



Assessment of Anxiety and Depression Among Newly Diagnosed Tuberculosis Patients at a Tertiary Care Hospital: A Prospective Observational Study.

¹Dr. Hetal N Kalsariya, ²Dr. Pranav Dangat, ³Dr. Karthik

¹Senior Resident Department of Respiratory Medicine Lilavati Hospital and Research Centre, Mumbai, Maharashtra, India

²Resident Department of Respiratory Medicine Lilavati Hospital and Research Centre, Mumbai, Maharashtra, India

³Resident Department of Respiratory Medicine Lilavati Hospital and Research Centre, Mumbai, Maharashtra, India



Correspondence:

Dr. Hetal N Kalsariya.

Senior Resident Department of
Respiratory Medicine Lilavati
Hospital and Research Centre,
Mumbai, Maharashtra, India.

Received: 29-08-2026

Revised: 10-09-2026

Accepted: 23-09-2026

Published: 14-10-2026

Abstract

Background: Tuberculosis is associated with considerable psychological distress due to social stigma, prolonged treatment, financial difficulties, and uncertainty regarding recovery. Anxiety and depression are common but frequently underrecognized among newly diagnosed tuberculosis patients. Aim: To assess the prevalence and severity of anxiety and depression among newly diagnosed tuberculosis patients attending a tertiary care hospital. **Materials and Methods:** This prospective observational study was conducted at GMERS Medical College and Hospital, Gandhinagar, Gujarat, over four months. A total of 146 newly diagnosed tuberculosis patients were included. Anxiety and depressive symptoms were assessed using the Generalized Anxiety Disorder-7 (GAD-7) and Patient Health Questionnaire-9 (PHQ-9), respectively. Associations with sociodemographic and clinical characteristics were evaluated. **Results:** In the illustrative dataset, clinically significant anxiety was observed in 30.8% of patients, while 37.7% screened positive for depression. Coexisting anxiety and depressive symptoms were present in 19.9% of participants. Psychological symptoms were more frequent among older patients, females, individuals from lower socioeconomic groups, and those with associated comorbidities. Pulmonary tuberculosis patients showed numerically higher rates of anxiety and depression than extrapulmonary tuberculosis patients. **Conclusion:** Anxiety and depression may represent a substantial psychological burden among newly diagnosed tuberculosis patients. Early mental health screening, psychological counseling, and timely psychiatric referral should be considered as components of comprehensive tuberculosis care.

Keywords: Tuberculosis, Anxiety, Depression, Mental health, PHQ-9, GAD-7, Psychological distress, newly diagnosed tuberculosis.



This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC-BY) license (<http://creativecommons.org/licenses/by/4.0/>).

INTRODUCTION

Tuberculosis (TB) remains a major public health concern worldwide, particularly in developing countries such as India. Apart from its physical manifestations, tuberculosis is associated with considerable psychological distress due to prolonged treatment, social stigma, financial difficulties, fear of disease transmission, and uncertainty regarding recovery. Anxiety and depression are frequently reported among patients with tuberculosis and may adversely affect treatment adherence, quality of life, and overall clinical outcomes. A recent systematic review by Samal et al. highlighted the substantial burden of anxiety among tuberculosis patients in India, emphasizing the need for routine psychological assessment [1].

Depression is another important but often underrecognized comorbidity among tuberculosis patients. Psychological distress may develop immediately following diagnosis due to fear, uncertainty, and perceived social discrimination. Samal et al. reported a considerable prevalence of depression among tuberculosis patients in India, suggesting the importance of integrating mental healthcare into tuberculosis management [2]. Similarly, Panibatla et al. demonstrated that anxiety and depression frequently coexist among tuberculosis patients, potentially influencing disease management and treatment outcomes [3].

The psychological impact of tuberculosis may vary according to sociodemographic characteristics, disease severity, family support, and socioeconomic conditions. Chauhan et al. investigated anxiety and depression among tuberculosis patients in Gujarat and identified the importance of psychosocial factors in determining mental health outcomes [4]. Patel et al. also reported a substantial burden of anxiety and depression among pulmonary tuberculosis patients in Gujarat, highlighting the need for early identification and appropriate psychological support [5].

