

Psychological Symptoms Before and After a 14-Day Initial Inpatient Treatment in Tuberculosis Patients Compared with Their Primary Caregivers and Healthy Controls

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Background: Tuberculosis (TB) is one of the most challenging public health burdens in the world. Recent research demonstrated high prevalence of mental disorders in TB patients and their caregivers. The purpose of this study was to assess mental health of TB patients and their caregivers in Iran before and after a two-week inpatient treatment and to determine the prevalence of psychological problems in these groups.

Materials and Methods: A standardized questionnaire (SCL-90) was used to assess psychological symptoms in 146 hospitalized TB patients and their caregivers (n=89). Furthermore, the scores of both target groups were compared with those of a group of healthy individuals (n=85).

Results: The mean scores before the start of the initial treatment of the patients were significantly lower for paranoid ideation (P=0.038) and hostility (P=0.046), and the scores of depression (P=0.046) and somatization (P=0.001) were significantly higher than those of the healthy individuals. The patients scored significantly higher than the caregivers on depression (0.047) and somatization (P<0.001), whereas the caregivers scored higher than the healthy individuals on paranoid ideation (P=0.044) and hostility (P=0.034). Multiple linear regression showed that age, educational level and marital status were factors affecting the mental health of TB patients and their caregivers. The variance in psychological symptoms of the patients was between 10% (paranoid ideation) and 27% (hostility) of the variance in the symptoms of their caregivers.

Conclusion: Tuberculosis control and treatment programs should not only address issues like continued respiratory symptoms, but should also focus on mental health in TB patients and their caregivers.

Key words: Mental Health, Tuberculosis, Caregivers

INTRODUCTION

Tuberculosis is one of the most challenging public health burdens in the world (1). Despite the availability of effective pharmacological treatments, TB continues to affect almost 10 million people annually, takes 1.7 million lives (2) and causes about two million deaths annually (1). The world health organization (WHO) has estimated that two billion people, almost one-third of the world's

population, have latent TB, and approximately 80% of TB cases are found in 23 countries. The highest incidence rates have been reported in Africa and South-East Asia (3).

The disease, caused by the bacterium *Mycobacterium tuberculosis*, is transmitted via the airborne route and is highly contagious. It primarily affects the respiratory system, but can involve virtually any organ (4). However,

aside from physical signs and symptoms, TB takes a heavy psychosocial toll. Associations between TB and psychological symptoms have long been recognized (5). A review in 1953 analyzed historical and contemporary perspectives about the role of mental health in both the etiology and course of TB (6). Even earlier, the social and psychological implications of the diagnosis of TB were seen as a significant contributing factor to "irregular discharges" of patients from the US Department of Veterans Affairs (VA) hospital system (7). More recent research has focused directly on the mental health of patients diagnosed with TB (8).

Day (9) believed that 30% of the patients he visited in an English sanatorium were "ill of mind". Breuer (10) reported that for 34% of his patients TB was "psychologically determined," and Forster and Shepard (11) found that 31% of TB patients in the Cragmor Sanatorium were suffering from an "abnormal mental state". Bobrowitz (12) mentioned that from 20% to 50% of the patients in the Otisville Sanatorium in New York left against medical advice mainly for psychological reasons. Eram et al. (13) reported that 30% of TB patients suffered from anxiety or tension, and 26% from loss of interest in life or depression, and 6% of the patients denied their TB diagnosis. A study in Pakistan showed that the prevalence of depression and anxiety among TB patients was 43% and 47%, respectively (14).

