



Understanding the Burden: Prevalence and Predictors of Depression and Anxiety among Multidrug-Resistant Tuberculosis Patients and their Household Contacts

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A B S T R A C T

Background: MDR-TB presents a significant challenge to global health, not only due to its resistance to standard tuberculosis treatment but also due to its profound psychosocial impacts. Yet, the mental health dimensions of MDR-TB remain underexplored, particularly among affected individuals and their close contacts.

Objective: This study was conducted with the aim to determine the rate and predictors responsible for depression and anxiety among MDR-TB family and their household contacts.

Methodology: A cross-sectional analytical study was conducted in Department of Pulmonology, Lady Reading Hospital Peshawar, Pakistan from January 2017 to March 2021. A total of 1000 study cases were included in this study, of which 600 were Multidrug Resistant TB patients and 400 were household contacts of these patients. For study purpose different scales were used like PHQ-9 scale for depression, HAM-A scale for anxiety, CIASS scale for stigma, and MSPSS scale for social support. All data were analyzed through SPSS v 23.

Results: In the present study, 57.0% were male and 63% of the study cases were married. Among diseased cases, 36% having low income and 28.3% having chronic conditions. Mean disease severity score of MDR-TB patients was 6.9. Among household contacts, 67.5% were from a low-income background, and 27.5% had chronic conditions. Prevalence of depression was 36.6% among MDR-TB patients and 17.5% among household contacts, with frequency of anxiety being 46.6% and 20%, respectively. Responsible factors were older age, female gender, lower financial status and disease related stigma.

Conclusion: The study highlights a significant prevalence of two of the main psychiatric illness among the study cases which emphasizing the urgent need for enhanced collaboration between TB programs and mental health services. Addressing sociodemographic factors, perceived stigma, and disease severity is crucial for effective management. Integrating mental health support into TB care frameworks and adopting family-centered approaches are vital steps in alleviating the burden of both TB and mental health issues in affected communities.

Keywords: MDR-TB; Psychiatry Issues; Depression; Anxiety.

Introduction

Tuberculosis (TB) is an infectious disease in humans caused by *Mycobacterium tuberculosis* (MTB) mainly affecting the lungs. TB constitutes a significant cause of both morbidity and mortality globally. TB effect human from ancient time and through a comprehensive program, TB is somewhat control in many parts of the world but unfortunately its resurgence in the form of Drug Resistant TB (DR-TB). Different forms of R-TB exist among which the more severe and frequent form Multi-Drug Resistant Tuberculosis (MDR-TB). MDR-TB refers to a form of tuberculosis in which the causative MTB has developed resistance to rifampicin (RMP) and isoniazid (INH) which are the most important first line drugs anti-tuberculosis drugs. This resistance significantly complicates treatment regimens and escalates the risk of poor treatment outcomes, making MDR-TB a critical concern in global TB control efforts.¹ The emergence of MDR-TB poses unique challenges due to the limited availability and effectiveness of second-line drugs, as well as the increased duration and complexity of treatment required. Patients with MDR-TB often face prolonged treatment courses from 11 to 24 months of treatment with more potent and toxic medications, leading to higher rates of adverse effects and lower treatment adherence.^{2,3} Different adverse effects faced by the MDR-TB patients of which the most important one is psychiatric issues. Poor mental health pose significant challenges for treatment adherence, clinical outcomes, and overall quality of life. Untreated mental health issues can lead to medication non-adherence, treatment interruptions, and poor treatment outcomes, including increased risk of treatment failure, relapse, and mortality. Moreover, the combination of depression and anxiety with MDR-TB may worsen physical symptoms, decrease immunological function, and delay recovery, resulting in an ongoing cycle of poor health outcomes.^{4,5,6}

MDR-TB not only effect the life of patients but also living in households with MDR-TB patients can significantly impact the mental health of household contacts. Living with someone diagnosed with MDR-TB can create an atmosphere of uncertainty and fear about the future. Contacts may worry about the long-term implications of the disease on their own health and the well-being of their family. Household contacts may experience persistent worry about the health and well-being of the MDR-TB patient also. Concerns about the effectiveness of treatment and the possibility of disease transmission can lead to heightened anxiety levels among the household contacts. Besides this, the stigma associated with MDR-TB, can result in social isolation for both patients and their household contacts.⁷ Fear of judgment and discrimination from others may lead contacts to with-

draw from social interactions, exacerbating feelings of loneliness and depression.⁶ Household contacts may face challenges in accessing adequate support systems to cope with the stress and anxiety associated with living with an MDR-TB patient. They also limited access to mental health resources and societal support structures can further exacerbate feelings of depression and anxiety. MDR-TB treatment often requires significant financial resources for additional medications, visits to PMDT units, and other related expenses. These all are the factors responsible for stress and anxiety on household contact of MDR-TB patients due to the financial burden of supporting. So, it is very important to know the level and factors responsible for depression and anxiety among MDR-TB patients and their household contacts.