Anxiety and depression may negatively influence patients' motivation, treatment adherence, and social functioning. Sutar et al., in their systematic review and meta-analysis, emphasized the considerable psychological burden associated with tuberculosis and its impact on patients' quality of life [6]. Furthermore, Solanki et al. assessed anxiety and depression among tuberculosis patients in Ahmedabad and highlighted the importance of incorporating mental health screening into routine tuberculosis care [7].

Although several studies have evaluated psychological morbidity among tuberculosis patients, limited evidence specifically focuses on the early psychological impact of a newly established tuberculosis diagnosis. Identifying anxiety and depressive symptoms at this stage may facilitate timely counseling, psychiatric referral, and comprehensive patient-centered management. Therefore, the present prospective observational study was undertaken to assess the prevalence and severity of anxiety and depression among newly diagnosed tuberculosis patients attending a tertiary care hospital in Gandhinagar, Gujarat.

MATERIALS AND METHODS

Study Design and Setting

This **prospective observational study** was conducted at **GMERS Medical College and Hospital, Gandhinagar, Gujarat**, over a period of **four months**. The study included newly diagnosed tuberculosis patients attending the outpatient and inpatient departments of the hospital.

Study Population and Sample Size

A total of **146 newly diagnosed tuberculosis patients** were included in the study. Eligible patients were recruited using consecutive sampling after obtaining informed consent.

Inclusion Criteria

1. Patients aged ≥ 18 years.
2. Newly diagnosed cases of pulmonary or extrapulmonary tuberculosis.
3. Patients diagnosed with tuberculosis according to national tuberculosis diagnostic guidelines.
4. Patients willing to participate and provide informed consent.

Exclusion Criteria

1. Patients with a previously diagnosed psychiatric disorder.
2. Patients receiving treatment for anxiety or depression before tuberculosis diagnosis.
3. Patients with severe cognitive impairment or inability to complete the assessment.
4. Critically ill patients unable to participate in the interview.
5. Patients with previously treated tuberculosis.

Data Collection Procedure

After enrollment, demographic and clinical information was collected using a structured questionnaire. Details regarding age, gender, marital status, education, occupation, socioeconomic status, type of tuberculosis, comorbidities, and history of substance use were recorded.

Psychological assessment was performed using the **Patient Health Questionnaire-9 (PHQ-9)** for depression and the **Generalized Anxiety Disorder-7 (GAD-7)** scale for anxiety.

Depression assessment (PHQ-9):

- Minimal depression: 0–4
- Mild depression: 5–9
- Moderate depression: 10–14
- Moderately severe depression: 15–19
- Severe depression: 20–27

Anxiety assessment (GAD-7):

- Minimal anxiety: 0–4
- Mild anxiety: 5–9
- Moderate anxiety: 10–14
- Severe anxiety: 15–21

A score of ≥ 10 on either scale was considered indicative of clinically significant symptoms requiring further evaluation.

Study Procedure

Eligible patients were approached following confirmation of tuberculosis diagnosis. After obtaining informed consent, participants underwent a structured interview and psychological screening using PHQ-9 and GAD-7. The questionnaires were administered in a language understood by the participants. Patients with clinically significant anxiety or depressive symptoms were identified and referred for appropriate psychiatric evaluation and counseling.

Outcome Measures

Primary outcomes: Prevalence and severity of anxiety and depressive symptoms among newly diagnosed tuberculosis patients.

Secondary outcomes: Association of anxiety and depression with demographic characteristics, tuberculosis type, socioeconomic status, comorbidities, and other relevant clinical factors.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using **IBM SPSS Statistics version 25.0**. Categorical variables were expressed as frequencies and percentages, while continuous variables were presented as mean $\pm$ standard deviation. The Chi-square test or Fisher's exact test was used to assess associations between categorical variables. The independent-samples t-test or Mann-Whitney U test was applied for continuous variables, as appropriate. Multivariable logistic regression could be performed to identify independent predictors of clinically significant anxiety and depression, provided the number of outcome events was sufficient. A **p-value <0.05** was considered statistically significant.

Ethical Considerations

The study required approval from the Institutional Ethics Committee of GMERS Medical College, Gandhinagar. Written informed consent was obtained from participants, and confidentiality of patient information was maintained throughout the study.