Generally, the literature indicates high prevalence rates of psychiatric comorbidity in TB patients (5, 13). Psychological issues such as isolation (15), stigma (16), lack of social support (17), denial, hopelessness about life, tension, anxiety, neglect by family and society (13), helplessness and depression (18) are common in patients with TB. Stigma associated with TB is often regarded as a barrier to health seeking and a cause of social suffering (19). Social isolation in the form of rejection by the family or community is a prominent manifestation of this stigma (20). Stigma is a major determinant of mental disorders, especially mood and anxiety disorders (21). It can lead to job loss and, sometimes, exclusion from the family or

community. According to a small study conducted in Nicaragua, 48% of TB patients mentioned problems with their jobs and 27% complained of social problems (22). Furthermore, young adults with TB have consistently reported concerns about their marital prospects (23). Damaging effects of TB on spiritual (24) and financial well-being only worsens the problem (25). Therefore, it is not surprising that patients with TB often struggle with psychiatric comorbidities. Depression has frequently been reported (26) and has been shown to have a prevalence rate as high as 30-50% in TB patients (14). The prevalence of depression in this population significantly surpassed the baseline depression rates for hospitalized patients, which may be due to the fact of being hospitalized and having a medical illness (27).

Caring for family members is both valued and respected in the Iranian culture and children and adolescents are often expected to act as caregivers for their adult family members who have illnesses before and after their hospitalization at home. Changes in the health care system such as cuts in home health care, shorter hospitalization periods, increased nursing home costs and managed care have increased the number of Iranian adults requiring home care. Unfortunately, related data from Iran are scarce. However, family caregivers provide an average of 17.9 hours per week with a maximum of 56.5 hours per week of service in the United States (28). Caregivers of patients with chronic diseases usually experience a high degree of distress (29) and the relationship between caregiving and health is generally described in terms of stress (30). The most frequently performed caregiving tasks are personal care and household duties that are most difficult and time consuming. Family life, school and time with friends are areas most likely being affected by care giving (31).

The issues identified in studies on caregivers of different groups of chronically ill patients seem relatively similar across the various patient groups and include depression, overload, burden and personal health issues (32). It is important to more intensely assess the characteristics and burden of caregivers to optimize the use

of support or intervention measures, and to reduce negative impacts on caregivers' lifestyle and quality of life.

However, research is usually focused on caregiving related to specific populations, such as the elderly with physical and mental conditions (33). Only a few studies have been carried out on mental health in TB patients and on the impact of care giving on the caregivers' mental health (34). Therefore, the purpose of this study was to investigate (a) mental health of TB patients in Iran before and after an initial two-week inpatient treatment; (b) to compare their mental health with that of their caregivers and (c) to assess differences in mental health among the TB patients, their caregivers and a group of healthy individuals.

MATERIALS AND METHODS

Sample and Setting

This study was conducted from November 2012 to October 2013 in Masih Daneshvari hospital, a WHO collaborative specialized center for treatment of TB in Iran. As a reference center, this hospital provides facilities for pulmonary TB patients who are referred from all TB control dispensaries all around the country. The sample consisted of 146 consecutive patients diagnosed with TB that were hospitalized for an initial 14-day inpatient treatment. This intensive part of the treatment consisted of Isoniazid, Rifampin, Ethambutol and Pyrazinamide for 2 months followed by Isoniazid and Rifampin for 4 months (35).

The inclusion criteria for the study were: 1) having a minimum of two sputum smear positive tests for acid-fast bacilli, 2) having only one sputum smear positive test for acid-fast bacilli and confirmed disease based on the reported radiographic changes of the thorax by a radiologist, or 3) having only one sputum smear positive test for acid-fast bacilli and one positive sputum culture for acid-fast bacilli (36) 4) age \geq 18. The exclusion criteria were:

1) sputum smear negative patients, 2) non-pulmonary TB, and 3) patients on retreatment for the disease.

