Original Article

Temperament and character profile assessment of anxiety and depression in tuberculosis patients

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Abstract:

BACKGROUND AND AIM: Tuberculosis (TB) is a terminal disease, which ranks first among infectious diseases throughout the world. Various psychosocial disorders, including anxiety and depression, first and foremost, and their undesired consequences are observed frequently in TB patients. In various studies, the psychosocial aspects of the disease have been investigated on several accounts, yet their temperament and character profile have not been examined. We intended to identify personality traits through temperament and character profiles of TB patients and compare them with healthy individuals in this study.

MATERIALS AND METHODS: In this study, a 240-item self-administered temperament and character inventory (TCI) and a 14-item Hospital Anxiety and Depression Scale were employed. Forty-five TB patients and 48 healthy volunteers participated in the study.

RESULTS: While average harm avoidance (HA) scores in TB patients were significantly higher than the scores of healthy controls, their average social acceptance scores, in turn, were significantly lower. Depression scores were significantly higher in TB patients than those of the control group ($P = 0.049$), whereas anxiety scores were insignificantly higher. TCI profiles were not correlated with anxiety and depression scores of TB patients.

CONCLUSION: The current study found that HA scores in TB patients were higher, while social acceptance scores were lower. Prospective studies may lead to specific and in focus interventions designed for TCI in TB patients. Consequently, the assessment and treatment of TB in clinical practice should also include psychosomatic approaches.

Keywords:
Character, personality, temperament, tuberculosis

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Introduction

Tuberculosis (TB) is a chronic infectious disease caused by *Mycobacterium TB* and is one of the leading causes of mortality throughout the world. According to the World Health Organization, it is estimated that 1.7 billion people have latent TB infection, and approximately 3 million people all around the world, mostly in low- and middle-income countries where the incidence and prevalence of the disease have been increasing, die every year due to TB, which is ancient disease.[1]

The need to approach common mental disorders along with other pathologies related to low income and poverty,[2] and the assumption that these disorders are an important source of intercultural disabilities[3] are topics that have been discussed for quite a long time. Nonetheless, the relationship between mental disorders and TB has been investigated only recently. Today, it is evident that anxiety, depression, and emotional distress are important aspects affecting the burden and inhibitory effects of the disease,[4] and they are closely related to the intensity of symptoms, the number of reported symptoms, the more frequent use of health-care services, low compliance with medication, more comprehensive treatment processes, and the reduction in disease and mortality control.[4,5] In conjunction with the rising interest in psychiatric comorbidity in medical and surgical patients, the results of TB have come to be better understood.[6] The high prevalence of depression and other psychiatric disorders among TB patients has been shown in many studies.[7] Hence, it was suggested that the prevention and immediate treatment of psychological disorders might be useful to increase treatment compliance and reduce TB relapse in TB patients.

Examining personality traits, Cloninger *et al.* set forth temperament and character aspects through the temperament and character inventory (TCI), the usefulness of which is known in clinical practice.[8] Temperament, which comprises four dimensions, was defined homogenously in genetic terms and independently hereditary. Character, in turn, comprises three dimensions and exhibits individual differences in self-conception on values pertaining to social experiences. While temperament was assumed to persist for a lifetime, character was assumed to be affected by the environment. It was asserted that the effect of genetic factors on character dimensions is 10%–15% and the effect of environmental factors is 30%–35%,[9,10] whereas temperament dimensions were suggested to be genetically independent and 40%–60% hereditary and remain constant throughout the lifetime.

Even though various aspects of the psychosocial state of TB patients have been investigated in many studies, as far as we are aware of, the personality traits of these patients have not been investigated with the Cloninger temperament and character model thus far. The primary purpose of this study is to investigate the personality traits of TB patients with Cloninger temperament and character model and to compare them with healthy control patients. Furthermore, anxiety and depressive disorders are observed more frequently in TB patients than normal individuals.[7] The relationship of anxiety and depression with various properties of temperament and character is well known.[11,12] Thus, we intended to investigate whether TB patients exhibit specific common personality traits (by assessing the self-reported TCI questionnaire) and whether there is a correlation between TCI scores and depression and anxiety.

