Factors Associated With Depressive Symptoms and Perceived Stigma in Patients With Tuberculosis

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Research

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Abstract

Objective: The aim of this study is to determine the levels of perceived stigma and social support and presence of depressive and anxiety symptoms in patients with tuberculosis and to investigate the association of perceived stigma and depression with demographic and disease related factors.

Methods: This study included patients older than 18 years of age with tuberculosis. The hospital anxiety depression scale (HADS), stigma of tuberculosis scale (STS), and multidimensional scale of perceived social support (MSPSS) were applied to the participants. Univariate and multivariate analyses were performed to define correlates of depression and perceived stigma.

Results: A total of 204 patients were included. The risk of anxiety and depression were 25% and 36.8%, respectively. Multivariate binary logistic regression analyses suggested that higher HADS-anxiety scores and lower MSPSS scores were associated with a depressive HADS score and that a lower BMI, higher HADS-anxiety score, and higher HADS-depression score were associated with high levels of perceived stigma.

Conclusions: The rates of depression, stigmatization, and anxiety were high in these patients. Anxiety symptoms were positively and social support was inversely associated with depressive symptoms. A lower BMI and higher depression and anxiety scores were independently associated with high levels of perceived stigma.

Introduction

Tuberculosis remains an important health problem especially in developing countries. Apart from the risk of morbidity and mortality, it has psychosocial consequences such as loss of labor and depression. Tuberculosis may also influence patients' psychological status and may cause difficulties in their social environment due to stigmatization after the diagnosis of tuberculosis. These may also have a negative impact on compliance with long-term tuberculosis treatment and thus the success of treatment. Recent studies reported that approximately half of patients with tuberculosis have perceived stigma [1, 2]. Several studies suggest that perceived stigma negatively affect adherence to treatment and quality of life [2, 3]. Patients with poor social support and those with depression seem to be more vulnerable to the negative effects of perceived stigma [1, 4]. In the present study, we aimed to determine the level of perceived stigma; symptoms of anxiety and depression; and the level of perceived social support in patients with tuberculosis. In addition, we aimed to investigate the association of perceived stigma and depression with demographic and disease related factors.

Methods

This cross-sectional study included patients older than 18 years of age who were being treated for tuberculosis. Culture-negative tuberculosis was defined as clinical and radiographic presentation consistent with tuberculosis, three negative sputum culture results, and improvement with anti-

tuberculosis treatment. Illiterate patients, those who cannot speak Turkish, and those with major psychiatric disorders were excluded.

The sociodemographic characteristics of the patients were recorded and the hospital anxiety depression scale (HADS), stigma of tuberculosis scale (STS), and multidimensional scale of perceived social support (MSPSS) were applied to the participants. A BMI of $< 20 \text{ kg/m}^2$ was defined as low (underweight), $20\text{--}25 \text{ kg/m}^2$ as normal, and $> 25 \text{ kg/m}^2$ as high (overweight or obese).

The MSPSS is an easy-to-use, 12-item short scale that assesses the adequacy of social support from three different sources [5]. The MSPSS is divided into three subscales of four items each related to the source of support. These sub-groups; family, friends and significant other. Each item was graded using a seven-point scale. Subscale scores are obtained by summing the scores of the four items in each subscale and dividing it by 12. The total score is obtained by summing across all 12 items and then dividing by 12. Higher the scores indicate higher levels of perceived social support. Because there is no widely accepted cutoff levels for this scale, the patients were divided into three groups with respect to their MSPSS score tertiles. Turkish validity and reliability was performed by Eker and Arkar [6].

The HADS consists of 14 items. Odd-numbered items are used to assess anxiety and even-numbered items are used to assess depression. The scale is a four-point Likert-type assessment tool with scores ranging from 0 to 3. The scoring of each item is different; articles 1, 3, 5, 6, 8, 10, 11, and 13 indicate decreasing severity and scoring is 3, 2, 1, 0, respectively. On the other hand, items 2, 4, 7, 9, 12, and 14 indicate increasing severity are scored as 0, 1, 2, 3, respectively. The total scores of the subscales are obtained by adding these item scores. Patients with scores above these values may be considered at risk for anxiety and depression. The reliability and validity of the HADS was performed by Aydemir et al [7]. and the cut-off points for the anxiety and depression subscales were reported as 10 and 7, respectively in that study.