Furthermore, 89 individuals were recruited for the study who were patients' family members and had already acted as their caregivers before admission to the hospital and accompanied them in the hospital. The caregivers had not received any education with regard to care giving for their relatives. Masih Daneshvari Hospital is a referral center for pulmonary diseases; therefore, there are always a considerable number of patients and their caregivers who leave their home in other provinces to come to this center. In close vicinity of the hospital there is a place belonging to the hospital where the caregivers can spend sometime after their patient is admitted. A total of 85 healthy individuals from the general population (relatives of the hospital personnel) voluntarily participated in this study and were assessed similar to patients and caregivers. They did not suffer from any physical or mental disease and were not involved in caregiving tasks according to their self-report. The Symptom Checklist-Revised (SCL-90-R) (37) was administered among the patients before the initiation and after a standard 14-day initial inpatient treatment. The two comparison groups (caregivers and healthy individuals) completed the questionnaires once at the beginning of the study. All three groups filled out the questionnaires within an interview-session performed by a psychologist.

Data collection

A questionnaire, comprising of three parts, was administered by the interviewers. It had a demographic section requesting information on age, gender, marital status, occupation, educational level, and relation with the caregiver. The second part consisted of behavioral habits like cigarette or Hooka (water pipe) smoking. The third part was the 90-item SCL-90-R to collect information about their mental health.

The Iranian version (38, 39) of the SCL-90-R (37) is a well-standardized and validated 90-item questionnaire

assessing nine primary symptom dimensions. The primary symptom scales are somatization, obsessive-compulsive disorder, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation and psychoticism with higher scores indicating higher distress caused by the various symptoms. Reliability of the scales was assessed by Cronbach's alpha scores as indicator of internal consistency of a scale. The Cronbach's alpha varied between 0.72-0.86 for the patient group, between 0.68 - 0.89 for the healthy comparison group, and between 0.78 - 0.90 for the caregivers. Data were analyzed by SPSS, version 22. The patients' mean scores of the nine scales before and after the initial treatments were compared by repeated measures MANOVA. Furthermore, the mean scores of the nine scales and GSI were compared pairwise between the three groups (TB-patients versus caregivers, TB-patients versus healthy individuals, and caregivers versus healthy individuals) using multiple analysis of covariance (MANCOVA).

To evaluate the severity of perceived distress and to define possible cases the mean score plus half of the standard deviation (SD) of each SCL-90-R scale of the healthy individuals was used as the cut-off score indicating a high level of distress. Subclinical cases were defined as those individuals with three or more high scores of the SCL-90-R scales and cases as those with five and more high scores.

Furthermore, multiple linear regression analysis was applied with psychological symptoms of the caregivers as dependent variables and the nine SCL-90-R scores of the related patients as independent variables to determine the impact of patients' symptoms on caregivers' distress in a selected group of patient-care giver pairs. Alpha value of 0.05 was considered as critical value.

Ethical consideration approval for the study was obtained from the Ethics Committee, Shahid Beheshti University of Medical Sciences and from the National Research Institute of TB and Lung Diseases (NRITLD). Participants signed an informed consent form prior to the

investigation explaining their anonymity, confidentiality of their information and voluntariness of participation, as well as the possibility to withdraw at any stage of the study.

RESULTS

Of the 320 participants who were included in this study, 172 (53.8%) were males and 148 (46.2%) were females. Thirty TB patients (20.5%) were illiterate as were 11 caregivers (12.4%), whereas none of the healthy individuals were illiterate. Ninety-eight (67.1%) patients and 79 (89.8%) caregivers were married. The healthy participants differed from the patients and caregivers with regard to the educational level and marital status. Table 1 presents some demographic characteristics of the participants by group. The groups did not differ in gender distribution but there was a significant difference ($P < 0.050$) in the mean age between the patient group and the healthy group.

