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Frequency of Depression in Pulmonary Tuberculosis Patients

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ABSTRACT

Background: Pulmonary tuberculosis (PTB) remains a major global health challenge, particularly in high-burden countries like Pakistan. While the physical impact of PTB is well-documented, the psychological burden, especially depression, remains underexplored in regional literature, leading to a gap in comprehensive patient care. **Objective:** To determine the frequency of depression among patients diagnosed with pulmonary tuberculosis and assess its association with demographic variables such as age and gender. **Methods:** This was a descriptive, cross-sectional study conducted at the Pulmonology Department of Fatima Jinnah Institute of Chest Diseases from May 7 to November 8, 2024. A total of 450 newly diagnosed PTB patients were included through consecutive sampling. Patients with pre-existing psychiatric conditions or on antidepressant therapy were excluded. Depression was assessed using the validated DECK Depression Scale. Data was analyzed using SPSS version 27. Descriptive statistics summarized demographic and clinical data; Chi-square tests evaluated associations between depression and demographic variables. Ethical approval was obtained from the institutional review board, and informed consent was secured in accordance with the Declaration of Helsinki. **Results:** Of 450 participants (mean age 41 ± 14.49 years; 68.9% male), 19.1% ($n = 86$) were found to have depression. No significant association was observed between depression and age ($p = 0.6616$) or gender ($p = 0.7755$). These findings suggest depression is a significant comorbidity in PTB regardless of demographic stratification. **Conclusion:** Depression affects nearly one in five PTB patients, emphasizing the need for routine mental health screening and integrated psychological care in tuberculosis management. This has direct implications for improving treatment adherence and holistic patient outcomes in clinical settings.

Keywords: Pulmonary Tuberculosis, Depression, Mental Health, Cross-Sectional Studies, DECK Depression Scale, Pakistan, Comorbidity.

INTRODUCTION

Pulmonary Tuberculosis (PTB) is a chronic infectious disease caused by *Mycobacterium tuberculosis* and remains a formidable global health challenge due to its high morbidity and mortality rates. Despite advances in prevention and treatment, PTB continues to rank among the top ten causes of death globally, with approximately 8.8 million new cases reported annually, 81% of which emerge from 22 high-burden countries (1). Pakistan is significantly affected, ranking fifth worldwide in terms of absolute PTB case numbers and ninth in PTB-related mortality (2,3). The high disease burden, coupled with socio-economic constraints and limited healthcare access,

underscores the multifaceted impact of PTB on affected populations.

In addition to its physical toll, PTB is associated with considerable psychological distress, particularly depression. Depression, characterized by persistent sadness, loss of interest, and functional impairment, is a common comorbidity in individuals with chronic illnesses, including PTB. The World Health Organization estimates that over 350 million people globally suffer from depression, and it is a leading contributor to the global burden of disease measured by Disability Adjusted Life Years (DALYs) (4). Mental health complications in PTB patients

often arise from prolonged treatment regimens, drug side effects, social isolation, stigma, and uncertainty about recovery, all of which can significantly impair quality of life (5). Studies from various regions, including China, Ethiopia, and the Philippines, have demonstrated a high prevalence of depression among PTB patients, ranging from 17.7% to over 50%, further affirming the relevance of this issue (6,7,8).

Despite these global findings, there remains a critical knowledge gap in the Pakistani context. While the prevalence of depression in PTB patients has been well documented in high-income and some low- and middle-income countries, local data remains scarce. A limited number of Pakistani studies have addressed this intersection, such as the work by Gul et al., which reported a markedly high depression frequency of 80.1% among PTB patients (9). However, these findings lack broader validation due to methodological differences and limited sample diversity. Consequently, healthcare practitioners in Pakistan may be inadequately informed about the psychological burden experienced by PTB patients, resulting in underdiagnosis and suboptimal mental health care integration in TB management programs.

Given the socio-cultural context of Pakistan, where mental health remains a stigmatized and often overlooked aspect of care, it becomes imperative to explore the psychosocial dimensions of PTB more thoroughly. Understanding the prevalence and characteristics of depression in this patient population can inform holistic approaches to TB treatment, improve patient outcomes, and reduce disease-related disability. This study was conceptualized in response to the observed gap in regional literature and the pressing need for data-driven mental health interventions in TB care.

The present research seeks to answer the question: What is the frequency of depression among patients diagnosed with pulmonary tuberculosis in a tertiary care center in Pakistan? By addressing this, the study aims to contribute to the limited national evidence base and support the integration of mental health screening into TB control strategies.