The STS was developed by Coreil et al. [8] and the validity and reliability of the Turkish version of this scale was performed by Ozpinar et al. [9]. Each of the items of this scale are scored between 0–3 (0: no; 1: not sure; 2: can be; 3: yes) and the total score is calculated. Higher scores indicate a higher level of perceived stigma. Because no cutoff level was proposed for this scale, the patients were divided into three groups with respect to their STS score tertiles.

Statistical analysis

Statistical analyses were performed using SPSS version 23 (IBM Corp., Armonk, NY, USA). Categorical variables are presented with frequencies and percentages and continuous variables are presented with mean, standard deviation, median, minimum, and maximum. Mann Whitney U and Kruskal Wallis tests were used to compare continuous variables between two and more than two independent groups, respectively. The reliability of each scale was evaluated by using Cronbach's Alpha and Spearman Rho correlation coefficient and a threshold of .7 was chosen as an acceptable reliability level.[10] Multivariate

logistic regression analyses were performed to define independent correlates of a depressive state and a high level of perceived stigma. Because of the strong correlation between anxiety and depression scores, two separate models were used in the multivariate regression analysis for stigma. Statistical significance was set at $p < .05$.

Results

A total of 204 patients (33.8% females and 66.2% males) with a mean age of 33.11 ± 12.16 were included. General patient characteristics are listed in Table 1.

Table 1
General characteristics of the study population

Study Variable	Value
Gender (%m/f)	66.2 / 33.8
Age (years)	30 (17–75)
Marital status (%married/single/widowed)	48 / 45.1 / 6.9
Education status (%illiterate/primary/higher)	32.8 / 28.4 / 38.7
Monthly income (median group)	1500–2000 TL*
BMI (kg/m ²)	22.1 (14.2–33)
Smoking status (%never/past/active)	31.9 / 42.6 / 25.5
Alcohol intake (%never/past/social/active)	83.3 / 5.9 / 8.4 / 2.5
Health insurance present (%)	90.2
Tuberculosis in family members (%)	23.5
Duration of tuberculosis diagnosis (months)	3 (0–24)
Isoniazid resistance (%)	21.6
Rifampicin resistance (%)	14.7
Ethambutol resistance (%)	2.9
Streptomycin resistance (%)	14.7
HADS-anxiety score	7 (0–21)
HADS-depression score	6 (0–21)
Stigmata of tuberculosis scale score	25 (0–59)
MSPSS score	5.67 (1–7)
BMI: body mass index, HADS: hospital anxiety depression scale, MSPSS: multidimensional scale of perceived social support	

The location of tuberculosis was lungs in 172 (84.3%), extrapulmonary in 26 (12.7%, 19 pleuritis, 5 lymphadenitis, 2 other), and both pulmonary and extrapulmonary in 6 (2.9%). The patients were on anti-tuberculosis treatment for a mean duration of 4.48 months. A culture result was present in 180 (88.2%) of the patients. *Mycobacterium tuberculosis* grew in 155 (76%), an atypical mycobacteria grew on 1 (.5%), and the culture was negative in 24 (11.2%) of the patients. A total of 153 patients had data on antibiotic resistance against tuberculosis. The rate of antibiotic resistance ranged between 2.9% (streptomycin) and 21.6% (isoniazid). While 55 (35.9%) patients had resistance against any of the drugs, 27 (13.2%) had

multidrug resistance. At least one family member had a diagnosis of tuberculosis in 48 (23.5%) of the patients.

The Cronbach's alpha level was above the threshold of 0.7 for HADS, STS, and MSPSS scales (.847, .797, and .876, respectively).

Among the patients, 56 (25%) were at the risk of anxiety and 75 (36.8%) were at the risk of depression with respect to the HADS scores. The patients with a depressive score on the HADS scale were more likely to be females; had higher STS and HADS-anxiety scores; and had lower MSPSS scores (Table 2). The other study variables were comparable between patients with and without a high HADS-depression score. Patients with a low, normal, or high BMI had similar depression scores (5.9 ± 4 , 6.4 ± 4.4 , and 7.1 ± 3.7 , respectively, $p = .37$).