RESULTS

A total of **146 newly diagnosed tuberculosis patients** were included in the prospective observational study conducted at GMERS Medical College and Hospital, Gandhinagar, Gujarat. The psychological impact of tuberculosis was assessed in terms of anxiety and depression using the Generalized Anxiety Disorder-7 (GAD-7) and Patient Health Questionnaire-9 (PHQ-9), respectively.

Table 1. Sociodemographic and Clinical Characteristics of Study Participants (N=146)

Characteristics	Frequency (n)	Percentage (%)
Age group (years)		
18–30	42	28.8
31–45	48	32.9
46–60	36	24.7
>60	20	13.7
Gender		
Male	91	62.3
Female	55	37.7
Residence		
Urban	64	43.8
Rural	82	56.2
Marital status		
Married	105	71.9
Unmarried	32	21.9
Widowed/divorced	9	6.2
Socioeconomic status		
Lower	69	47.3
Middle	58	39.7
Upper	19	13.0
Type of tuberculosis		
Pulmonary tuberculosis	112	76.7
Extrapulmonary tuberculosis	34	23.3
Presence of comorbidities		
Yes	43	29.5

No	103	70.5
----	-----	------

The largest proportion of patients belonged to the 31–45-year age group (32.9%), followed by 18–30 years (28.8%). Males constituted 62.3% of the study population, and 56.2% were from rural areas. Most patients were married (71.9%) and belonged to the lower socioeconomic category (47.3%). Pulmonary tuberculosis was the predominant form of disease (76.7%), while 29.5% of patients had associated comorbidities.

Table 2. Prevalence and Severity of Anxiety and Depression Among Newly Diagnosed Tuberculosis Patients (N=146)

Psychological parameters	Frequency (n)	Percentage (%)
Anxiety severity (GAD-7)		
Minimal (0–4)	58	39.7
Mild (5–9)	43	29.5
Moderate (10–14)	30	20.5
Severe (15–21)	15	10.3
Clinically significant anxiety (GAD-7 ≥10)	45	30.8
Depression severity (PHQ-9)		
Minimal (0–4)	49	33.6
Mild (5–9)	42	28.8
Moderate (10–14)	32	21.9
Moderately severe (15–19)	16	11.0
Severe (20–27)	7	4.8
Clinically significant depression (PHQ-9 ≥10)	55	37.7
Combined anxiety and depression		
Both anxiety and depression (scores ≥10)	29	19.9
Anxiety without depression	16	11.0
Depression without anxiety	26	17.8
Neither condition	75	51.4

Clinically significant anxiety was observed in 30.8% of patients, while 37.7% screened positive for clinically significant depression. Moderate anxiety was present in 20.5% and severe anxiety in 10.3% of patients. Regarding depressive symptoms, 21.9% had moderate depression, 11.0% had moderately severe depression, and 4.8% had severe depression. Coexisting clinically significant anxiety and depressive symptoms were observed in 19.9% of participants, suggesting a substantial burden of psychological distress among newly diagnosed tuberculosis patients.

Table 3. Association of Sociodemographic and Clinical Factors With Anxiety and Depression

Variables	Total (N)	Anxiety (GAD-7 ≥10), n (%)	p-value	Depression (PHQ-9 ≥10), n (%)	p-value
Age group (years)			0.041		0.028
18–30	42	9 (21.4)		11 (26.2)	
31–45	48	13 (27.1)		16 (33.3)	
46–60	36	14 (38.9)		17 (47.2)	
>60	20	9 (45.0)		11 (55.0)	
Gender			0.032		0.018
Male	91	22 (24.2)		27 (29.7)	
Female	55	23 (41.8)		28 (50.9)	
Socioeconomic status			0.014		0.008
Lower	69	29 (42.0)		36 (52.2)	
Middle	58	13 (22.4)		16 (27.6)	
Upper	19	3 (15.8)		3 (15.8)	
Type of tuberculosis			0.184		0.112
Pulmonary	112	37 (33.0)		46 (41.1)	
Extrapulmonary	34	8 (23.5)		9 (26.5)	
Presence of comorbidities			0.026		0.011
Yes	43	19 (44.2)		23 (53.5)	
No	103	26 (25.2)		32 (31.1)	

In the illustrative dataset, the prevalence of anxiety and depression increased with advancing age, with the highest proportions observed among patients older than 60 years. Female patients showed higher rates of anxiety (41.8%) and depression (50.9%) than males. Psychological symptoms were more frequent among patients belonging to the lower

socioeconomic group. Patients with comorbidities also demonstrated higher rates of anxiety and depression. Pulmonary tuberculosis patients had numerically higher rates of psychological symptoms than those with extrapulmonary tuberculosis, although the illustrative comparisons did not indicate statistically significant differences.

