



Original Article

To Evaluate Quality of Life and Psychological Changes in Post-TB Lung Disease Patients Attending A Tertiary Health Care Centre

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Received: 25-06-2026

Accepted: 02-07-2026

Available online: 17-07-2026

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Medical and Pharmaceutical Research

ABSTRACT

Background: Post-tuberculosis lung disease (PTLD) is increasingly recognized as a major cause of long-term respiratory disability among patients who have completed anti-tubercular treatment. Persistent pulmonary impairment is often accompanied by psychological distress, adversely affecting patients' quality of life. However, data regarding these outcomes remain limited in the Indian population.

Aim: To evaluate the quality of life and psychological changes among patients with post-tuberculosis lung disease attending a tertiary health care centre.

Materials and Methods: This hospital-based, cross-sectional observational study was conducted in the Department of Pulmonary Medicine in collaboration with Department of Psychiatry, Maharshi Vashistha Autonomous State Medical College (MVASMC), Basti, Uttar Pradesh, from May 2025 to May 2026. A total of 252 adult patients with post-tuberculosis lung disease were enrolled after obtaining informed consent. Demographic and clinical characteristics were recorded using a structured proforma. Quality of life was assessed using the World Health Organisation Quality of Life-BREF (WHOQOL-BREF) questionnaire, while depression and anxiety were evaluated using the Patient Health Questionnaire-9 (PHQ-9) and Generalised Anxiety Disorder-7 (GAD-7) scales, respectively. Data were analyzed using SPSS version 26.0, with a p-value <0.05 considered statistically significant.

Results: Among the 252 participants, the majority were aged 46–60 years (33.3%), and males constituted 61.1% of the study population. Breathlessness (72.2%) and chronic cough (66.7%) were the most common residual respiratory symptoms. Moderate-to-severe depression was observed in 48.4% of patients, while 39.7% had moderate-to-severe anxiety. The physical health domain of WHOQOL-BREF showed the lowest mean score (48.6 ± 12.4), indicating substantial impairment in quality of life. Patients with moderate-to-severe depression and anxiety had significantly poorer overall quality of life compared with those with minimal or mild psychological symptoms ($p < 0.001$).

Conclusion: Patients with post-tuberculosis lung disease experience considerable impairment in quality of life along with a high burden of depression and anxiety. Routine psychological assessment, integrated mental health services, and pulmonary rehabilitation should be incorporated into post-TB follow-up care to improve long-term clinical outcomes and overall well-being.

Keywords: Post-tuberculosis lung disease, Quality of life, Depression, Anxiety, WHOQOL-BREF, PHQ-9, GAD-7, Pulmonary rehabilitation.

INTRODUCTION

Tuberculosis (TB) remains one of the leading infectious causes of morbidity and mortality worldwide despite the availability of effective chemotherapy. According to the World Health Organization, approximately 10.8 million people developed tuberculosis globally in 2023, with India contributing the highest burden of disease. Although successful completion of anti-tubercular therapy (ATT) achieves microbiological cure in most patients, a substantial proportion continue to experience persistent respiratory symptoms, structural lung damage, and functional impairment after treatment completion, a condition collectively referred to as post-tuberculosis lung disease (PTLD) [1].

Post-tuberculosis lung disease encompasses a spectrum of chronic pulmonary abnormalities resulting from previous pulmonary TB, including fibrosis, bronchiectasis, emphysema, cavitary destruction, airflow obstruction, restrictive lung disease, and pulmonary vascular abnormalities. These sequelae often lead to chronic cough, dyspnea, reduced exercise tolerance, recurrent respiratory infections, and progressive deterioration in pulmonary function [2,3]. The growing recognition of PTLD has shifted attention from microbiological cure alone to long-term functional recovery and quality of life among TB survivors.

The consequences of PTLD extend beyond physical disability and significantly affect psychological well-being. Persistent respiratory symptoms, physical limitations, financial hardship, social isolation, and stigma associated with previous tuberculosis contribute to the development of depression, anxiety, stress, and reduced self-esteem [4]. Psychological disorders frequently remain underdiagnosed in these patients despite their substantial impact on treatment adherence, rehabilitation, healthcare utilization, and overall prognosis.

Quality of life (QOL) has emerged as an important patient-centered outcome in chronic respiratory diseases. The World Health Organization defines quality of life as an individual's perception of their position in life within the context of the culture and value systems in which they live, considering their goals, expectations, standards, and concerns. Studies have consistently demonstrated that patients with PTLD experience significantly impaired quality of life across physical, psychological, social, and environmental domains compared with healthy individuals [5,6].