Table 1. Age, gender, education and marital status of the patients, caregivers and healthy individuals

| Factors | Variables | Patients N= 146 | Control N=85 | Caregivers N=89 |
|-----------------------|---------------|--------------------|-----------------|--------------------|
| Sex | Male | 83 (56.8%) | 47 (55.3%) | 42 (47.2%) |
| | Female | 63 (43.2%) | 38 (44.7%) | 47 (52.8%) |
| Age | Mean±SD | 41.66±13.38 | 36.14±16.48 | 39.33±12.35 |
| | Illiterate | 30 (20.5%) | 0 (0%) | 11 (12.4%) |
| | Elementary | 46 (31.5%) | 1 (1.2%) | 18 (20.2%) |
| | Middle school | 27 (18.5%) | 3 (3.6%) | 19 (21.3%) |
| Education | High school | 31 (21.2%) | 27 (32.1%) | 26 (29.2%) |
| | diploma | 12 (8.2%) | 51 (60.8%) | 15 (16.9%) |
| | BS or MS | 0 (0%) | 2 (2.4%) | 0 (0%) |
| | PhD | | | |
| Marital status | Single | 30 (20.5%) | 34 (40.0%) | 7 (8.0%) |
| | Married | 98 (67.1%) | 48 (56.5%) | 79 (89.8%) |
| | Divorced | 8 (5.5%) | 0 (0%) | 0 (0%) |
| | Widowed | 10 (6.8%) | 3 (3.5%) | 2 (2.3%) |

Table 2 presents psychological symptom scores (SCL-90-R) of the patients before the initial 14-day treatment, the healthy individuals and the caregivers.

Table 2. SCL-90-R scores of patients (n= 146) before the two-week initial treatment, the caregivers (n= 89) and the healthy individuals (n= 85)

| Psychological symptom | Group | Mean±SD | 0.95 CI |
|----------------------------------|---------------------|-----------|------------|
| Psychoticism | Patients | 0.72±0.67 | 0.61- 0.83 |
| | Healthy individuals | 0.42±0.53 | 0.36- 0.59 |
| | Caregivers | 0.66±0.86 | 0.51- 0.86 |
| Paranoid ideation | Patients | 1.08±0.89 | 0.94- 1.23 |
| | Healthy individuals | 1.2±0.83 | 1.00- 1.4 |
| | Caregivers | 1.2±0.93 | 1.01- 1.4 |
| Phobic anxiety | Patients | 0.56±0.65 | 0.46- 0.67 |
| | Healthy individuals | 0.38±0.45 | 0.30- 0.48 |
| | Caregivers | 0.48±0.61 | 0.35- 0.61 |
| Hostility | Patients | 0.54±0.63 | 0.43- 0.64 |
| | Healthy individuals | 0.78±0.77 | 0.01- 0.94 |
| | Caregivers | 0.60±0.70 | 0.45- 0.75 |
| Anxiety | Patients | 1.05±0.82 | 0.91- 1.20 |
| | Healthy individuals | 0.73±0.73 | 0.58- 0.89 |
| | Caregivers | 0.91±0.84 | 0.73- 1.09 |
| Depression | Patients | 1.30±0.86 | 1.17- 1.46 |
| | Healthy individuals | 0.72±0.67 | 0.57- 0.86 |
| | Caregivers | 0.99±0.94 | 0.79- 1.20 |
| Interpersonal sensitivity | Patients | 0.90±0.82 | 0.77- 1.04 |
| | Healthy individuals | 0.61±0.58 | 0.49- 0.74 |
| | Caregivers | 0.93±0.86 | 0.75- 1.11 |
| Obsessive compulsive | Patients | 0.92±0.46 | 0.79- 1.04 |
| | Healthy individuals | 0.77±0.66 | 0.62- 0.91 |
| | Caregivers | 0.85±0.77 | 0.68- 1.00 |
| Somatization | Patients | 1.44±0.89 | 1.30- 1.59 |
| | Healthy individuals | 0.77±0.67 | 0.62- 0.91 |
| | Caregivers | 0.85±0.78 | 0.68- 1.01 |