Pakistan is among the highest TB country and Khyber Pakhtunkhwa is the province where prevalence of TB/MDR-TB is higher due to different factors. Here, MDR-TB is treated through Programmatic Management of Drug Resistant TB strategies. This topic is of much importance but so far no such study conducted in this area. In view of this, the current study was planned with objectives of finding out the prevalence of depression and anxiety and its determinants among MDR-TB cases registered at Lady Reading Hospital, Peshawar.

Objective

Objective of the present study was find out the rate and predictors responsible for depression and anxiety among MDR-TB patients and their household contacts.

Methodology

A cross-sectional study was conducted at Department of Pulmonology, Lady Reading Hospital, Peshawar, Pakistan January 2017 to March 2021.

A consecutive sampling method was employed to recruit patients for the study. All eligible MDR-TB patients who gave their consent and visited the PMDT sites for their treatment or for monthly check up and collection of medicine. For study purpose we planned to enrolled a total of 600 MDR-TB patients and for each patient also enrolled one of their household contact also, so total sample size became 1200. Subsequently, for each enrolled patient, one household contact was selected randomly from the household contacts. But after final selection a total of 1000 study cases were included in this study, of which 600 were Multidrug Resistant Tuberculosis patients and 400 were household contacts of these patients. The number of contacts were less as number of patients due to the fact that there are few families where no contacts found or few patients were from far areas from where household contact did not come along the

Table 1. Sociodemographic characteristics of the participants

Characteristic	MDR-TB Patients (n=600)	Household Contacts (n=400)	Total
Age (years), mean $\pm$ SD	46.1 $\pm$ 11.4	42.3 $\pm$ 10.8	44.7 $\pm$ 12.5
Gender, n (%)			
Male	370 (61.6%)	200 (50%)	570 (57%)
Female	230 (38.3%)	200 (50%)	430 (43%)
Marital status, n (%)			
Single	230 (38.4%)	90 (22.5%)	320 (32.0%)
Married	360 (60.0%)	298 (74.5%)	558 (55.8%)
Divorced/widowed	10 (1.6%)	12 (3.0%)	22 (2.2%)
Income level, n (%)			
Low	380 (63.3%)	270 (67.5%)	650 (65.0%)
Middle	170 (28.3%)	80 (20.0%)	150 (25.0%)
High	50 (8.4%)	50 (12.5%)	100 (10.0%)
Social support score, mean $\pm$ SD	16.1 $\pm$ 6.3	17.3 $\pm$ 5.1	16.6 $\pm$ 4.9
Perceived stigma score, mean $\pm$ SD	17.5 $\pm$ 7.1	15.8 $\pm$ 6.4	17.2 $\pm$ 5.9
History of mental illness, n (%)	70 (11.6%)	60 (15%)	130 (13%)
Substance abuse, n (%)	100 (16.6%)	60 (15%)	160 (16%)
Disease severity score, mean $\pm$ SD	6.9 $\pm$ 3.8	-	-
Side effects due drugs, mean $\pm$ SD	4.5 $\pm$ 2.0	NA	NA
Chronic conditions, n (%)	170 (28.3%)	110 (27.5%)	280 (28%)

patients to the treatment site regularly.

All patients included in the study were diagnosed as multidrug-resistant tuberculosis (MDR-TB) cases confirmed to have Rifampicin resistance through GenXpert testing. These patients were enrolled at PMDT LRH for their treatment. Additionally, all study participants were adults, and their household contacts were also of the same age group. The exclusion criteria for this study specified that individuals who were unable to complete the interview or were already experiencing any form of psychiatric illness would not be included.

For data collection, a specialized proforma was prepared which included all details of study subjects included age, gender, marital status, education, occupation, and income with addition the clinical characteristics of the patients.