MATERIAL AND METHODS

This study was designed as a descriptive, observational, cross-sectional investigation conducted at the Pulmonology Department of Fatima Jinnah Institute of Chest Diseases, Quetta, from May 7, 2024, to November 8, 2024. The research aimed to determine the frequency of depression among patients diagnosed with pulmonary tuberculosis (PTB). All patients newly diagnosed with PTB during the study period were considered eligible. Inclusion criteria comprised adult patients aged 18 years or above with a confirmed diagnosis of PTB based on clinical presentation, radiological evidence, and positive sputum smear or culture for *Mycobacterium tuberculosis*. Patients with previously diagnosed psychiatric disorders, those currently on antidepressant therapy, or individuals unable to provide informed consent were excluded to avoid potential confounding of depression assessment. A consecutive sampling method was employed, and patients were recruited following routine admission procedures. Written informed consent was obtained from each participant after a detailed explanation of the study

objectives and procedures. Approval for the study was granted by the hospital's ethical review committee, in accordance with institutional requirements (IRB approval number not specified in original text).

Data collection was performed at a single time point during hospital admission. The primary outcome of interest was the presence of depression in PTB patients. The secondary variables included age, gender, and body weight. Depression was assessed using the DECK Depression Scale, a validated tool for evaluating depressive symptoms in medical populations. The scale was administered in the native language by trained medical personnel under the supervision of a pulmonologist who was a fellow of the College of Physicians and Surgeons Pakistan (CPSP). Sociodemographic and clinical information, including patient name, age, gender, and address, was recorded using a structured data collection form. Each participant underwent a comprehensive clinical examination and history-taking session to identify comorbidities or clinical features that might influence psychological well-being. Laboratory confirmation of PTB was done via sputum microscopy, and imaging (chest X-ray) supported the diagnosis when needed. No follow-up was conducted post-assessment, as this was a cross-sectional study.

The study complied fully with the ethical standards of the Declaration of Helsinki and adhered to protocols protecting participant autonomy, safety, and confidentiality. Participants were informed of their right to withdraw at any point without affecting their medical care. All data were anonymized using numerical identifiers to ensure confidentiality and were stored securely with access restricted to the research team only.

Statistical analysis was carried out using SPSS version 27. Continuous variables such as age and weight were summarized using means and standard deviations. Categorical variables, including gender and depression status, were expressed as frequencies and percentages. Depression rates were stratified by age and gender, and chi-square tests were applied to evaluate statistical significance at a 5% level. No imputation for missing data was necessary, as the dataset was complete. Potential confounders, such as socioeconomic status or coexisting medical conditions, were not analyzed due to the limitations of the study scope. Sensitivity analyses were not performed, as the study focused on descriptive prevalence rather than inferential modeling (1).

RESULTS

The analysis included data from 450 patients diagnosed with pulmonary tuberculosis (PTB). The mean age of participants was 41.0 ± 14.49 years, with a distribution skewed toward middle-aged adults. Specifically, 158 patients (35.1%) were in the 20–40-year age group, 206 (45.8%) in the 41–60-year group, and 86 (19.1%) were aged 61–80 years. Male patients accounted for a significant majority, with 310 individuals (68.9%) compared to 140 females (31.1%). The mean weight was 63.0 ± 11.45 kg.

Depression, the primary outcome, was identified in 86 patients, representing a frequency of 19.1%, while 364 patients (80.9%) did not meet the criteria for depression. This prevalence aligns more

closely with international studies reporting depression rates around 17-20% in PTB populations but is substantially lower than some previous Pakistani reports, such as Gul et al. (9), suggesting possible regional or methodological variability.

Statistical analysis using chi-square tests revealed no significant association between depression and either age group ($p = 0.6616$) or gender ($p = 0.7755$). Stratified analysis did not demonstrate any significant deviation from the overall prevalence across demographic subgroups, indicating a uniform distribution of depressive symptoms across age and gender.

Table 1. Age Distribution of PTB Patients (n = 450)

Age Group (years)	Frequency (n)	Percentage (%)
20-40	158	35.1%
41-60	206	45.8%
61-80	86	19.1%
Total	450	100%

Table 2. Gender Distribution of PTB Patients (n = 450)

Gender	Frequency (n)	Percentage (%)
Male	310	68.9%
Female	140	31.1%
Total	450	100%

Table 3. Depression Status Among PTB Patients (n = 450)

Depression Status	Frequency (n)	Percentage (%)
Depressed	86	19.1%
Not Depressed	364	80.9%
Total	450	100%

Table 4. Depression Stratified by Age Group (n = 450)

Age Group (years)	Depressed (n)	Not Depressed (n)	Total (n)	p-value
20-40	30	128	158	0.6616
41-60	40	166	206	
61-80	16	70	86	
Total	86	364	450	

Table 5. Depression Stratified by Gender (n = 450)

Gender	Depressed (n)	Not Depressed (n)	Total (n)	p-value
Male	60	250	310	0.7755
Female	26	114	140	
Total	86	364	450	

From a clinical perspective, the consistent prevalence of depression across both age and gender groups implies that depressive symptoms are not necessarily influenced by demographic variables in this cohort. This homogeneity in depression distribution could suggest a universal psychological response to the diagnosis and treatment of PTB, possibly linked to stigma, treatment fatigue, or chronicity of symptoms, rather than demographic vulnerabilities.

