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## A Comparison Between the MMPI-2 Profiles in Tuberculosis and other Pulmonary Diseases

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### ABSTRACT

**Background:** Globally, tuberculosis (TB) causes the greatest mortality due to a single infectious agent. Apart from the pulmonary damages, its psychological aspects are of great concern. This study aimed at a comparison between the MMPI-2 (Minnesota Multiphasic Personality Inventory) profiles in TB patients and the patients with other lung diseases.

**Materials and Methods:** New cases of tuberculosis (recently documented TB patients) were interviewed and also took the MMPI-2 test 15 days after admission to the hospital.

Control subjects consisted of the patients with lung diseases other than tuberculosis, hospitalized in the pulmonary internal and surgical wards of the hospital. They were interviewed and took the MMPI test as well. The results were analyzed with Hotelling's T<sub>2</sub> and t-test using NCSS 2000.

**Results:** Of 120 patients in this study, 60 had pulmonary TB and 60 were non-TB control patients. The mean age of the patients was 35.18 years. Eight clinical scales of the MMPI-2 (Ma, Sc, Pt, Pa, Pd, Hy, D, Hs) with T scores less than 50 (<50), 50-70, and more than 70 (>70), respectively, represented the normal personality, tendency for psychological disorders, and psychological disorder. Depression Scale (D) in TB group showed 7 patients (%11) <50, 43 patients (%71) 50-70, and 10 patients (%16) >70. In the same group, Psychopathic Deviate scale (Pd) revealed 6 patients (%10) <50, 51 patients (%85) 50-70, and 3 persons (%5) >70. Both of the scales showed a significant difference in cases over the control group ( $p=0.006$  for D and  $p=0.0001$  for Pd). All the MMPI scales together showed a significant difference ( $p=0.0139$ ) in TB patients over the controls.

**Conclusion:** The difference in personality profiles of TB patients with those of the controls, and the higher D and Pd scores in TB group can indicate the higher risk of TB for persons with depression and psychopathic deviation. But it may also be due to the confounding effect of mood on the MMPI-2 test results. (Tanaffos 2003; 2(5), 43-49)

**Key words:** Tuberculosis (TB), Depression, Psychopathy, Minnesota Multiphasic Personality Inventory-2 (MMPI-2).

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## INTRODUCTION

Globally, tuberculosis (TB) causes the greatest mortality due to a single infectious agent, with an annual incidence of 3 million cases. Apart from the somatic problems, TB patients suffer from a number of psychosocial problems which affect their lives at different levels. As scholarly denoted by Sir William Osler "The care of a tuberculosis patient is more related to what he has in mind rather than what he has in chest."

Nervous and immune systems have reciprocal effects on each other: on one hand, stress and depression can enhance or suppress immune reactions; hence, causing or aggravating disorders such as neoplasms or infectious diseases; and on the other hand, there is some evidence indicating stimulation of immune system, as in some infectious, neoplastic, and autoimmune disorders are accompanied by symptoms like those observed in chronic stress or depression (1).

Another study has shown that stress can alter bodily response to infectious agents and change the initiation course and outcome of infections both in human and animals (2). The prevalence of depression, anxiety, and adjustment disorders has been reported to be 30.2% among the patients with infectious diseases such as TB (3). Symptoms of major depression have been observed among 733 patients with chronic pulmonary diseases (COPD), and there was a significant positive correlation between depression and general health of the patients and severity of their lung disease (4). A study on 157 TB and COPD patients has shown that the prevalence of depression and anxiety were 19% in TB new cases, 21.6% in TB old cases, 25.6% in MDR (multi-drug resistant) tuberculosis, and 41.3% in COPD patients (5). All the aforementioned studies imply a close interrelationship between the mind and the body which must be taken into consideration especially in cases of infectious diseases.

In the current study we aimed at evaluating the correlation between pulmonary TB and the personality profiles to attain a clearer understanding of the possible psycho-somatic interactions in TB.

## MATERIALS AND METHODS

Our study was a case-control. The cases were TB new cases admitted to tuberculosis ward and the controls were hospitalized patients in other pulmonary internal and surgical wards in Massih Daneshvari Hospital, Tehran, Iran.

Inclusion criteria were: positive microscopic (sputum smear and culture), clinical and radiological evidence, and a negative history of TB or anti-TB medication in case subjects; and the presence of pulmonary diseases other than TB in control subjects.

The exclusion criteria for both cases and controls were: a documented past history of psychological disorders, psychiatric medication, or documented malignancies.