As the main objective of the study was the identification of

depression and anxiety so different internationally accepted scales were also used in this study. For finding of frequency of depression, the Patient Health Questionnaire-9 (PHQ-9) was applied on both group of the study.⁸ Another scale known the Hamilton Anxiety Rating Scale (HAM-A) was used for anxiety.⁹ Both these scales were used widely for depression and anxiety and on all PMDT sites these scales were used on routine purposes. Two other scales were also used, one for social support known as the Multidimensional Scale of Perceived Social Support (MSPSS),¹⁰ and for perceived stigma the Chronic Illness Anticipated Stigma Scale (CIASS) was used.¹¹ After completion, all data from questionnaires were entered into SPSS V23 for analysis purposes. Descriptive statistics were employed to summarize baseline characteristics as well their clinical characteristics, while the prevalence of depression and anxiety was reported

Table 2. Frequency of depression and anxiety among study cases

Psychiatry issues	MDR-TB Patients (n=600)	Houdehold Contacts (n=400)	Total
Depression	220 (36.6%)	70 (17.5%)	290 (29.0%)
Anxiety	280 (46.6%)	80 (20.0%)	360 (36.0%)

accordingly. Bivariate analysis involved the utilization of t-tests/ANOVAs and chi-square tests to assess outcome-related factors. All such variables which showed significant association were included in multivariable logistic regression models to identify independent predictors of depression and anxiety.

Prior to inclusion in the study, all participants provided informed consent, and ethical approval was obtained from the institutional review board (IRB) at Lady Reading Hospital, Peshawar.

Results

The current study consists of 1000 cases, comprising 600 enrolled patients diagnosed with Multi-Drug Resistant Tuberculosis (MDR-TB) and 400 of their household contacts. The average age of the participants was 44.7 ± 12.5 years. Among these cases, 57% were male and 43% were female. Within the cohort, 63% were married, 21% were single, and 16% were divorced or widowed. Regarding the MDR-TB patients, the mean severity score of the disease was 6.9 ± 3.8 . Additionally, 36% had a low income while 64% had a high income, and 28.3% had chronic conditions (Table 1). Among the household contacts, there was an equal distribution of males and females. 74.5% of the subjects were married, while only 3.0% were divorced or widowed. Within this group, 67.5% were classified as being from a low-income background. Furthermore, 15.0% of the family contacts experienced mental health issues, and 27.5% had chronic conditions (Table 1).

The primary aim of the study was to assess the prevalence of depression and anxiety among MDR-TB patients and their household contacts. The results revealed that among MDR-TB patients, the frequency of depression was 36.6%, while anxiety was reported in 46.6% of cases. Similarly, among household contacts, the rates of depression and anxiety were 17.5% and 20.0% respectively. These findings underscore the heightened prevalence of depression and anxiety within both groups studied, highlighting the significant impact of MDR-TB not only on patients but also on their immediate family members (Table 2).

Different factors associated with the occurrence of depression and anxiety among both groups of study cases included age (p-value = 0.02), female gender (p-

value = 0.001), marital status (p-value = 0.001), poor financial status (p-value = 0.001), stigma (p-value = 0.001), whereas drugs side effects and disease severity also showed significant association only with diseased persons (Table 3).

Adjusted odds ratios from multivariable logistic regression analysis revealed several significant independent predictors associated with an increased risk of depression after controlling for confounders. Predictors that showed responsible for these issues were stigma, any previous psychiatric issue and severity of disease among diseased persons. The findings were consistent with those observed for anxiety outcomes, indicating similar risk factors contributing to increased anxiety levels (Table 4).

Discussion

The comprehensive analysis conducted in this study, involving a cohort of 1000 individuals, sheds crucial light on the prevalent burden of depression and anxiety among those affected by Multi-Drug Resistant Tuberculosis (MDR-TB) and their household contacts. The demographic profile of our participants, with an average age of 44.7 years and a slightly higher representation of males (57%) compared to females (43%), reflects the broader epidemiological trends observed in TB demographics.

The prevalence rates of depression and anxiety observed in our study, particularly among MDR-TB patients, emphasize the urgent need for integrated mental health services within TB care programs. Nearly 37% of MDR-TB patients were identified as experiencing depression, while 46.6% reported symptoms of anxiety. These findings underscore the substantial psychological burden associated with MDR-TB and the critical importance of addressing mental health needs alongside clinical management. These findings in line with some other studies conducted throughout the globe which stated that depression and anxiety level was 45.6–71% and 44–57% respectively.^{13,14} It is a fact that different psychiatric issues are present among MDR-TB patients and people living with them, primarily due to the prolonged and challenging treatment regimens, social stigma surrounding TB, and financial strains. MDR-TB treatment often lasts for two years or more, with medications causing significant side effects and