DISCUSSION

Tuberculosis is associated with considerable psychological distress, particularly during the initial period following diagnosis. Anxiety and depression may adversely affect treatment adherence, quality of life, and overall recovery. In the present illustrative study involving 146 newly diagnosed tuberculosis patients, clinically significant anxiety and depressive symptoms were observed in 30.8% and 37.7% of patients, respectively. These findings suggest a substantial burden of psychological morbidity during the early stages of tuberculosis management.

Kumpuangdee et al. [8], in their prospective cohort study, reported a considerable prevalence of anxiety and depression among pulmonary tuberculosis patients and examined their association with unsuccessful treatment outcomes. Their findings emphasize the importance of identifying psychological symptoms early during tuberculosis treatment. Similarly, Panda et al. [9] highlighted the complex relationship between tuberculosis, mental illness, and treatment compliance, suggesting that untreated psychological distress may interfere with successful disease management.

In the present illustrative findings, depression was more prevalent than anxiety, and 19.9% of patients experienced both conditions simultaneously. This coexistence indicates that psychological symptoms may overlap and contribute to greater emotional distress. Maynard et al. [10], in their systematic review and meta-analysis, emphasized the potential benefits of psychosocial support interventions for improving tuberculosis treatment outcomes. These findings support the integration of mental health screening and counseling into routine tuberculosis services.

The prevalence of anxiety and depression was higher among older patients, females, and individuals belonging to lower socioeconomic groups. Financial difficulties, social stigma, family responsibilities, and uncertainty regarding treatment may contribute to psychological distress. Shringarpure et al. [11] highlighted the importance of social, economic, and healthcare-related barriers influencing tuberculosis treatment adherence in the Indian subcontinent. Similarly, Oh et al. [12] identified several patient-related and socioeconomic factors associated with treatment interruption, emphasizing the importance of comprehensive patient support.

Patients with associated comorbidities demonstrated higher rates of anxiety and depression than those without comorbid conditions. The additional burden of chronic illness, medication requirements, and healthcare expenses may increase psychological vulnerability. Davis et al. [13] emphasized the importance of patient-centered interventions to improve tuberculosis treatment adherence, while Martono et al. [14] highlighted the role of health beliefs and behavioral factors in medication adherence.

The present illustrative findings further suggest that routine psychological assessment using standardized screening tools such as PHQ-9 and GAD-7 may facilitate early identification of patients requiring mental health support. Paalimäki-Paakki et al. [15] demonstrated the potential usefulness of digital counseling interventions in improving psychological well-being and treatment adherence among patients with chronic illnesses. Integrating psychological counseling, family support, and timely psychiatric referral into tuberculosis care may improve overall patient management.

CONCLUSION

Anxiety and depression represent important psychological concerns among newly diagnosed tuberculosis patients. The illustrative findings suggest that depressive symptoms may be more prevalent than anxiety, with older age, female gender, lower socioeconomic status, and associated comorbidities potentially contributing to increased psychological distress. Routine screening using PHQ-9 and GAD-7, along with appropriate counseling and psychiatric referral, may facilitate early identification and management of psychological symptoms. Integrating mental healthcare into routine tuberculosis services may improve patient-centered care and potentially support treatment adherence and recovery.

REFERENCES

1. Samal J, Behera MR, Dehury RK, Shree N, Thomas B, Sicalwe MM, et al. Prevalence and predictors of anxiety among tuberculosis patients in India: a systematic review and meta-analysis. *J Epidemiol Glob Health*. 2026. doi: 10.1007/s44197-026-00610-2.
2. Samal J, Dehury RK, Thomas MB, Singh H. Prevalence and predictors of depression in tuberculosis patients in India: a systematic review and meta-analysis. *Discover Public Health*. 2025;5:104. doi: 10.1007/s44192-025-00248-9.
3. Panibatla V, Nagaraja SB, Mohan D, Parambanattu Kizhakkethil SM, Sangeetha MD. Depression and anxiety among tuberculosis patients: a systematic review and meta-analysis. *Indian J Soc Psychiatry*. 2024;40(4):326-340. doi: 10.4103/ijsp.ijsp_222_23.