Materials and Methods

Study population
Forty-five patients with pulmonary and extrapulmonary TB who applied to University Department of Chest Diseases and other clinics between January 2014 and January 2016, diagnosed clinically, radiologically, and bacteriologically, and who were diagnosed and visited the hospital for control purposes were admitted to the study. Persons who were unwilling to participate in the study; had an education of <8 years; had other infectious or systemic diseases; displayed significant pathologies in routine blood counts and biochemistry examinations; were pregnant; or received antidepressant treatment during the last month were not admitted to the study. The control group was composed of 48 healthy individuals, whose age, gender, and level of education were similar to the patients. These individuals were selected among those who visited the hospital with the subject or among the general public through face-to-face interviews. Control patients were also questioned in terms of the existence of any chronic disease. Individuals who were diagnosed with depression and on antidepressant medication within the last month were also excluded from the study. After patients were informed about the study, and the informed consent of all participants was received in line with the ethics committee approval. The study was approved by the decision of the Faculty of Medicine ethics committee dated November 26, 2013 and numbered 2013/16-33 and carried out in accordance with the Helsinki Declaration published in 2000.

The scales used
This self-reported scale consists of 240 items that include "true" or "false" choices, and can be applied to persons at 18 years of age or older. It has been utilized in psychological and psychiatric research as well as in various fields of application. The scale was developed by Cloninger *et al*. Moreover, the accuracy and reliability of its Turkish version was confirmed.[13,14] The Cloninger model investigates the character dimension with three scales: Self-Directedness (SD, 44 items in total), Cooperativeness (C, 42 items in total), and Self-Transcendence (ST, 33 items in total). The SD scale is examined under five subscales including: Responsibility (SD1, 8 items), Purposefulness (SD2, 8 items), Resourcefulness (SD3, 5 items), Self-Acceptance (SD4, 11 items), and Congruent Second Nature (SD5, 12 items). The C scale is examined under five subscales including social acceptance (C1, 8 items), empathy (C2, 7 items), helpfulness (C3, 8 items), compassion (C4,

10 items), and Virtuousness-Scrupulousness (C5, 9 items). The ST scale is examined under three subscales including self-forgetfulness (ST1, 11 items), transpersonal identification (ST2, 9 items), and spiritual acceptance (ST3, 13 items). The temperament dimension, in turn, is examined through four scales: Novelty Seeking (NS, 40 items in total), Harm Avoidance (HA, 35 items in total), Reward Dependence (RD, 38 items in total), and Persistence (P, 8 items). Among these scales, NS is examined under four subscales including exploratory excitability (NS1, 11 items), impulsiveness (NS2, 10 items), extravagance (NS3, 9 items), and disorderliness (NS4, 10 items). HA is examined under four subscales including anticipatory worry (HA1, 11 items), fear of uncertainty (HA2, 7 items), shyness with strangers (HA3, 8 items), and fatigability and asthenia (HA4, 9 items). RD is examined under three subscales including sentimentality (RD1, 10 items), attachment (RD3, 8 items), and dependence (RD4, 6 items); there are no subscales for P.[10,15]

The symptoms of anxiety and depression were assessed with the verified Turkish version of the Hospital Anxiety and Depression Scale (HADS), a tool for which the reliability has been proven for the investigation of anxiety and depression. This scale consists of two parts, which include seven questions assessing anxiety and seven questions assessing depressive symptoms. It is accepted that a HADS anxiety score equal to or higher than 11 indicates anxiety, whereas a HADS depression score equal to or higher than eight indicates depression.[16]

Statistical analysis

The characteristics of the patients were expressed in terms of averages (SD) or numbers (%). The compliance of numeric data to normal distribution was confirmed, and Student's *t*-test or Mann–Whitney *U*-test were used to compare the variables between groups. Categorical data were analyzed with the Chi-square test or Fisher's exact Chi-square test. All statistical analyses were conducted with the SPSS for Windows version 18.0 (SPSS Inc., Chicago, IL, USA) software. Values that have $P < 0.05$ were accepted as statistically significant.

Results

Demographic data such as the age distribution, level of education, occupational status, and marital status of both the patient and control groups are presented in Table 1. Both groups are similar in terms of age and gender distribution.

While 24 patients (53.3%) were diagnosed with pulmonary TB, 38 patients (84.4%) were in new TB category, 13 patients (28.9%) had a period of disease between 6 and 12 months, 10 patients (42.2%) were in

the intensive TB treatment phase, 34 patients (75.6%) received social support at a satisfactory level, and 13 patients (28.9%) had a TB stigma perception. Seventeen patients (37.8%) out of all patients who participated in the study displayed comorbid chronic diseases, whereas 22 (48.9%) were currently smoking, using substances such as chewing tobacco or alcohol. Clinical variables of TB patients are given [Table 2].