Table 3. Group comparison findings for the SCL-90-R scales by MANCOVA

| Comparison | Effect | Variable | Pillai's trace | F | df/df | p | η^2 | Power |
|--|-------------|-------------------|----------------|------|-------|---------|----------|-------|
| TB-patients vs. caregivers | Main effect | Group | 0.20 | 6.17 | 9/222 | 0.001 | 0.20 | 1.00 |
| | Covariate | Literacy status | 0.01 | 2.65 | 9/222 | 0.006 | 0.01 | 0.94 |
| | Covariate | Gender | 0.08 | 2.19 | 9/222 | 0.024 | 0.082 | 0.884 |
| | Covariate | Employment status | 0.10 | 2.60 | 9/222 | 0.007 | 0.095 | 0.939 |
| TB-patients vs. healthy individuals | Main effect | Group | 0.18 | 5.24 | 9/218 | < 0.001 | 0.18 | 1.00 |
| | Covariate | Literacy status | 0.07 | 1.84 | 9/218 | 0.063 | 0.070 | 0.808 |
| | Covariate | Gender | 0.09 | 2.29 | 9/218 | 0.018 | 0.086 | 0.900 |
| Caregivers vs. healthy individuals | Main effect | Group | 0.13 | 2.68 | 9/161 | 0.006 | 0.130 | 0.943 |
| | Covariate | Literacy status | 0.16 | 3.28 | 9/161 | 0.001 | 0.155 | 0.980 |
| | Covariate | Gender | 0.19 | 4.13 | 9/161 | < 0.001 | 0.187 | 0.996 |

Psychological symptoms of TB patients versus caregivers

When comparing the SCL-90-R scores of the TB patients and the caregivers controlling for gender, literacy status, and employment status in MANCOVA, both groups differed significantly on depression ($P=0.047$) and somatization ($P<0.001$) with higher scores in the TB-patient group (see Table 3 for MANCOVA results) according to post-hoc comparisons.

Psychological symptoms of TB patients versus healthy individuals

In MANCOVA comparing the SCL-90-R scores of the TB-patients with those of the healthy individuals with literacy status and gender as covariates, the groups significantly differed on paranoid ideation ($P= 0.038$), hostility ($P= 0.010$), depression ($P= 0.046$), and somatization ($P= 0.001$) with the patients showing less distress caused by paranoid ideation and hostility and higher distress caused by depression and somatization than the healthy individuals (see Table 3 for MANCOVA results).

Psychological symptoms of caregivers versus healthy individuals

When comparing the SCL-90-R scores of the caregivers and healthy individuals controlling for gender and literacy status in a MANCOVA, both groups differed significantly on paranoid ideation ($P= 0.044$) and hostility ($P= 0.034$) with higher scores in the caregiver group for paranoid ideation and lower scores for hostility than in the healthy individuals (see Table 3 for MANCOVA results).

Severity of distress and prevalence of subclinical and clinical cases possibly suffering from some psychological disorders

To evaluate the severity of perceived distress, the mean score plus half of the related SD of each SCL-90-R scale of the healthy individuals was used as cut-off score indicating a high level of distress. Subclinical cases have been defined as those individuals with three or more high scores on the SCL-90-R scales and cases as those with five and more high scores. Based on these definitions,

depression (52.7%) and somatization (55.5%) were the most commonly experienced symptoms and hostility (13.0%) and paranoid ideation (26.7%) were the least common experienced symptoms among the TB-patients (Table 4). Caregivers most commonly reported high distress caused by depression (41.6%) and interpersonal sensitivity (41.6%) while reported hostility (15.7%) and paranoid ideation (25.8%) least commonly; whereas among the healthy individuals anxiety (31.8%) and paranoid ideation (30.6%) were the most often severely expressed symptoms and hostility (18.8%) and psychoticism (22.4%) were least commonly experienced as highly distressing.