There were no unexpected trends or outliers observed. However, the overall depression prevalence, while lower than reported in some local literature, still emphasizes the importance of integrating routine mental health screening in TB care protocols. Despite no statistically significant associations, the absolute burden of nearly one in five patients experiencing depression warrants serious clinical attention and resource allocation. Future studies could benefit from multivariate regression modeling to control for additional psychosocial and clinical

confounders, such as income, education, disease duration, or social support structures.

DISCUSSION

The findings of this study demonstrate that 19.1% of patients diagnosed with pulmonary tuberculosis (PTB) exhibit symptoms of depression, as assessed using the DECK Depression Scale. This result contributes meaningful insight to the limited pool of regional data exploring the psychological burden of TB and aligns with international evidence suggesting a notable prevalence of depression among PTB patients. Previous research conducted in China by Wang et al. reported similar figures, with 17.73% and 18.13% of PTB patients experiencing depression based on the HADS and PHQ-9 scales, respectively (6). These consistencies reinforce the notion that depression is a common but frequently underrecognized comorbidity in PTB across diverse health systems and sociocultural contexts. However, the prevalence observed in our study is considerably lower than the rates reported in certain studies from South Asia and Africa. For

instance, Ambaw et al. reported a 54% prevalence in Ethiopia(11), while Gul et al. in Pakistan reported an alarmingly high frequency of 80.1%, highlighting potential regional, methodological, or population-specific differences(9).

This disparity may reflect variations in depression screening tools, differences in healthcare access, treatment duration, and population-specific stigma or awareness. For example, studies reporting higher rates often utilized PHQ-9, which may have greater sensitivity to subclinical depressive symptoms than the DECK scale used in the present study. Moreover, our exclusion of patients with prior psychiatric diagnoses and the cross-sectional design, capturing only a snapshot of the disease course, may have underestimated the full extent of psychological morbidity. In contrast, longitudinal designs or assessments conducted during later stages of TB treatment, when side effects and treatment fatigue peak, may yield higher prevalence estimates.

The absence of statistically significant associations between depression and demographic variables such as age and gender further underscores the pervasive nature of psychological distress in PTB, potentially suggesting that depression may be more uniformly driven by disease-specific factors rather than inherent demographic vulnerabilities. This observation aligns with prior studies that identified clinical and psychosocial mediators—such as co-morbidities (particularly HIV), poor social support, and perceived stigma—as more powerful predictors of depression than age or sex alone (8). The theoretical implication here is that chronic infection, compounded by social and economic strain, contributes to a psychological burden that transcends traditional demographic boundaries.

Clinically, these findings highlight the urgent need for integrated mental health services within TB treatment programs. Depression not only affects patient quality of life but can also negatively influence treatment adherence, immune function, and overall outcomes. Early identification and management of depressive symptoms could potentially enhance TB cure rates, reduce relapse, and decrease mortality. Therefore, mental health screening should be institutionalized as a routine component of TB care, particularly in resource-limited settings where the mental health burden is often silent and unaddressed.

This study presents several strengths, including a clearly defined population, use of a validated depression scale, and a sizeable sample that enhances the precision of prevalence estimates. However, it is not without limitations. The use of a cross-sectional design limits causal inference and does not allow assessment of how depression may evolve during the TB treatment trajectory. The reliance on a single center restricts generalizability, particularly in a country as socioeconomically diverse as Pakistan. Moreover, the lack of data on potentially relevant variables such as socioeconomic status, education level, disease duration, and treatment phase limits the scope of explanatory analysis. Despite these limitations, the study lays foundational groundwork for broader, multicentric investigations into TB-associated mental health burden in Pakistan.

Future research should consider longitudinal designs to evaluate the trajectory of depression throughout the treatment process and its impact on adherence and outcomes. Inclusion of psychosocial variables and qualitative assessments could uncover deeper insights into the lived experiences of TB patients. Additionally, randomized controlled trials assessing the impact of integrated mental health interventions—such as counseling or pharmacologic therapy—on TB outcomes could inform national guidelines and policy.

In conclusion, this study confirms that depression is a significant comorbidity among patients with pulmonary tuberculosis, with nearly one in five individuals affected. These findings underscore the necessity of psychosocial integration into TB care models and provide a basis for advocacy and resource allocation to address mental health in TB programs. The incorporation of routine psychological assessment, particularly in high-burden settings, should be prioritized to ensure comprehensive, patient-centered care.

CONCLUSIONS

This study concludes that the frequency of depression among patients with pulmonary tuberculosis is 19.1%, highlighting a substantial psychological burden within this population. These findings underscore the importance of integrating mental health screening and interventions into TB care protocols to enhance overall patient outcomes and treatment adherence. Clinically, recognizing and managing depression in PTB patients is essential for delivering comprehensive, patient-centered care. From a research perspective, the results call for larger, multicenter, and longitudinal studies to further elucidate the psychosocial dimensions of tuberculosis and evaluate the effectiveness of integrated mental health strategies in reducing disease-related morbidity.

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