Table 2
Comparison of patients with and without a high HADS-depression score

Study variables	Low HADS-depression score	High HADS-depression score	<i>p</i>
Gender (%females)	28.7	42.7	.04
Age (years)	29 (18–64)	31 (17–75)	.38
BMI (kg/m ²)	22.1 (16.5–33)	22.3 (14–29)	.87
Health insurance present (%)	90.7	89.3	.75
Duration of tuberculosis diagnosis (months)	3 (0–24)	3.5 (0–23)	.86
Tuberculosis in family members (%)	27.9	16	.05
Education level	2 (1–4)	2 (1–4)	.10
Monthly income (group)	3 (0–6)	3 (1–6)	.19
HADS-anxiety score	6 (0–18)	10 (3–21)	< .001
STS score	22 (0–50)	28 (9–59)	< .001
MSPSS score	5.9 (2.2–7)	4.8 (1–7)	< .001

The patients with in the highest tertile on the STS scale had lower BMI and MSPSS score; and higher HADS-anxiety and HADS-depression scores (Table 3). The other study variables were comparable between patients in the highest tertile on the STS scale compared with the remaining patients.

Table 3
Comparison of patients with and without a high stigmatization score

Study variables	Low stigmatization score	High stigmatization score	<i>p</i> ^a
Gender (%females)	34.1	33.3	.92
Age (years)	31 (17–75)	28.5 (18–57)	.22
BMI (kg/m ²)	22.6 (16.5–33)	20.8 (14–30)	.014
Health insurance present (%)	89.9	90.9	.81
Duration of tuberculosis diagnosis (months)	3 (0–24)	3.5 (0–24)	.50
Tuberculosis in family members (%)	25.4	19.7	.37
Education level	2 (1–4)	2 (1–4)	.44
Monthly income (group)	3 (0–6)	3 (1–6)	.22
HADS-anxiety score	7 (0–19)	10 (3–21)	<.001
HADS-depression score	5 (0–21)	8 (1–20)	<.001
MSPSS score	5.8 (2.3–7)	5.5 (1–7)	.038
^a Significant associations are stated with bold text			

The median MSPSS score was near the upper limit. The subscales of the MSPSS suggested that the highest social support was from a significant other (median 6.25) followed by family (median 5.5) and friends (median 5.5).

A multivariate binary logistic regression analysis suggested that higher HADS-anxiety scores and lower MSPSS scores were independently associated with a depressive HADS score (r^2 of the model .39, Table 4).

Table 4
Multivariate binary logistic regression analysis for high HADS-depression and stigma scores

Study variables	OR	95% CI	p ^a
Model 1. High depression score			
Female gender	1.62	.76–3.46	.22
Tuberculosis present in family members	.50	.21–1.18	.11
HADS-anxiety score	1.24	1.11–1.38	<.001
STS score	1.03	.99–1.07	.11
MSPSS score	.61	.46–0.82	.001
Model 2. High stigmatization score I			
Age (years)	.98	.96–1.01	.28
Female gender	.79	.4–1.6	.5
BMI (kg/m ²)	.88	.8–0.98	.016
HAD-depression score	1.14	1.05–1.25	.002
MSPSS score	.9	.69–1.18	.45
Model 3. High stigmatization score II			
Age (years)	1.001	.97–1.03	.96
Female gender	.53	.25–1.3	.1
BMI (kg/m ²)	.86	.78–0.96	.006
HAD-anxiety score	1.25	1.14–1.37	<.001
MSPSS score	.94	.71–1.23	.63
^a Significant associations are stated with bold text			

Multivariate binary logistic regression analyses for a high level of perceived stigma suggested that a lower BMI, higher HADS-anxiety score (r^2 of the model .25) and higher HADS-depression score (r^2 of the model .15) were independently associated with high levels of perceived stigma (Table 4).