Depression and anxiety are among the most common psychiatric comorbidities in patients recovering from pulmonary tuberculosis. Their prevalence is considerably higher than that observed in the general population and is associated with poorer physical functioning, increased symptom burden, lower treatment satisfaction, impaired social participation, and reduced health-related quality of life [7,8]. Early recognition and appropriate management of psychological distress may therefore improve long-term outcomes among TB survivors.

In India, where the burden of tuberculosis remains exceptionally high, relatively limited data are available regarding the psychological consequences and quality of life among patients with post-TB lung disease. Understanding these dimensions is essential for developing comprehensive rehabilitation strategies that integrate respiratory care with mental health services.

Therefore, the present study was undertaken to evaluate the quality of life and psychological changes among patients with post-tuberculosis lung disease attending a tertiary health care centre. The study also aimed to examine the association between psychological morbidity and quality of life in this patient population.

MATERIALS AND METHODS

Study Design

This hospital-based, cross-sectional, observational study was conducted to evaluate the quality of life and psychological changes among patients with post-tuberculosis (post-TB) lung disease attending a tertiary health care centre.

Study Setting

The study was carried out in the Department of Pulmonary Medicine in collaboration with Department of Psychiatry, Maharshi Vashistha Autonomous State Medical College (MVASMC), Basti, Uttar Pradesh, in collaboration with the Department of Pulmonary Medicine, where eligible patients were identified and referred for psychiatric assessment.

Study Duration

The study was conducted over a period of one year, from May 2025 to May 2026.

Study Population

Adult patients diagnosed with post-tuberculosis lung disease (PTLD) attending the outpatient and inpatient services during the study period were screened for eligibility. A total of 252 patients fulfilling the inclusion criteria were enrolled after obtaining written informed consent.

Sample Size

The final study sample comprised 252 patients with post-TB lung disease.

Inclusion Criteria

- Patients aged 18 years or older.
- History of microbiologically or clinically confirmed pulmonary tuberculosis who had successfully completed anti-tubercular treatment.
- Presence of post-tuberculosis lung disease with persistent respiratory symptoms and/or radiological evidence of residual pulmonary damage.
- Patients willing to provide written informed consent.

Exclusion Criteria

- Patients with active pulmonary or extrapulmonary tuberculosis.
- Individuals with previously diagnosed major psychiatric disorders before tuberculosis diagnosis.
- Patients with severe cognitive impairment or neurological illness affecting psychological assessment.
- Patients with severe medical illness requiring intensive care.
- Patients unwilling to participate in the study.

Data Collection

After obtaining informed consent, demographic details including age, gender, marital status, educational status, occupation, socioeconomic status, smoking history, alcohol consumption, and comorbid illnesses were recorded using a structured case record form.

Clinical information including duration since completion of anti-tubercular treatment, history of previous TB episodes, duration of illness, respiratory symptoms, radiological findings, pulmonary function status (where available), and associated comorbidities was documented from patient interviews and medical records.

Assessment of Quality of Life

Quality of life was assessed using the World Health Organization Quality of Life-BREF (WHOQOL-BREF) questionnaire. The instrument evaluates four domains:

- Physical health
- Psychological health
- Social relationships
- Environmental health

Domain scores were calculated according to standard WHOQOL-BREF scoring guidelines, with higher scores indicating better quality of life.

Assessment of Psychological Status

Psychological changes were evaluated using validated psychiatric assessment tools:

- Patient Health Questionnaire-9 (PHQ-9) for assessment of depression.
- Generalized Anxiety Disorder-7 (GAD-7) scale for assessment of anxiety.

Severity of depression and anxiety was categorized according to the recommended cut-off scores for each instrument.

Outcome Measures

The primary outcomes included:

- Quality of life scores across WHOQOL-BREF domains.
- Prevalence and severity of depression.
- Prevalence and severity of anxiety.

Secondary outcomes included the association of quality of life and psychological status with demographic and clinical variables such as age, sex, smoking status, duration after TB treatment completion, pulmonary symptoms, and comorbid conditions.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using Statistical Package for the Social Sciences (SPSS) software version 26.0 (IBM Corp., Armonk, NY, USA).

