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A Multidimensional Analysis of Factors Influencing Depression and Anxiety among Multidrug-Resistant Tuberculosis Patients

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Abstract: *This study investigates multidimensional factors influencing depression and anxiety symptoms in multidrug-resistant tuberculosis (MDR-TB) patients, aiming to inform effective mental health intervention strategies. A cross-sectional study included 103 MDR-TB patients treated at our hospital from January 2021 to August 2024. Assessments utilized the Hospital Anxiety and Depression Scale (HADS), Connor-Davidson Resilience Scale (CD-RISC-10), and Perceived Social Support from Family Scale (PSS-Fa). Demographic and clinical data were collected. Statistical analyses (descriptive, correlation, multiple regression) were performed using SPSS 26.0. Depression and anxiety prevalence rates were 50.5% and 35.0%, respectively. Significant correlations linked depressive/anxious states with gender, activity levels, sleep quality, treatment stage, disease perception, healthcare experiences, family support, and resilience. Treatment stage, family support, and resilience emerged as key depression factors; gender, sleep quality, disease perception, family support, and resilience influenced anxiety. MDR-TB patients experience high depression and anxiety rates influenced by complex personal and environmental factors. Enhanced mental health education, personalized psychological support, optimized family involvement, and resilience training are crucial in clinical care to enhance mental health and treatment outcomes.*

Keywords: *Multidrug-resistant tuberculosis (MDR-TB), Depression, Anxiety, Mental health, Family support, Psychological resilience*

1. Introduction

Multidrug-resistant tuberculosis (MDR-TB) poses significant therapeutic challenges, which, in turn, severely impact patients' mental health, as evidenced by multiple studies highlighting depression and anxiety as common comorbidities among MDR-TB patients[1-3]. This underscores the urgency of addressing mental health concerns within the global public health landscape. The presence of depression and anxiety symptoms among MDR-TB patients not only undermines their quality of life but also poses challenges to the sustainability and efficacy of treatment [4]. In China, the mental health issues among MDR-TB patients are particularly acute, with the incidence of anxiety and depression significantly higher than that observed in the general population [5]. This study aims to delve into the multidimensional factors influencing depressive and anxiety symptoms in MDR-TB patients, encompassing socioeconomic status, family support, individual perceptions of the disease, healthcare experiences, and more. By doing so, we aspire to provide a scientific basis for the development of effective mental health intervention strategies, ultimately enhancing patients' psychological well-being, improving treatment outcomes, and facilitating their holistic recovery.

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2. Materials and Methods

2.1 Participants

This study employed a cross-sectional design, enrolling 103 MDR-TB patients treated at our hospital from January 2021 to August 2024 using a consecutive sampling method. Stratification was applied based on gender, age, and educational level, with data presented in Table 1. Inclusion criteria were based on WHO diagnostic standards, with an age range of 16 to 80 years, ensuring participants had basic communication and comprehension abilities to complete the questionnaires. Patients with a history of mental illness, intellectual disabilities, pregnant or lactating women, and those with other severe physical illnesses were excluded.

2.2 Measures

The study utilized three self-report scales, supplemented by a questionnaire on personal and family background information.

2.2.1 Depression and Anxiety Scale

The Hospital Anxiety and Depression Scale (HADS) was used to assess depressive and anxiety symptoms [6]. The HADS consists of two subscales with a total of 14 items, using a 4-point scoring system to comprehensively evaluate the psychological state of patients over the past month. Scores of 8-10 indicate borderline, 11-14 mild, 15-18 moderate, and 19 or above severe.

2.2.2 Psychological Resilience Scale

The Connor-Davidson Resilience Scale (CD-RISC-10) was used to measure psychological resilience, containing 10 items scored on a 5-point Likert scale, with a total score ranging from 0 to 40, where higher scores indicate greater resilience [7].

2.2.3 Family Support Scale

The Perceived Social Support from Family Scale (PSS-Fa) was used to assess family support [8]. The scale includes 15 items covering four dimensions: material, emotional, informational, and companionship support, scored using a "yes/no" method, with a total score of 0-15, reflecting varying levels of family support.

2.3 Data Collection

After obtaining informed consent, researchers explained the study's purpose and procedures to the patients in detail. Questionnaires were distributed electronically, with necessary guidance and assistance provided to ensure accurate completion. All data were processed anonymously to protect patient privacy, in accordance with the hospital's ethical and privacy protection regulations.

2.4 Data Analysis

Collected data were organized and screened to remove invalid data. Descriptive statistics, correlation tests, and multiple regression analyses were performed using SPSS version 26.0 to understand the current state of depression and anxiety among patients and the distribution and correlation of various factors. The primary factors influencing depression and anxiety were identified to explore the multidimensional influences on these conditions in MDR-TB patients.