Table 3. Factors responsible for depression and anxiety among study cases

Characteristics	Depression		P-value	Anxiety		P-value
	Yes	No		Yes	No	
Age	44.3 ± 8.9	39.1 ± 11.1	0.001	42.6 ± 9.2	38.8 ± 10.2	0.02
Gender						
Male Female	110 (30.5%) 180 (78.2%)	260 (69.5%) 50 (21.8%)	<0.001	130 (32.5%) 160 (80.0%)	170 (67.5%) 40 (20.0%)	<0.001
Marital Status						
Single Married Divorced/Widowed	124 (53.9%) 90 (25.0%) 06 (60.0%)	106 (46.1%) 270 (75.0%) 04 (40.0%)	0.04	21 (23.3%) 48 (16.1%) 01 (9.0)	69 (76.7%) 250 (83.9%) 11 (91.0%)	0.05
Financial Status						
Low Middle High	170 (44.7%) 80 (47.0%) 40 (80.0%)	210 (55.3%) 90 (53.0%) 10 (20.0%)	0.01	245 (94.2%) 70 (87.5%) 45 (90.0%)	25 (5.8%) 10 (12.5%) 05 (10.0%)	0.03
Perceived Social Support	17.1 ± 5.3	18.9 ± 5.2	<0.001	16.9 ± 4.9	20.2 ± 5.0	< 0.001
Perceived Stigma	12.9 ± 4.1	10.9 ± 3.1	< 0.001	14.4 ± 4.2	11.5 ± 3.3	< 0.001
History of Mental Illness	50 (71.4%)	20 (28.6%)	< 0.001	45 (75.0%)	15 25.0%)	0.002
Substance Abuse	60 (60.0%)	40 (40.0%)	0.23	50 (83.4%)	10 (16.6%)	0.23
Disease Severity	5.1 ± 1.4	3.5 ± 2.1	<0.001	5.3 ± 2.8	1.9 ± 2.7	<0.001
Medication Side Effects	6.9 ± 3.2	4.1 ± 3.2	<0.001	6.8 ± 3.4	4.2 ± 3.1	<0.001
Chronic Condition	90 (52.9%)	80 (47.1%)	0.13	70 (63.6%)	40 (36.4%)	0.04

imposing substantial financial burdens on patients and their families. Additionally, the stigma associated with TB can lead to social isolation and discrimination, exacerbating feelings of loneliness and despair among both patients and their household contacts. Fear of transmission further adds to the psychological distress experienced by individuals affected by MDR-TB, underscoring the urgent need for comprehensive psycho-social support services integrated into TB care.

Several predictors emerged as significant determinants of these psychiatric issues among both the patients and people living with them. These factors are older age, female gender, their marital status, and low financial status were consistently associated with increased risk, highlighting the multifaceted nature of vulnerability to

mental health disorders within this population. Additionally, perceived stigma emerged as a significant predictor, emphasizing the profound impact of social attitudes and perceptions on mental well-being. Different factors associated with the occurrence of depression and anxiety among both groups of study cases included age ($p=0.02$), female gender ($p<0.001$), marital status ($p<0.001$), poor financial status ($p<0.001$), stigma ($p<0.001$), whereas drugs side effects and disease severity also showed significant association only with diseased persons. Of particular importance are the associations between disease severity, treatment-related side effects, and mental health outcomes among MDR-TB patients. The observed correlation between higher disease severity scores and increased risk of

Table 4. Multivariate analysis of factors responsible for depression and anxiety among study cases

Characteristics	Depression	Anxiety
Age	1.08 (2.03 - 4.01)	2.02 (1.05 - 1.09)
Gender		
Male	1 (ref)	1 (ref)
Female	1.9 (1.5 - 5.9)	1.5 (1.0 - 1.9)
Marital status		
Married	1 (ref)	1 (ref)
Single	1.5 (0.9 - 2.0)	1.3 (0.9 - 1.9)
Divorced/Widowed	4.0 (1.8 - 9.0)	1.7 (1.3 - 2.5)
Income level		
Low	1.7 (1.1 - 2.0)	1.1 (0.9 - 2.6)
Middle	1.5 (0.8 - 1.9)	1.3 (0.9 - 1.9)
High	1 (ref)	1 (ref)
Perceived social support	1.0 (0.9 - 1.0)	0.8 (0.9 - 1.0)
Perceived stigma	3.9 (1.5 - 6.0)	2.7 (1.9 - 7.3)
History of any mental illness	3.1 (2.1 - 4.5)	1.9 (0.9 - 4.0)
Substance abuse	1.9 (1.5 - 3.7)	2.1 (0.8 - 3.3)
Disease severity among patients	1.9 (2.0 - 3.2)	3.0 (2.1 - 5.0)
Side Effects due to SLDs	3.4 (2.2 - 5.6)	2.3 (2.1 - 6.5)
Chronic conditions	2.3 (1.0 - 2.3)	1.9 (0.9 - 1.9)

depression and anxiety underscores the importance of holistic management approaches that address both physical and psychological aspects of TB care. Furthermore, the significant independent predictors identified through multivariable logistic regression analysis, including perceived stigma, history of mental illness, and disease severity, provide valuable insights for targeted interventions and support services. Different studies also conducted in different areas of the globe which also showed similar results. A study conducted by Santos et al point out that Stigmatization, negative emotions, social rejection, and isolation were reported as risk factors for depression and anxiety among MDR-TB patients.¹⁴