The prevalence of depression in our study was 44% in TB patients and 6.2% in the control group. The HADS-D scores in TB patients were significantly higher than those of the control group ($P = 0.049$). Furthermore, this study revealed that the prevalence of anxiety in TB patients was 40%, whereas it was 2.1% in the control group. However, the HASD-A scores of the TB subject group were not significantly higher than the control group ($P > 0.05$) [Table 3].

The HA score in TB patients was significantly higher than the control patients ($P = 0.002$). Concurrently, the sub-score of Fear of Uncertainty (HA2) was also significantly higher in TB patients than the control group ($P = 0.002$) [Table 4]. On the other hand, among the character traits, Social Acceptance (C1) was significantly lower in TB patients ($P = 0.001$) [Table 4]. HADS-D and HADS-A scores of TB patients were not correlated with any of the temperament and character dimensions.

Discussion

TB is a chronic disease that may reduce the subject's quality of life and have negative physical, emotional, and social impacts.[17-19] Many other studies have indicated that TB affects the general perception of well-being, physical faculties, mental health, physical and social functionality, and other aspects of quality of life; moreover, it may lead to additional problems such as social stigmatization, isolation, difficulties in the use of medication, lengthiness of the treatment, sexual dysfunctions, loss of income, and fear.[17,18]

The studies carried out by Thomas Holmes in the United States in 1950s suggested that it is necessary to understand the personal narratives of the patients, and the emotional states caused by the hardships of life may lead to a predisposition to TB.[20] In the epidemiology of the disease, in addition to the virulence of the germ, the strength and efficacy of the host's immune system is also decisive.[21] Each infected case does not become a TB patient. The popular belief of "getting TB because of grief" may be a hypothesis worth to consideration and investigation, since today, it has been understood that depression severely affects the immune system. In this respect, studies indicating that stress causes marked changes over the immune system may provide

Table 1: Sociodemographic variables of patients and controls

	TB (*n*=45)	Control (*n*=48)	*P*
Male/female (*n*)	30 (66.7)/15 (33.3)	30 (62.5)/18 (37.5)	0.675
Age, mean±SD (minimum-maximum)	42.98±12.98 (19-65)	46.15±11.87 (23-65)	0.258
Marital status			
Divorced	1 (2.2)		-
Married	37 (82.2)	44 (91.7)	
Unmarried	5 (11.1)	3 (6.3)	
Widowed	2 (4.4)	1 (2.1)	
Education status			
No formal education	8 (17.8)	4 (8.3)	-
Primary education	3 (6.7)	24 (50)	
Secondary education	25 (55.6)	12 (25)	
Higher education	9 (20)	8 (16.7)	
Occupation status			
Government employee	14 (31.1)	13 (27.1)	-
Private employee	7 (15.6)	19 (39.6)	
House wives	7 (15.6)	5 (10.4)	
Jobless	14 (31.1)	4 (8.3)	
Retired	3 (6.7)	7 (14.6)	

TB: Tuberculosis, SD: Standard deviation

Table 2: Description of clinical, psychosocial and substance use factors among patients with tuberculosis

Variables	Frequency (%)
Classification	
Pulmonary TB	24 (53.3)
Extra-pulmonary TB	21 (46.7)
Category of treatment	
New	38 (84.4)
Return after default	4 (8.9)
Relapse/treatment after failure	3 (6.7)
Duration of illness (months)	
<6	7 (15.6)
6-12	13 (28.9)
≥12	25 (55.6)
Phase of treatment	
Intensive phase	19 (42.2)
Continuation phase	26 (57.8)
Co-morbid chronic illness	
Yes	17 (37.8)
No	28 (62.2)
Good social support	
Yes	34 (75.6)
No	11 (24.4)
Perceived TB stigma	
Yes	13 (28.9)
No	32 (71.1)
Substance (maras powder, cigarette and alcohol) use	
Yes	22 (48.9)
No	23 (51.1)

TB: Tuberculosis

guidance.[22] Furthermore, the effect of depression and anxiety in a disease such as TB, which is known to be a result of the host's reaction to the germ, is a question that should be answered. To this end, this study aimed to identify the temperament and character dimensions with anxiety and depression levels in TB patients, and to specify the correlation between these psychological fields and sociodemographic and clinical variables. To our knowledge, this is the first study that compares the personality traits of TB patients to healthy control individuals using TCI personality questionnaire, the accuracy of which has been well established.