Based on the defined criteria for subclinical and clinical cases, 52.1% of the TB patients can be described as subclinical or clinical cases and 39.0% as clinical cases; 43.8% of the caregivers were classified as subclinical and clinical cases and 32.6% as clinical cases; whereas only 36.5% of the healthy individuals had more than two high scores in SCL-90-R scales and 24.7% had more than four high scores (Table 4). Only 27.4% of the patients were below the cut-off score in all nine SCL-90-R scales but 41.6% of the caregivers and 44.7% of the healthy individuals were below the cut-off score.

Table 4. Percentages of high scores in SCL-90-R scales and prevalence of possible subclinical and clinical cases suffering from psychological disorders

| Subscales | TB-patients (%) | Caregivers (%) | Healthy individuals (%) |
|---|-----------------|----------------|-------------------------|
| Somatization | 55.5 | 28.1 | 28.2 |
| Obsessive compulsive | 34.2 | 28.1 | 24.7 |
| Interpersonal sensitivity | 37.7 | 41.6 | 29.4 |
| Depression | 52.7 | 41.6 | 28.2 |
| Anxiety | 41.1 | 33.7 | 31.8 |
| Hostility | 13.0 | 15.7 | 18.8 |
| Phobic anxiety | 36.3 | 30.3 | 25.9 |
| Paranoid ideation | 26.7 | 25.8 | 30.6 |
| Psychoticism | 40.4 | 39.3 | 22.4 |
| Prevalence of subclinical and clinical cases | | | |
| Not a case | 27.4 | 41.6 | 44.7 |
| Three or more high score subclinical and clinical cases | 52.1 | 43.8 | 36.5 |
| Five or more high score clinical cases | 39.0 | 32.6 | 24.7 |

Symptom change in TB patients from before to after the initial 14-days treatment

Psychological profiles of 146 patients were compared before and after they were treated for two weeks in the hospital by means of repeated measures MANOVA. There were significant within subject effects (Pillai's trace = 0.38; $F = 5.92; 9/89; P < 0.001; \eta^2 = 0.375; \text{power} = 1.00$) based on significant unvaried differences for all SCL-90-R scores except for paranoid ideation ranging from $F = 29.75; P < 0.001$ for obsessive-compulsive to $F = 5.52; P = 0.021$ for hostility (Figure 1) (Table 5).

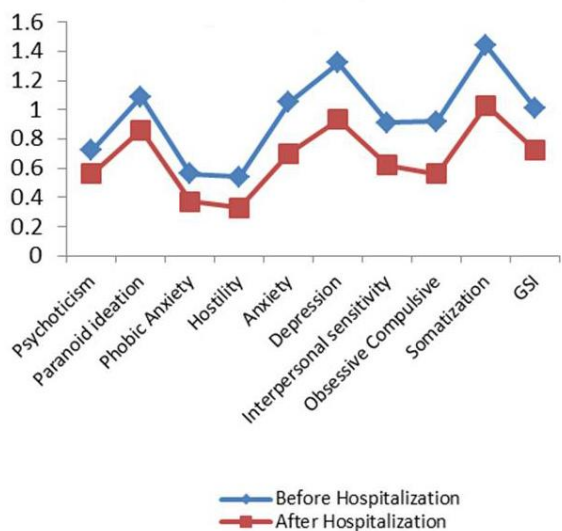


Figure 1. Change in mean scores of all symptoms after two weeks of hospitalization in patients

Table 5. Change in the mean scores of all symptoms after two weeks of initial inpatient treatment in the TB patients

| Time | Before treatment | After treatment |
|---------------------------|------------------|-----------------|
| Subscales | Mean±SD | Mean±SD |
| Somatization | 1.39±0.90 | 1.03±0.87 |
| Obsessive compulsive | 0.88±0.79 | 0.56±0.64 |
| Interpersonal sensitivity | 0.86±0.83 | 0.62±0.75 |
| Depression | 1.32±0.93 | 0.93±0.79 |
| Anxiety | 1.01±0.83 | 0.70±0.63 |
| Hostility | 0.46±0.59 | 0.33±0.50 |
| Phobic anxiety | 0.58±0.70 | 0.37±0.54 |
| Paranoid ideation | 0.98±0.85 | 0.86±0.85 |
| Psychoticism | 0.69±0.67 | 0.56±0.60 |