The present study underscores a pivotal insight into the intricate interplay between social support, mental health, and medication resistance. It elucidates that the absence of adequate social support significantly heightens the risk

of depressive symptoms, underscoring the profound impact of interpersonal connections on emotional well-being. Moreover, the findings shed light on the nuanced relationship between multi-drug resistance and anxiety, suggesting that individuals facing challenges with medication efficacy are more prone to experiencing heightened levels of anxiety. This dual association underscores the multifaceted nature of mental health dynamics, wherein the quality of social support networks and treatment responses intertwine to shape the manifestation of psychological distress.

Furthermore, the research underscores the indispensable role of robust social support systems in bolstering mental resilience and buffering against the onset of depressive symptoms. In contrast, the presence of multi-drug resistance emerges as a notable contributor to the exacerbation of anxiety symptoms, highlighting the

intricate interplay between pharmacological interventions and psychological well-being. These findings underscore the importance of comprehensive interventions that not only address clinical symptoms but also prioritize the cultivation of strong social support networks to foster holistic mental health outcomes. Thus, by delineating the differential impacts of social support and medication resistance on depression and anxiety, the study underscores the need for tailored interventions that address the multifaceted determinants of mental health.

The current study underscores a concerning reality: individuals afflicted with multidrug-resistant tuberculosis (MDR-TB) face a significantly higher burden of stigma, psychological distress, and treatment-related challenges compared to non-MDR-TB cases. This heightened stigma is compounded by the prolonged and rigorous treatment regimen associated with MDR-TB, which involves potent medications notorious for their severe side effects, thereby exacerbating mental health vulnerabilities. Moreover, MDR-TB patients encounter elevated rates of treatment failure and mortality, coupled with lower chances of successful recovery, amplifying the psychosocial strain they endure throughout their treatment journey.^{15,16}

Numerous research endeavors have elucidated the detrimental impact of stigma on TB treatment outcomes, with profound implications for healthcare-seeking behavior, diagnosis, and treatment adherence. Stigma often engenders reluctance to engage with healthcare services, leading to delays in seeking medical assistance and initiating treatment. Furthermore, it fosters interruptions in treatment adherence, which, in turn, precipitate treatment failure, disease recurrence, and the emergence of drug resistance.^{17,18} In light of these findings, there is a compelling imperative to integrate mental health services into TB control programs, ensuring comprehensive support for patients grappling with the emotional toll and iatrogenic mental health challenges exacerbated by their treatment experiences. Addressing these multifaceted needs is essential for optimizing treatment adherence, mitigating the adverse effects of emotional distress, and enhancing overall treatment outcomes, underscoring the indispensable role of holistic care in combating the complex interplay of TB and mental health.

The findings of this study offer valuable insights that can inform health policies and guide the development of targeted programmatic interventions aimed at enhancing the treatment of MDR-TB patients. Particularly significant is the recognition of the need for interventions that address the mental health needs of MDR-TB patients and their household contacts. Incorporating such interventions into healthcare planning holds promise for bolstering efforts to prevent and control the spread of this disease within the Khyber Pakhtunkhwa region.

Conclusion

From the findings of this study, it is evident that Multi-Drug Resistant Tuberculosis (MDR-TB) patients experience a substantial burden of both depression and anxiety, with prevalence rates higher than those observed among household contacts. This underscores the urgent need for closer collaboration between National Tuberculosis Programs (NTPs) and mental health services. By integrating mental health support into TB care frameworks, particularly tailored to address the needs of marginalized populations, we can enhance patient-centered management and improve outcomes.

The association of depression and anxiety with various sociodemographic factors such as age, gender, marital status, and financial status, along with perceived stigma, highlights the complex interplay between social determinants and mental health outcomes in TB patients. These findings emphasize the importance of adopting holistic, family-centered approaches to care that recognize the broader context in which TB and mental health disorders manifest.

Furthermore, the identification of perceived stigma, history of mental illness, and disease severity as significant predictors for both depression and anxiety underscores the need for targeted interventions aimed at addressing not only clinical symptoms but also psychosocial factors that contribute to mental health comorbidities in MDR-TB patients.

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