Various studies reported that the incidence of treatment compliance, and personality traits and psychological factors that affect the outcomes of the treatment in TB patients is high (50%–80%).[23] Another study evaluated the potential impact of psychiatric morbidity and personality traits on treatment completion and negligence of taking medications in the directly observed short-term treatments of TB patients. In the mentioned study, 53.4% of the patients were neurotic, 26.2% were introverts, 18.2% were extroverts, and 2.2% displayed other personality traits. It was also stated that the moods of most patients displayed unstable, submissive, mild-mannered, and overprotective (i.e. oversensitive and delusional) characteristics.[24] Similar observations were made by other researchers.[25] The use of TCI, which allows the assessment of temperament and character with a psychobiological model, in studies in order to understand the relationship between TB and personality, plays an important role.[9] Cloninger's psychobiological personality model, which has been used widely in studies recently, provides an opportunity to deal with this necessity.

The current study revealed that TB patients exhibit higher HA scores as well as higher Fear of Uncertainty subscores. Persons who have higher HA scores tend to be deliberate,

Table 3: Comparison of average hospital anxiety and depression scores between tuberculosis patients and healthy controls

	TB (%)	Control (%)	P
HAD-A	6.18±4.76	5.23±2.20	0.837
HAD-D	5.70±3.05	4.40±1.85	0.049
HADS-A (≥11 indicative of anxiety)			
Yes	18 (40)	1 (2.1)	0.001
No	27 (60)	47 (97.9)	
HADS-D (≥8 indicative of depression)			
Yes	20 (44.4)	3 (6.2)	0.001
No	25 (55.6)	45 (93.8)	

HAD-A: Hospital anxiety and depression-anxiety, HAD-D: Hospital anxiety and depression-depression, TB: Tuberculosis

Table 4: Comparison of the temperament and character subdimensions in tuberculosis patients, and healthy controls

	TB	Controls	P
Novelty seeking	9.69±3.204	8.96±3.195	0.274
NS1 exploratory	2.96±1.492	2.83±1.521	0.643
NS2 impulsiveness	2.27±1.304	2.19±1.232	0.924
NS3 extravagance	2.44±1.617	2.15±1.502	0.381
NS4 disorderliness	1.98±1.288	1.79±1.254	0.412
Harm avoidance	9.98±3.739	7.92±2.323	0.002
HA1 anticipatory worry	3.36±1.909	2.92±1.528	0.384
HA2 fear of uncertainty	2.64±1.786	1.62±1.566	0.002
HA3 shyness	1.42±1.118	1.48±1.238	0.927
HA4 fatigability	2.53±1.984	1.9±1.225	0.266
Reward dependence	7.42±2.379	6.81±2.238	0.182
RD1 sentimentality	3.8±1.914	3.42±1.635	0.400
RD3 attachment	2.33±1.087	2.17±1.078	0.493
RD4 dependence	1.29±0.968	1.23±1.036	0.702
Persistence	2.58±1.574	2.5±1.75	0.690
Self-directedness	13.44±4.165	13.79±2.996	0.648
SD1 responsibility	2.36±1.246	2.35±1.229	0.943
SD2 purposefulness	2.93±1.543	2.83±1.521	0.733
SD3 resourcefulness	1.76±1.026	1.81±0.982	0.788
SD4 self-acceptance	2.6±1.529	2.75±1.537	0.592
SD5 congruence	3.76±2.002	4.02±1.984	0.542
Cooperativeness	14.06±3.303	16.18±3.839	0.005
C1 social acceptance	2.42±1.381	3.91±1.844	0.001
C2 empathy	2.83±1.534	2.91±1.552	0.843
C3 helpfulness	1.9±1.225	1.98±1.196	0.603
C4 compassion	3.81±2.049	3.78±2.141	0.953
C5 integrated conscience	3.13±1.525	3.6±1.876	0.258
Self-transcendence	10.98±3.986	10.88±3.505	0.895
ST1 self-forgetfulness	3.49±1.829	3.4±1.954	0.789
ST2 trans-identification	3.6±1.851	3.5±1.81	0.688
ST3 spiritual acceptance	3.82±2.177	3.94±2.067	0.697

TB: Tuberculosis

careful, apprehensive, tense, nervous, skeptical, passive, and negativistic or inclined to be pessimistic even about events that does not worry others.[26] Such persons are also inclined to fear rejection and embarrassed in social situations.[27] Persons with high HA scores react to stressful events with depressive symptoms at a higher rate, and expect hazardous outcomes even when there is no danger.[8,9] High HA scores are related to depression and anxiety symptoms. Various studies have indicated higher HA scores in patients with depression and anxiety.[28] In the current study, in turn, even though TB patients were more depressive than the control group, a significant correlation between HA and anxiety could not be detected.