Prediction of caregivers perceived distress by the patients' psychological symptoms

In multiple regressions with various SCL-90-R scores of the caregivers as dependent variables and the set of the nine SCL-90-R scores of the TB patients as independent variables between 10% (for paranoid ideation) and 27% (for hostility) of the variance in the scores of the caregivers could be explained by the variance in the set of SCL-90-R scales of the TB-patients with psychoticism most often occurring with a significant standardized β in the regression equation (Table 6).

Table 6. Multiple regression findings to predict the various SCL-90-R scores of the caregivers (all with dfs 9/73)

| Dependent variable | Adjusted r ² | F | P | Independent variables with significant standardized β (standardized β ; t; p) |
|---------------------------|-------------------------|------|-------|--|
| Psychoticism | 0.11 | 2.18 | 0.033 | Obsessive compulsive: -0.39; -1.98; 0.051 |
| Paranoid ideation | 0.10 | 1.99 | 0.053 | Psychoticism: 0.38; 1.95; 0.056 |
| Phobic anxiety | 0.13 | 2.34 | 0.023 | Hostility: -0.33; -2.03; 0.046 |
| Hostility | 0.27 | 4.39 | .001 | Psychoticism: 0.53; 3.07; 0.003 Anxiety: -0.47; -2.39; 0.019 Somatization: 0.41; 2.80; 0.007 |
| Anxiety | 0.15 | 2.63 | 0.11 | Obsessive compulsive: -0.45; -2.33; 0.022 |
| Depression | 0.21 | 3.38 | 0.002 | Psychoticism: 0.34; 1.88; 0.064 Obsessive compulsive: -0.33; -1.78; 0.080 |
| Interpersonal sensitivity | 0.18 | 3.06 | 0.004 | Psychoticism: 0.44; 2.38; 0.020 Anxiety: -0.38; -1.84; 0.070 |
| Obsessive compulsive | 0.17 | 2.91 | 0.005 | Psychoticism: 0.39; 2.10; 0.040 Interpersonal sensitivity: 0.41; 1.96; 0.054 |
| Somatization | 0.16 | 2.75 | 0.008 | Psychoticism: 0.40; 2.14; 0.035 Anxiety: -0.51; -2.43; 0.017 |

DISCUSSION

Lung disease is among the chronic medical conditions that are strongly associated with psychiatric symptoms. Despite the high prevalence and morbidity of respiratory disorders their psychological aspects have not received the same attention like in other areas of internal medicine such as heart diseases or cancer (40). TB often causes physical, social and mental problems for the affected individuals (41). Early psychiatric studies on TB were focused on the personality traits that may predispose to TB, but did not focus on psychological symptoms and mental disorders in the treatment period. The role of emotional stresses was also found to be associated with immunological responsiveness and the reactivation of the bacillus (42).

According to our literature survey, the present study is the first which assesses the impact of TB and its initial short course therapy on mental health of the TB patients and compares it with mental health of their caregivers and healthy individuals. Results showed that TB patients had significantly higher mean scores in eight subscales compared to the caregivers and healthy individuals; it means that TB impacts not only on physical, but also on mental health.

Comparing the symptom scores of the newly diagnosed patients before the initial treatment and those of their caregivers revealed that the patients reported significantly higher scores only on depression and somatization. In a study by Yanwei et al (43), somatization, depression and anxiety were significantly higher in TB patients than in healthy people, whereas Yang et al. found that somatization, obsessive-compulsiveness, anxiety, phobic anxiety and paranoid ideation and psychotism of the TB group were significantly higher than those of the healthy group (44). Balaji et al. (45) indicated that the prevalence of depression in TB patients was 39.5%. This represents a similarly high prevalence of clinical cases as in our study (39.0 %) taking it into account that depression and somatization scores are the most commonly reported high scores. This also demonstrates the impaired mental health

among TB patients in comparison with the healthy individuals (25 % clinical cases only and not predominantly related to depression). However, the prevalence of clinical cases among the caregivers (32.6 %) was similarly high compared to the rate among the TB patients giving evidence for the high burden of care and for the need for therapeutic help for caregivers.