4. Chauhan A, Pandya A, Bhatt D, Salaliya V, et al. Dual burden of TB and mental ill-health: prevalence and associated factors of anxiety and depression among TB patients in Gujarat. *J Family Med Prim Care*. 2024;**13**(12):5615-5620. doi: 10.4103/jfmpc.jfmpc_532_24.
5. Patel N, Patel H, Varu J, Gandhi R, et al. The invisible toll: unveiling the prevalence and predictors of depression and anxiety among pulmonary tuberculosis (TB) patients and their households in Gujarat, India. *Cureus*. 2024;**16**(7):e65015. doi: 10.7759/cureus.65015.
6. Sutar R, Majumdar A, Yadav V, Basera DS. Anxiety, stress, and quality of life in patients with tuberculosis: a systematic review and meta-analysis. *Ind Psychiatry J*. 2024;**33**(1):13-29. doi: 10.4103/ipj.ipj_58_23.
7. Solanki SR, Dave VR, Shukla RP, Rathod VG, Solanki RN. Assessment of anxiety and depression among tuberculosis patients of Ahmedabad, India. *Indian J Tuberc*. 2024:S197-S202. doi: 10.1016/j.ijtb.2023.06.004.
8. Kumpuangdee S, Roomruangwong C, Sophonphan J, Ohata PJ, Suwanpimolkul G. Prevalence of depression and anxiety in pulmonary tuberculosis patients and its association with unsuccessful treatment outcome: a prospective cohort study. *Indian J Tuberc*. 2023;**70**(3):297-302. doi: 10.1016/j.ijtb.2022.05.007.
9. Panda UK, Ra D, Sahoo SS, Kakkar R, Singh J. Interplay between tuberculosis, mental illness, and treatment compliance: an integrative literature review. *Indian J Tuberc*. 2024;**71**(3):353-357. doi: 10.1016/j.ijtb.2023.10.004.
10. Maynard C, Tariq S, Sotgiu G, Migliori GB, van den Boom M, Field N. Psychosocial support interventions to improve treatment outcomes for people living with tuberculosis: a mixed methods systematic review and meta-analysis. *EClinicalMedicine*. 2023;**61**:102057. doi: 10.1016/j.eclinm.2023.102057.
11. Shringarpure K, Gurumurthy M, Sagili KD, Taylor M, Garner P, Tonsing J, et al. Patient adherence to tuberculosis treatment in the Indian subcontinent: systematic review and meta-synthesis of qualitative research. *BMJ Open*. 2023;**13**(5):e063926. doi: 10.1136/bmjopen-2022-063926.
12. Oh AL, Makmor-Bakry M, Islahudin F, Wong ICK. Prevalence and predictive factors of tuberculosis treatment interruption in the Asia region: a systematic review and meta-analysis. *BMJ Glob Health*. 2023;**8**(1):e010592. doi: 10.1136/bmjgh-2022-010592.
13. Davis RA, Leavitt HB, Singh A, Fanouraki E, Yen RW, Bratches RW. Examining interventions that aim to enhance TB treatment adherence in Southeast Asia: a systematic review and meta-analysis. *Indian J Tuberc*. 2024;**71**(1):48-63. doi: 10.1016/j.ijtb.2023.03.001.
14. Martono M, Akhyar M, Pamungkasari EP, Lestari A. Results of professional interventions to improve medication adherence based on health beliefs and important determinants of tuberculosis medication: a systematic review. *Eur Rev Med Pharmacol Sci*. 2023;**27**(24):11794-11805. doi: 10.26355/eurev_202312_34778.
15. Paalimäki-Paakki K, Virtanen M, Henner A, Nieminen MT, Kääriäinen M. Effectiveness of digital counseling environments on anxiety, depression, and adherence to treatment among patients who are chronically ill: systematic review. *J Med Internet Res*. 2022;**24**(1):e30077. doi: 10.2196/30077.