3. Results

3.1 Prevalence of Depression and Anxiety in MDR-TB Patients (See Table 1)

Our study cohort of 103 MDR-TB patients exhibited depressive and anxiety symptom prevalence rates of 50.5% and 35.0%, respectively, with corresponding mean scores of 10.12±4.16 and 9.45±3.06 on the Hospital Anxiety and Depression Scale (HADS). These findings highlight the pervasive nature of psychological distress among MDR-TB patients, necessitating intervention. Specifically, there were differences in the prevalence of depressive symptoms across different genders, ages, and levels of education. Male patients had higher rates of depression (55.6%) and anxiety (40.3%) compared to

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females (38.7% and 22.6%). Patients under 20 years old had the highest rate of depression (66.7%), while those aged 50-60 had a higher rate of anxiety (55.0%). Patients with an education level of primary school or below had a higher rate of depression (54.5%), and those with a college education had a relatively higher rate of anxiety (42.1%).

Table 1. Prevalence and Mean Scores of Depression and Anxiety in MDR-TB Patients

Variable		N (%)	Depression		Anxiety	
			Frequency (%)	Score ± SD	Frequency (%)	Score ± SD
Gender	Male	72(69.9%)	40(55.6%)	10.50±4.00	29(40.3%)	9.82±3.01
	Female	31(30.1%)	12(38.7%)	9.26±4.56	7(22.6%)	8.58±3.04
Age	Under 20	6(5.8%)	4(66.7%)	11.00±5.40	3(50.0%)	10.17±3.82
	20-35	23(22.3)	11(47.8%)	10.26±4.93	7(30.4%)	9.00±3.13
	35-50	19(18.4%)	10(52.7%)	9.89±3.68	6(31.6%)	9.32±2.54
	50-60	20(19.4%)	12(60.0%)	10.90±4.12	11(55.0%)	10.60±3.39
	Over 60	35(34.0%)	15(42.9%)	9.54±3.79	9(25.8%)	9.03±2.93
Education Level	≤ Elementary	22(21.4%)	12(54.5%)	10.77±4.39	8(36.4%)	9.95±3.15
	Middle School	34(33.0%)	17(50.0%)	9.94±3.97	11(32.4%)	9.41±3.07
	High School /Technical	25(24.3%)	12(48.0%)	9.56±4.31	8(32.0%)	8.88±3.11
	College	19(18.4%)	10(52.7%)	10.37±3.99	8(42.1%)	9.58±2.73
	≥ Bachelor's	3(2.9%)	1(33.3%)	10.33±6.66	1(33.3%)	10.00±5.20

3.2 Univariate Analysis of Factors Affecting Depression and Anxiety in MDR-TB Patients (See Table 2)

Table 2. Univariate Analysis of Factors Affecting Depression and Anxiety in MDR-TB Patients

Variable	Depression		Anxiety	
	r	P	r	P
Gender	0.153	>0.05	0.227	<0.05
Age	-0.079	>0.05	-0.055	>0.05
Education Level	-0.045	>0.05	-0.029	>0.05
Occupation	-0.004	>0.05	-0.029	>0.05
Residence Type	-0.07	>0.05	0.033	>0.05
Treatment Stage	-0.019	<0.05	-0.028	<0.05
Daily Activity	-0.143	>0.05	-0.226	<0.05
Sleep Quality	-0.171	>0.05	-0.309	<0.01
Disease Awareness	-0.265	<0.01	-0.287	<0.01
Healthcare Experience	-0.233	<0.05	-0.258	<0.01
Support	-0.904	<0.01	-0.83	<0.01
Resilience	-0.798	<0.01	-0.733	<0.01

The results of the univariate analysis indicate that age, occupation, education level, and residence type were not significantly associated with depression or anxiety in MDR-TB patients. Gender, daily activity level, and sleep quality were not significantly associated with depression, but they were significantly related to anxiety. Specifically, daily activity level and sleep quality were negatively correlated with anxiety, meaning that higher levels of daily activity and better sleep quality were associated with lower anxiety rates. Furthermore, the treatment stage, disease awareness, healthcare experience, family support, and psychological resilience were all negatively correlated with both depression and anxiety. This indicates that an earlier stage of treatment, greater disease awareness, better healthcare experience, higher family support, and stronger psychological resilience were associated with lower probabilities of depression and anxiety in patients.

3.3 Multivariate Analysis of Factors Influencing Depression in MDR-TB Patients (See Table 3)

Table 3 presents the results of the multivariate regression analysis examining factors influencing depression in patients with multidrug-resistant tuberculosis (MDR-TB). The analysis included

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significant univariate factors as independent variables and depression scores as the dependent variable. The results indicate that the treatment stage, family support, and psychological resilience are significant factors influencing depression in MDR-TB patients ($p < 0.01$). Patients with longer treatment durations, lower levels of family support, and poorer psychological resilience are more likely to experience depressive symptoms.