Continuous variables were expressed as mean $\pm$ standard deviation (SD), while categorical variables were presented as frequency and percentage. Comparisons between groups were performed using the Student's t-test or one-way analysis of variance (ANOVA) for continuous variables and the Chi-square test or Fisher's exact test for categorical variables, as appropriate. Correlation between quality of life scores and psychological parameters was assessed using Pearson's or

Spearman's correlation coefficient depending on data distribution. Multivariable logistic regression analysis was performed to identify independent predictors of poor quality of life and psychological morbidity. A p-value <0.05 was considered statistically significant.

Ethical Considerations

The study protocol was reviewed and approved by the Institutional Ethics Committee of Maharshi Vashistha Autonomous State Medical College (MVASMC), Basti, Uttar Pradesh, prior to commencement of the study. Written informed consent was obtained from all participants before enrollment. Confidentiality of participant information was maintained throughout the study, and all procedures were conducted in accordance with the ethical principles of the Declaration of Helsinki.

RESULTS AND OBSERVATIONS

A total of 252 patients with post-tuberculosis lung disease (PTLD) were included in the study. The quality of life and psychological changes were evaluated using standardized assessment tools. The demographic characteristics, clinical profile, quality of life domains, and psychological outcomes are presented below.

Table 1. Age Distribution of Study Participants (n = 252)

Age Group (Years)	Number (n)	Percentage (%)
18–30	42	16.7
31–45	76	30.2
46–60	84	33.3
>60	50	19.8
Total	252	100.0

Observation: The majority of patients (33.3%) belonged to the 46–60 years age group.

Table 2. Gender Distribution

Gender	Number (n)	Percentage (%)
Male	154	61.1
Female	98	38.9
Total	252	100.0

Observation: Males constituted 61.1% of the study population.

Table 3. Marital Status

Marital Status	Number (n)	Percentage (%)
Married	178	70.6
Unmarried	44	17.5
Widowed/Divorced	30	11.9
Total	252	100.0

Observation: Most participants (70.6%) were married.

Table 4. Smoking History

Smoking Status	Number (n)	Percentage (%)
Smoker	96	38.1
Non-smoker	156	61.9
Total	252	100.0

Observation: Nearly two-fifths (38.1%) of patients had a history of smoking.

Table 5. Duration Since Completion of Anti-Tubercular Treatment

Duration	Number (n)	Percentage (%)
<1 year	68	27.0
1–3 years	96	38.1
>3 years	88	34.9
Total	252	100.0

Observation: The largest proportion of patients (38.1%) had completed TB treatment 1–3 years before enrollment.

Table 6. Common Residual Respiratory Symptoms

Symptom	Number (n)	Percentage (%)
Chronic cough	168	66.7
Breathlessness	182	72.2

Chest pain	84	33.3
Fatigue	160	63.5
Sputum production	114	45.2

Observation: Breathlessness (72.2%) was the most common residual symptom, followed by chronic cough (66.7%).

Table 7. Severity of Depression (PHQ-9)

Depression Severity	Number (n)	Percentage (%)
Minimal	54	21.4
Mild	76	30.2
Moderate	62	24.6
Moderately Severe	38	15.1
Severe	22	8.7
Total	252	100.0

Observation: Moderate to severe depression was observed in 122 (48.4%) patients.

Table 8. Severity of Anxiety (GAD-7)

Anxiety Severity	Number (n)	Percentage (%)
Minimal	70	27.8
Mild	82	32.5
Moderate	60	23.8
Severe	40	15.9
Total	252	100.0

Observation: Moderate to severe anxiety was present in 100 (39.7%) patients.

Table 9. WHOQOL-BREF Domain Scores

Domain	Mean $\pm$ SD
Physical Health	48.6 $\pm$ 12.4
Psychological Health	51.2 $\pm$ 11.8
Social Relationships	56.8 $\pm$ 13.5
Environmental Health	60.4 $\pm$ 12.1

Observation: The physical health domain demonstrated the lowest mean quality-of-life score, whereas the environmental domain showed the highest score.

Table 10. Association Between Depression and Overall Quality of Life

Depression Category	Poor QOL n (%)	Good QOL n (%)	p-value
Minimal/Mild (n=130)	48 (36.9)	82 (63.1)	
Moderate to Severe (n=122)	96 (78.7)	26 (21.3)	<0.001

Observation: Patients with moderate-to-severe depression had significantly poorer quality of life compared with those having minimal or mild depression ($p<0.001$).

Table 11. Association Between Anxiety and Overall Quality of Life

Anxiety Category	Poor QOL n (%)	Good QOL n (%)	p-value
Minimal/Mild (n=152)	62 (40.8)	90 (59.2)	
Moderate/Severe (n=100)	80 (80.0)	20 (20.0)	<0.001

Observation: Moderate-to-severe anxiety was significantly associated with poor quality of life among post-TB lung disease patients ($p<0.001$).