Our study revealed that demographic variables such as gender and education were significantly associated with mental symptoms in all three groups under study (TB patients, caregivers, and healthy individuals). Our findings are similar to those of Aghanwa and Erhabor (46) who reported higher psychiatric morbidity in TB patients with lower educational attainment. The illiteracy rate was higher in the patient group than in the healthy group in our study. In fact, TB is known to affect poor and under educated people (46); similarly, our study showed that more psychological symptoms were also reported in TB patients with lower educational level.

Our findings also showed that active TB exerts very important adverse effects on psychological symptoms of not only the TB patients but also their caregivers. Depression as an effect of care-giving has been intensively examined and widely reported among caregivers, especially among women and those of younger age (47). Caregiving can cause physical and psychological symptoms in caregivers (48). According to other studies, the patient situation causes stressful conditions which may lead to subjective and objective burden or cost for the family (49). However, it is difficult to differentiate between the burden caused by caregiving and predisposing factors in the caregivers which affect the stress of the caregivers conditions (50). In the Iranian culture, caregivers are deeply involved in caring of their patients and sometimes primary caregivers stay at hospital with their patients, and in the Iranian culture this means that they really love their relatives.

A complete course of TB treatment takes about six months after two weeks of intensive inpatient treatment. During this period primary caregivers have to provide

physical and emotional care for their patients. However, in hospital they have health service support like nursing and other caregivers who work in hospital but after discharge from hospital the caregivers' role becomes more prominent.

After the first two weeks of treatment at hospital, patients will receive therapy for six months. Douglas found that physical health status of long-term caregivers of patients declined after the patients were discharged from hospital (47). These studies indicate that caring for an ill family member at home negatively affects the caregivers' health. This supports the assumption that the mental health among the caregivers might become even more impaired under these conditions as it already was at the time of investigation in the present study. Therefore, we highly recommend that emotional problems and other psychological symptoms of TB patients should be assessed from the early detection of their disease on; and that the emotional and psychological burdens of the caregivers should be assessed by the health workers when caring for the patients at home.

It should be noted that some anti-TB treatments, particularly Isoniazid (INH), have been associated with psychiatric co-morbidities such as psychosis, obsessive-compulsive disorder, and mania (51). However, many studies have described an improvement in mental health both during and after completion of TB treatment (52).

The interpretation of our findings is limited by that fact that we assessed patients and their caregivers in the hospital where caregivers and patients were supported by health service workers and the caregiving burden was not as high as the previous inpatient treatment and after that short term hospitalization. Since caregivers providing care to ill family members at home are potentially at risk for caregiver burden and declining of physical and psychological health we suggest researchers to study mental health of TB patients and their caregivers after complete treatment. Furthermore, the social status of the healthy individuals was higher compared to that of the patients and their caregiving relatives probably resulting in a lower prevalence of psychological symptoms.

CONCLUSION

Studies on mental health of TB patients and their caregivers are scarce. The findings of the present study increase our knowledge about the occurrence of mental health symptoms in these two groups. The reasons for the association of TB and psychiatric complications have not yet been fully explained. But, studies in this regard are scarce. Unfortunately, only limited information is available on patients' and their caregivers' mental health during this period. We highly recommend emotional problems and other psychological symptoms of TB patients being assessed and treated from the early detection of disease. Furthermore, we recommend the emotional and psychological symptoms of the caregivers being assessed and treated by the health workers, especially when caring for the patients at home.

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