Table 3. Multivariate Analysis of Factors Influencing Depression in MDR-TB Patients

Variable	B	Std. Error	Beta	t	p
(Constant)	4.006	0.256		15.648	0.000
Family Support	-1.078	0.084	-0.644	-12.76	0.000
Psychological Resilience	-0.563	0.08	-0.356	-7.028	0.000
Treatment Stage	-0.342	0.015	-0.108	-2.987	0.004

$R2=0.880$, Adjusted $R^2=0.876$; $F=241.470$, $P<0.001$

3.4 Multivariate Analysis of Factors Influencing Anxiety in MDR-TB Patients (See Table 4)

Table 4. Multivariate Analysis of Factors Affecting the Anxiety State of MDR-TB Patients

Variable	B	Std. Error	Beta	t	p
(Constant)	4.075	0.237		17.207	0.000
Gender	0.275	0.088	0.147	3.134	0.002
Sleep Quality	-0.224	0.044	-0.25	-5.092	0.000
Disease Awareness	-0.106	0.048	-0.115	-2.215	0.029
Family Support	-0.741	0.09	-0.544	-8.218	0.000
Psychological Resilience	-0.365	0.086	-0.284	-4.234	0.000

$R2=0.803$, Adjusted $R^2=0.793$; $F=79.097$, $P<0.001$

A multiple regression analysis was conducted with significant univariate factors as independent variables and the level of anxiety as the dependent variable. The results, as shown in Table 4, indicate that gender, sleep quality, level of disease knowledge, family support, and psychological resilience are significant factors influencing anxiety in MDR-TB patients ($P < 0.05$). Male patients, those with poor sleep quality, low disease knowledge, low family support, and poor psychological resilience are more likely to exhibit symptoms of anxiety.

4. Discussion

Our study reveals a notably high prevalence of depressive (50.5%) and anxiety (35.0%) symptoms among MDR-TB patients, consistent with both domestic and international findings [1-4], highlighting the significant mental health challenges confronting these patients during their extensive treatment period. Depression and anxiety not only impair the quality of life but can also decrease treatment adherence, compromise therapeutic outcomes, and potentially increase mortality rates [9-10]. Therefore, prioritizing the mental health of MDR-TB patients is crucial for improving prognosis.

Our multidimensional factor analysis further indicates that gender, level of daily activity, sleep quality, treatment phase, disease awareness, healthcare experiences, degree of family support, and psychological resilience are all influential factors in the manifestation of depressive and anxiety symptoms in MDR-TB patients. Patients undergoing lengthy treatment regimens, experiencing suboptimal healthcare encounters, lacking adequate disease knowledge, receiving diminished familial support, and demonstrating lower psychological resilience are more prone to develop depression and anxiety. These conditions may be linked to the extended duration of MDR-TB, substandard treatment efficacy, and the economic and lifestyle pressures they induce [11-13], as well as reduced coping capacities and diminished family support within these groups [14-15]. Additionally, male patients, those with reduced daily activities, and individuals with poor sleep quality display more pronounced anxiety symptoms, potentially due to unique societal roles attributed to men [16].

Furthermore, family support, as a critical resource for patients battling illness, offers multifaceted assistance including emotional, financial, informational, and companionship support. Adequate family support bolsters patients' psychological resilience, enabling them to manage the stress and challenges posed by their condition more effectively [17-18]. Our study confirms a significant negative correlation between family support and psychological resilience with depressive and anxiety symptoms in patients, suggesting that optimizing the home environment and fostering patient resilience should be emphasized

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in the care of MDR-TB patients [19].

In light of our findings, healthcare professionals engaged in the treatment and care of MDR-TB patients must monitor patients' sleep patterns, disease awareness, satisfaction with medical care, and levels of daily activity. Multifaceted interventions, such as enhanced health education, psychological support, and behavioral modifications, should be implemented to elevate patients' understanding of their condition, improve their mental state, and bolster their capacity to cope with the disease [20-21]. Moreover, attention should be given to patients' financial situations and family support networks, providing necessary financial aid and resource linkage to alleviate their economic burdens [22].

Although this study provides a scientific foundation for the mental health management of MDR-TB patients, it acknowledges certain limitations. Future research could involve longitudinal studies to further explore the dynamic relationship between influencing factors and depressive-anxiety symptoms, with expanded sample sizes. Additionally, further exploration of other potential influencing factors, such as family and economic circumstances and social engagement, would contribute to a comprehensive understanding of the determinants impacting the mental health of MDR-TB patients.

5. Conclusion

This study substantiates the high prevalence of depressive and anxiety symptoms among patients with MDR-TB and elucidates the multifaceted impact of various factors including gender, level of daily activity, sleep quality, stage of treatment, disease perception, healthcare experience, family support, and psychological resilience on their mental health status. Specifically, prolonged treatment duration, negative healthcare experiences, inadequate knowledge about the disease, insufficient familial support, and reduced psychological resilience exacerbate the psychological burden on patients, heightening the risk for depression and anxiety. It is noteworthy that male patients, those with decreased levels of physical activity, and individuals experiencing poor sleep quality are more prone to develop anxiety. Consequently, healthcare providers should employ a multidimensional approach encompassing education, psychological support, family engagement, and psychological resilience training to mitigate these symptoms, thereby enhancing patients' psychological well-being, improving their quality of life, and facilitating overall recovery.

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