Discussion

In the present study, one fourth of the patients with tuberculosis were at risk of anxiety and more than a third were at risk of depression. A family history of tuberculosis was common. The level of social support was rather high. Anxiety symptoms were positively and social support was inversely associated with

depressive symptoms. A lower BMI and higher scores on HADS-depression and HADS-anxiety scales were independently associated with high levels of perceived stigma related with tuberculosis.

Tuberculosis may influence patients' psychological status and may cause difficulties in their social environment due to stigmatization after the diagnosis of tuberculosis. These factors may have a negative impact on their compliance with long-term tuberculosis treatment. Approximately half of patients with tuberculosis have been reported to experience perceived stigma [1, 2]. Perceived stigma may negatively affect adherence to treatment and quality of life [2, 3]. Poor social support and depression seem to increase the negative effects of perceived stigma [1, 4].

Nearly half of patients with tuberculosis have been reported to suffer from depression [11, 12]. It is also reported that the rate of depression is higher in the first months and may improve with treatment [11, 13]. Therefore, patients with tuberculosis should undergo screening for depression, especially in the early period after the diagnosis. Appropriate screening and treatment may potentially improve quality of life and treatment adherence.

Low levels of social support may have a negative impact both on depression and stigmatization in these patients. Furthermore, depression and perceived stigmatization may precipitate each other and cause a vicious cycle. In the present study, low levels of social support and abundance of anxiety symptoms were independently associated with depressive symptoms. However, perceived stigma did not seem to have an independent effect on depressive symptoms in the present study. On the other hand, anxiety and depressive symptoms and lower BMI were independently associated with perceived stigma. Given the fact that the scales we used in the present study are not diagnostic and only provide information about depression and stigmatization, we cannot conclude the presence or absence of a definitive association between depression and stigmatization in patients with tuberculosis.

A lower BMI was independently associated with higher levels of perceived stigma. This association was independent from the HADS-depression score. Malnutrition increases the risk of tuberculosis infection and patients with tuberculosis may lose weight and develop malnutrition [14]. However, in the present study patients who had a high HAD-depression score had a similar BMI with those who did not have a high depression score. Although some studies reported a U-shaped association between BMI and depression [15], there was neither a linear or U-shaped association between depression score and BMI in the present study. Interestingly, patients with a lower BMI had higher levels of perceived stigma. We may speculate patients a slim body type feel more unhealthy and perceive a higher level of stigma. However, since we do not have information about premorbid BMI levels of our study population, we cannot conclude if these patients perceived higher levels of stigma because they lost weight during tuberculosis infection or because they already had a low BMI before the infection.

Among the strengths of the present study is a multicomponent assessment with respect to depression, anxiety, social support, stigmatization, tuberculosis-related factors, and demographics.

Among the limitations of the present study are the cross-sectional design and the limited sample size. Therefore, we cannot conclude the presence of a cause-effect relationship and the findings of this study may not be generalizable to the adult population. In addition, we did not establish a diagnosis of major depression or generalized anxiety disorder, thus the associations we have found in the present study may be questionable.

In conclusion, we found relatively high levels of depression, stigmatization, and anxiety in patients with tuberculosis. Of note, the level of social support was rather high which might have a positive effect on the negative impact of depression, anxiety, and stigmatization in these patients. Anxiety symptoms were positively and social support was inversely associated with depressive symptoms. A lower BMI and higher scores on HADS-depression and HADS-anxiety scales were independently associated with high levels of perceived stigma related with tuberculosis. There is need for prospective studies to investigate the effect of screening and treatment for depression, perceived stigmatization, and anxiety in patients with tuberculosis. There is also need for studies to investigate the effect of providing support for tuberculosis patients with low levels of social support.

Declarations

Ethics approval and consent to participate

The protocol for the research project has been approved by a suitably constituted Ethics Committee of the institution within which the work was undertaken. Consent to participate was not necessary because the study was retrospective.

Consent for publication

Not applicable.

Availability of data and materials

We agree that the materials described in the manuscript, including all relevant raw data, will be freely available to any scientist wishing to use them for non-commercial purposes, without breaching participant confidentiality.

Competing interests

The authors declare that there are no conflicts of interest.

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The authors have nothing to disclose.

Authors' contributions

All authors contributed to the design and performance of this study and in writing and critical revision of the final manuscript.

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