All the beds with TB new cases were numbered and then the samples were selected with the random number table. Then, 2 weeks after admission and in the absence of the exclusion criteria, the patients were interviewed (face-to-face) and took the MMPI-2 and the results were recorded in special forms. The same process was performed for selection and testing of the controls from pulmonary internal and surgical wards. The data were acquired, and the results were analyzed using Hotelling's T<sub>2</sub> and t-test.

### **Instrument:**

The Minnesota Multiphasic Personality Inventory-2 (MMPI-2) is a self-administrated test with yes/no questions. The score of each scale was computed according to the answering key and the T scores (mean of 50 and standard deviations of 10) were obtained (3).

### **Validity Scales:**

1-L scale (lie scale): To detect deliberate attempt of the respondent to present a favorable picture of self.

2-F Scale: To assess test-taking attitudes; deviant responses.

3-K Scale: To reveal defensiveness and denial by the respondents about their shortcomings.

#### **Clinical Scales:**

Scale 1, Hypochondriasis (Hs): To identify when respondents show a neurotic concern about physical health and present with imaginary or real exaggerated vague bodily complaints.

Scale 2, Depression (D): To detect poor morale, lack of hope about the future, and a general dissatisfaction with one's own life situation.

Scale 3, Hysteria (Hy): To assess the tendency for hysterical reaction to stress and developing conversion-type symptoms to subconsciously avoid responsibility or stress situation.

Scale 4, Psychopathic Deviate (Pd): To identify asocial, amoral personality; lack of acceptance of authority, inability to make affective bonds with others, and a lack of sympathy.

Scale 6, Paranoia (Pa): To detect pathologic suspiciousness, jealousy, and rigid opinions.

Scale 7, Psychasthenia (Pt): To reveal anxiety, obsessive-compulsive behaviors, excessive doubts, unreasonable fears, and guilt feelings.

Scale 8, Schizophrenia (Sc): To identify peculiar behavior, bizarre thoughts, delusions, hallucinations, and social alienation.

Scale 9, Hypomania (Ma): To detect elevated mood, hyperactivity, and flight of ideas.

## **RESULTS**

Of all 60 cases of TB in the present study, 30 were male and 30 were female, with the mean age of  $36.7 \pm 16.9$  years. Of 60 control patients, 36 were male and 24 were female, with the mean age of  $33.6 \pm 13.8$  years. Regarding the ethnicity, in case group (TB patients) 46 (76%) were Iranian and 14 (23%) were Afghan. In control group there were 59 (98%) Iranians and 1 (2%) Afghan. 55 (91%) of cases and 45 (75%) of controls resided in urban areas. The difference between cases and controls in regard to

age, gender, ethnicity ( $p > 0.025$ ), and the residence was not statistically significant.

Comparing the central measures of the MMPI-2 test, results of cases and controls yielded the following results:

The difference in results of the Scales L, F, Hs, Hy, Pa, Pt, Sc, and Ma was not statistically significant between cases and controls ( $p = 0.05$ ). The scores of Depression and Psychopathic Deviate were significantly higher in the TB group ( $p = 0.006$  and  $p = 0.0001$ , respectively.) Finally, multivariate analysis of Hotelling's T<sup>2</sup> and t-test yielded a significant difference between the MMPI-2 profiles of cases and controls at 0.05 level.

**Table 1.** Means and standard deviations (STD) in case group (TB patients)

Scale	N	Minimum	Maximum	Mean	STD
L	60	30.00	75.00	50.0833	11.80677
F	60	40.00	80.00	59.3333	11.51516
K	60	25.00	65.00	47.0000	10.54450
Hs	60	35.00	75.00	55.6667	8.35984
D	60	40.00	85.00	60.3333	9.90919
Hy	60	35.00	65.00	52.3333	8.25785
Pd	60	35.00	75.00	58.6667	8.87133
Pa	60	35.00	80.00	58.5833	12.52427
Pt	60	30.00	75.00	57.0833	10.54818
Sc	60	35.00	75.00	55.1667	9.82761
Ma	60	25.00	75.00	51.9167	10.08824
AGE (years)	60	15.00	75.00	36.7167	16.91864
Valid N (listwise)	60				