DISCUSSION

The present study evaluated the quality of life and psychological changes among 252 patients with post-tuberculosis lung disease attending a tertiary care centre. The findings demonstrate that PTLT is associated with considerable physical disability, a high prevalence of anxiety and depression, and significant impairment in quality of life. These observations emphasise that microbiological cure of tuberculosis does not necessarily translate into complete recovery, and many patients continue to experience long-term health consequences requiring multidisciplinary care.

Most participants in the present study belonged to the 46–60-year age group, with males constituting approximately two-thirds of the study population. Similar demographic patterns have been reported in previous Indian and international studies, where pulmonary tuberculosis predominantly affected economically productive middle-aged adults, resulting in persistent respiratory morbidity after treatment completion [2,9]. The predominance of male patients may be attributed to

greater occupational exposure, higher smoking prevalence, delayed healthcare-seeking behaviour, and increased TB incidence among men.

Persistent respiratory symptoms remained common in the study population, with breathlessness and chronic cough being the most frequently reported complaints. These findings are consistent with previous reports describing airflow limitation, pulmonary fibrosis, bronchiectasis, and chronic respiratory disability among PTLT patients [3,10]. Structural lung damage following tuberculosis contributes substantially to long-term functional impairment and reduced exercise capacity, thereby affecting daily activities and overall well-being.

Nearly half of the participants exhibited moderate-to-severe depressive symptoms, while approximately 40% had moderate-to-severe anxiety. These findings are comparable to previous studies demonstrating that psychiatric morbidity is highly prevalent among individuals recovering from pulmonary tuberculosis [7,11]. Chronic respiratory symptoms, fear of disease recurrence, financial burden, social stigma, and reduced physical functioning may collectively contribute to psychological distress in these patients. Depression and anxiety often remain overlooked during routine follow-up despite significantly influencing rehabilitation outcomes.

Assessment of quality of life using the WHOQOL-BREF questionnaire revealed that the physical health domain was the most adversely affected, followed by the psychological domain. Similar observations have been reported by various investigators who found significantly lower physical and psychological quality-of-life scores among patients with residual pulmonary impairment after tuberculosis [5,12]. Persistent dyspnea, fatigue, exercise intolerance, and reduced work capacity substantially compromise physical functioning, while anxiety and depression further impair emotional well-being and social participation.

An important finding of the present study was the significant association between psychological morbidity and poor quality of life. Patients with moderate-to-severe depression and anxiety demonstrated significantly poorer overall quality-of-life scores compared with those having minimal psychological symptoms. Similar associations have been described in previous studies, indicating that mental health disorders independently predict poorer health-related quality of life among patients with chronic respiratory diseases and post-tuberculosis sequelae [8,13]. These findings reinforce the importance of routine mental health screening during post-TB follow-up.

The results support recent recommendations advocating comprehensive post-tuberculosis care that extends beyond microbiological cure. Pulmonary rehabilitation, smoking cessation, respiratory physiotherapy, psychosocial counseling, nutritional support, and timely psychiatric interventions may substantially improve long-term functional outcomes and quality of life [3,14]. Integration of mental health services within TB follow-up clinics could facilitate early identification and treatment of depression and anxiety, thereby improving patient-centered outcomes.

The present study has certain limitations. Being a single-centre cross-sectional study, causal relationships between psychological changes and quality of life cannot be established. The findings may not be generalizable to all populations. Furthermore, pulmonary function testing and radiological severity were not correlated with psychological outcomes in all patients. Nevertheless, the study provides important evidence regarding the substantial psychological burden among PTLT patients and highlights the need for multidisciplinary rehabilitation strategies.

Overall, the findings indicate that post-tuberculosis lung disease significantly impairs quality of life and is associated with a high prevalence of depression and anxiety. Incorporating psychological assessment into routine post-TB care may facilitate early intervention, improve patient well-being, and optimize long-term recovery.

CONCLUSION

Post-tuberculosis lung disease is associated with significant impairment in quality of life and a high prevalence of psychological morbidity, particularly depression and anxiety, even after successful completion of anti-tubercular treatment. The physical health domain was the most adversely affected, and patients with moderate-to-severe psychological symptoms demonstrated significantly poorer overall quality of life. These findings highlight the need for comprehensive post-TB care that integrates routine psychological screening, pulmonary rehabilitation, and multidisciplinary management to improve long-term functional outcomes and overall well-being among TB survivors.

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