Evidence indicating that emotional distress expressed in terms of anxiety and depression in TB patients is quite high has been increasing. In the case of Ethiopia, while 46.7% of HIV negative TB patients exhibited significant levels of distress, this ratio was 63.7% in HIV positive TB patients.[29] In a study conducted in South Africa, it was reported that 87% of TB patients had distress.[30] In a recent study conducted in Pakistan, anxiety and depression were identified according to HADS in 37.1% of TB patients in an outpatient clinic.[31] In another study conducted in Brazil, the ratio of depressive mood and prevalent mental disorders were observed to be 34% higher in the presence of pulmonary TB.[7] In our study, the prevalence of depression was determined as 44.4%, which is similar to the results of other studies. The prevalence of depression in the healthy control group, on the other hand, was 6.2%. According to the HADS-D scores in the current study, TB patients were much more depressed than control patients, with a difference that was statistically significant.

Cooperativeness indicates social approval, empathy, helpfulness, compassion, and virtuousness-scrupulousness. Individuals with a high level of cooperativeness are viewed as reasonable, compassionate, empathic, helpful, and principled.[8,9] As shown in many previous studies, there is a negative correlation between depression and anxiety and cooperativeness. In our study, social acceptance was lower in TB patients than the control group. This can be interpreted as an indication of the withdrawal of the individual from society due to stigmatization because of the subject's clinical condition. In recent years, an issue that has been drawing attention in TB patients was self-inflicted discrimination, isolation, and stigmatization.[32] Conventionally, TB patients are known to feel that they are alienated from the society mainly due to concerns related to the spread of the disease. In various studies, it was shown that the stigma is not a subjective feeling inflicted by the patients upon themselves, but rather that the individuals in their environment actually behave in a manner to isolate them.[33] In our study, 13 patients (28.9%) perceived stigmatization. Several previous studies have suggested that feelings of embarrassment, discomfort, or social isolation were observed among TB patients.[34] Nevertheless, social anxiety, which is mainly a psychiatric condition that is

characterized by these feelings, has not been studied in depth. In another study focusing on the stigma of TB, the authors concluded that the stigma associated with TB may have a negative impact that can result in the individual and his/her family withdrawing from society due to embarrassment and fear.

The results of our study have certain restrictions. First, the sample size is relatively small, which therefore may not be representative for TB patients. We believe that other studies with larger clinical sample sizes should be conducted in order to verify these findings. Furthermore, causal links cannot be established because of the cross-sectional structure of the data. Moreover, self-reported questionnaires were used in this study to assess psychiatric symptoms; therefore, more reliable findings can be achieved through structured interviews and scales to be applied by clinicians.

Conclusion

Consequently, in this study we suggest that TB patients have distinctive temperament dimensions with respect to healthy control patients. Further studies need to be conducted in order to determine the correlation between the patterns of temperament and character dimensions, including successful treatment and longitudinal patient processes, and TB.

Quick look
Current knowledge
Anxiety and depression are mental disorders that are frequently observed in TB patients at a high rate. When depression and anxiety accompany TB, they lead to the global control of TB and insufficient treatment compliance, which increases the risk of morbidity and mortality due to TB. Therefore, in order to increase treatment compliance and reduce TB relapse in TB patients, it might be important to assume that prevention and immediate treatment of psychological disorders can be useful.

What this paper contributes to our knowledge
TCI provides a psychobiological model that has the potential to shed light on human personality traits in multiple levels of analysis. Even though various aspects of TB patients' psychosocial state have been investigated in the past, to our knowledge, the personality traits of these patients have not been examined with Cloninger's temperament and character model. This is the first study that compares TB patients' personality traits with healthy control patients using a TCI personality questionnaire, the accuracy of which is well established. Furthermore, according to this study, it can be suggested that TB patients exhibit distinctive temperament dimensions with respect to healthy control patients.

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Conflicts of interest

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