**Table 2.** Means and standard deviations (STD) in control group (non-TB patients)

Scale	N	Minimum	Maximum	Mean	STD
L	60	30.00	75.00	52.4167	12.12546
F	60	35.00	80.00	55.8333	12.21858
K	60	25.00	85.00	48.7500	12.60969
Hs	60	40.00	85.00	57.7500	10.98632
D	60	35.00	80.00	55.5000	9.23791
Hy	60	30.00	80.00	53.6667	10.61126
Pd	60	30.00	75.00	52.1667	9.40459
Pa	60	40.00	85.00	56.8333	10.57526
Pt	60	30.00	75.00	53.2500	10.72874
Sc	60	30.00	70.00	53.0833	10.13016
Ma	60	30.00	70.00	49.3333	9.45402
AGE (years)	60	15.00	71.00	33.6500	13.83416
Valid (listwise)	N 60				

## DISCUSSION

As the results show, there is a significant difference in Psychopathic Deviate Scale scores between cases and controls. Considering the similar sexual composition of both groups, this difference cannot be attributed to this factor. We can postulate two hypotheses to explain the higher frequency of Psychopathic Deviate personality among TB patients.

As a reaction to the social "stigma" of tuberculosis, antisocial features have been expressed more in TB

patients, causing a higher score in Scale Pd. This finding has not been reported in other studies outside Iran. This can be due to worse impression of stigma of TB among Iranians due to cultural factors. For this reason we suggest that cross-cultural studies be performed to test this hypothesis. Moreover it can be assumed that these patients had had antisocial tendencies which placed them in a lower socioeconomic status, leading to TB infection, thus resulting in a higher Pd Scale scores among TB patients. To come over this dilemma, a cohort study is recommended with pre- and post TB infection assessments for Psychopathic Deviate characteristics or socioeconomic state.

Another factor which can relate TB infection with psychopathic deviation is drug abuse. Mirsaeidi et al. in a study on mortality factors in 33 TB patients found that the patients highly abused narcotics (6). In another study by the same researcher (unpublished) on 97 TB patients, the prevalence of drug abuse was reported 12% which is noticeably higher than 2.8% in normal population (7). Several other studies have shown the positive correlation of psychopathic deviation and drug abuse (8). So it can be stated that psychopathic deviation can lead to drug abuse, and drug abuse in turn can increase the risk of tuberculosis. A complementary study on drug abuser and non-drug abuser TB patients regarding psychopathic deviation will be helpful.

Other studies have revealed a higher prevalence of tuberculosis among lower socioeconomic states. Similar findings on antisocial traits have been shown (8). Thus, it can be deduced that presence of higher scores in Pd scale among TB patients a chance result due to the confounding factor of the low socioeconomic state. Likewise this argument can be tested by comparing Pd scores in patients with high and low socioeconomic states.

Several studies have considered the prevalence of depression in tuberculosis. Felker, (4), Aghanwa and

Erhabor, (3), Aydin and Ulusahin, (5), and Aghanwa and Erhabor (9) have reported higher prevalence of depression in TB and COPD patients, but none has performed a comparison between these two. Some other studies can help to justify this finding, by revealing the concomitant effects of psychological stress on both mood and the immune system (2); Kiecolt, (10); Imai and Nakachi, (11); Cohen (12); Drummond and Hewson-Bower, (13), or the effects of behavior on the function of immune system during infectious diseases [Raison and Miller, (1); Yang and Glaser, (14)].

However, the present study reveals a new finding that is significantly higher prevalence of depression in tuberculosis as compared with other lung diseases. Second looks at the results show that depression is higher in both cases and controls than that in the normal population, but the cases are affected significantly more ( $p < 0.006$ ).

A possible explanation for this finding is the longer hospitalization and longer isolation of TB patients in comparison with the patients with other lung diseases. The second possibility is the grave stigma of TB considered as an irremediable disease. It can be tested by using a valid and reliable instrument to group the patients as high stigma and low stigma. Then, the level of depression must be assessed and compared in both groups.

The third explanation can be the role of chemical mediators released in the course of tuberculosis, as endogenous agents of depression, namely: the cellular immunity cytokines such as gamma and alpha interferons, tumor necrosis factor alpha (TNF $\alpha$ ), and interleukins 1, 2, 6, 12 [Raison and Miller, (1), Yang and Glaser, (14)]. This probability can be put to test by measuring the severity of depression and the levels of aforementioned mediators in patients with major depression and those suffering from infectious diseases.

## CONCLUSION

Different psychological manifestations can appear in TB causing a delay in the treatment of these patients. The current study showed that psychological evaluation of TB patients could assist the diagnosis and management of tuberculosis. Pd (psychopathic deviate) and D (depression) scales showed higher scores in cases over the controls. More thorough investigations and possibly pharmacotherapy and/ or psychotherapy can be a future adjuvant in treatment of tuberculosis.

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