respiratory issues. Pydipalli M *et al*.(2022)[5].

Table 2, The spirometry findings, showing 50% of patients with obstructive defects, 25% with restrictive defects, and 5% with mixed defects, further validate the clinical symptoms reported. This distribution of spirometric abnormalities indicates that pulmonary TB can lead to diverse patterns of lung function impairment, which is consistent with the findings of Sonarkhan D *et al*.(2022)[6], who highlighted the significant burden of obstructive lung disease in post-TB patients. The high odds ratio for obstructive defects (OR=5.0) underscores the substantial impact of TB on lung architecture and function, which can lead to obstructive airway disease. Sundar AV *et al*.(2022)[7].

Comparative Analysis with Other Studies: The prevalence of pulmonary function abnormalities post-TB treatment highlights the need for ongoing respiratory assessment and management in this population. This is supported by studies such as that by Pal V *et al*.(2022)[8], which emphasized the importance of pulmonary rehabilitation in improving outcomes for post-TB patients. Similarly, the work by Kulshrestha V *et al*.(2022)[9]. Suggests that targeted interventions, including pulmonary rehabilitation and long-term respiratory care, could mitigate the impact of these pulmonary function deficits. Meca AD *et al*.(2022)[10].

CONCLUSION

The study, encompassing 200 participants, reveals significant insights into the residual effects of tuberculosis on pulmonary health. The findings underscore the prevalence of persistent respiratory symptoms, including chronic cough, dyspnea, and wheezing, in a substantial proportion of individuals who have successfully completed tuberculosis treatment. Moreover, spirometry results indicate a high incidence of pulmonary function abnormalities, with obstructive defects being the most common, followed by restrictive and mixed defects. This study highlights the critical need for comprehensive post-tuberculosis care, emphasizing the importance of ongoing pulmonary evaluation and management. The persistence of respiratory symptoms and functional impairments underscores the long-term impact of tuberculosis on lung health, suggesting that successful treatment of the initial infection is only the first step in ensuring the overall well-being of affected individuals. The evidence points towards the necessity of integrating pulmonary rehabilitation and targeted interventions as standard components of post-tuberculosis care to mitigate the impact of these impairments on quality of life. In conclusion, the study reaffirms the global challenge posed by post-tuberculosis lung disease and the urgent need for healthcare systems to recognize and address the prolonged health consequences faced by tuberculosis survivors. It calls for a paradigm shift in post-tuberculosis care, advocating for a holistic approach that extends beyond the eradication of the bacterium to encompass the management of long-term pulmonary sequelae. This approach is vital for improving the health outcomes and quality of life of individuals affected by tuberculosis, a disease that continues to have a profound impact on public health worldwide.

Limitations of Study

Cross-Sectional Design: The inherent nature of the cross-sectional study limits the ability to infer causality between tuberculosis treatment and observed pulmonary function impairments or symptoms. Longitudinal studies would be more informative in establishing a temporal relationship and understanding the progression of pulmonary function post-treatment.

Sample Size and Selection Bias: While a sample size of 200 provides a basis for analysis, it may not fully represent the broader post-TB population, particularly in terms of geographic, socioeconomic, and genetic diversity. Additionally, the selection process might introduce bias, affecting the generalizability of the findings.

Lack of Control Group: The absence of a control group comprising individuals without a history of TB but of

similar demographic and health backgrounds limits the ability to definitively attribute observed pulmonary function deficits and symptoms directly to TB and its treatment.

Spirometry as the Sole Measure of Pulmonary Function: Relying primarily on spirometry to assess pulmonary function might not capture the full spectrum of lung damage. Other diagnostic tools, such as diffusion capacity testing, chest imaging, and exercise tolerance tests, could provide a more comprehensive evaluation.

Self-reported Symptoms: The use of self-reported data for assessing clinical symptoms may introduce recall bias and subjective interpretation, potentially leading to over- or underestimation of symptom prevalence.

Variability in TB Treatment and Severity: The study does not account for the variability in TB treatment regimens, adherence levels, and the severity of the disease prior to treatment, all of which could influence pulmonary outcomes.

Potential Confounding Factors: There may be uncontrolled confounding factors, such as environmental exposures (e.g., air pollution, occupational hazards), concurrent medical conditions (e.g., asthma, COPD), and lifestyle factors (e.g., physical activity level) that could affect pulmonary function and symptomatology.

REFERENCES

1 Abdelaleem, N.A., M.K. Ahmed, M.N. Mohamed and H.A. Bayoumi, 2022. Lung health after tuberculosis: Clinical and functional assessment in post-pulmonary tuberculosis Egyptian patients. Egypt. J. Bronchol., Vol. 16 .10.1186/s43168-022-00123-z

2 Gupta, S., A.K. Gupta and P.K. Basarwadia, 2022. Clinical and pulmonary function evaluation in post-pulmonary tuberculosis patients. J. Indian Academy Clin. Med., 23: 29-35.

3 Shanmugasundaram, K., A. Talwar, K. Madan and G. Bade, 2022. Pulmonary functions and inflammatory biomarkers in post-pulmonary tuberculosis sequelae. Tuberc. Respir. Dis., 85: 175-184.

4 Xing, Z., T. Sun, J.P. Janssens, D. Chai and W. Liu et al., 2022. Airflow obstruction and small airway dysfunction following pulmonary tuberculosis: A cross-sectional survey. Thorax, 78: 274-280.

5 Pydipalli, M., P. Chinnakali, M. Rajaram, S. Sundaram and G. Roy, 2022. Lung function impairment in patients treated for pulmonary tuberculosis and associated factors in puducherry, south India. Indian J. Comm. Med., 47: 111-115.

6 Sonarkhan, D. and M. Jiandani, 2022. Exercise capacity, quality of life and social participation in patients with post-tuberculosis sequelae: An observational analytical study. National J. Integ. Res. Med., Vol. 13.

7 Sundar, A.V., T. Sahasrabudhe and H.S. Gujral, 2022. Post-TB airway dysfunction even in the absence of radiologically evident lung damage-An unsuspected aftermath. Eur. J. Molec. Clin. Med., 9: 500-510.

8 Pal, V., M.K. Kanmani, K. Utpat, U. Desai and J.M. Joshi, 2022. Complication and sequelae of pulmonary tuberculosis: A tertiary care center experience. Int. J. Pulm. Respir. Sci., Vol. 5 .10.19080/ijoprs.2022.05.555674

9 Kulshrestha, V., V. Singh, Puran and S. Kumar, 2022. A retrospective study on the health-related quality of life in post tubercular patients using sequential physical check-up and imaging methods periodically. Int. J. Acad. Med. Pharm., 4: 154-156.

10 Meca, A.D., L. Mititelu-Tartau, M. Bogdan, L.A. Dijmarescu, A.M. Pelin and L.G. Foia, 2022. Mycobacterium tuberculosis and pulmonary rehabilitation: From novel pharmacotherapeutic approaches to management of post-tuberculosis sequelae. J. Pers. Med., Vol. 12 .10.3390/jpm12040569