

Psychological characteristics of patients with asthma

Emel Bulcun¹, Yakup Turkel², Omer Oguztürk³, Ersel Dag², S. Visal Buturak³, Aydanur Ekici¹ and Mehmet Ekici¹

¹ Faculty of Medicine, Department of Pulmonary Diseases, Kirikkale University, Kirikkale, Turkey

² Faculty of Medicine, Department of Neurology, Kirikkale University, Kirikkale, Turkey

³ Faculty of Medicine, Department of Psychiatry, Kirikkale University, Kirikkale, Turkey

Abstract

Introduction: Psychological distress of patients with asthma may be reduced when they learned to live with their illness. Asthma can change the psychological and personality characteristics. We aim to investigate the psychological and personality characteristics of patients with asthma using MMPI (Minnesota Multiphasic Personality Inventory).

Methods: Thirty-three adult patients with asthma (23 female and 10 male) and 20 healthy controls (14 females and 6 males) were enrolled in this study. Psychometric evaluation was made with the Turkish version of the MMPI. The patients were separated into two groups according to the duration of symptoms (recent-onset asthma < 10 years, long-standing asthma \geq 10 years).

Results: Patients with asthma compared with control group had significantly higher the rate of clinical elevation on depression, hysteria, psychasthenia and social introversion. Patients with recent-onset asthma compared with long-standing asthma have significantly higher the rate of clinical elevation on depression, hysteria, psychopathic deviate, psychasthenia and social introversion. MMPI mean *t* score in patients with recent-onset asthma was higher than patients with long-standing asthma. MMPI mean *t* score in patients with asthma was negatively associated with the symptom duration in multivariate model.

Conclusions: Patients with asthma have relatively more inactivity, anergia, guilt, pessimism, nonspecific physical complaints, irrational fears and introvert. Patients with long-standing asthma have less psychological distress, suggesting that learned to cope with his illness.

Please cite this paper as: Bulcun E, Turkel Y, Oguztürk O, Dag E, Visal Buturak S, Ekici A and Ekici M. Psychological characteristics of patients with asthma. *Clin Respir J* 2018; 12: 113–118. DOI:10.1111/crj.12494.

Conflict of interest

The authors have stated explicitly that there are no conflicts of interest in connection with this article.

Introduction

Recent data revealed that psychological disorders are more common in asthmatic patients than in the general population (1, 2). Psychological factors have been implicated as potentially contributing to asthma severity and may be a risk factor for asthma-related morbidity and mortality (3, 4). Psychosocial stress has the potential to affect asthma at multiple levels, directly

inducing exacerbations in some patients and increasing the incidence and severity of asthmatic responses (5). At another level, there is evidence that asthma itself may induce psychologic stress (6). Psychosocial stress alters susceptibility to systemic illnesses and may enhance airway inflammation in asthma by modulating immune cell function through neural and hormonal pathways. Stress activates the hypothalamic-

Key words

asthma – MMPI – personality traits – psychiatric disorders – psychometric evaluation – symptom duration

Correspondence

Emel Bulcun, MD, Faculty of Medicine, Department of Chest Disease, Kirikkale University, Kirikkale, Turkey.

Tel: +90 318 3335010/5414

Fax: +90 318 224 07 86

email: emelbulcun@hotmail.com

Received: 25 May 2015

Revision requested: 14 December 2015

Accepted: 19 April 2016

DOI:10.1111/crj.12494

Authorship and contributorship

Designed the study: Mehmet Ekici, Emel Bulcun, Aydanur Ekici, Omer Oguzturk.

Performed the study: Emel Bulcun, Aydanur Ekici, Mehmet Ekici, Yakup Turkel, Omer Oguzturk, Ersel Dag, S. Visal Buturak.

Analyzed the data: Mehmet Ekici. Wrote the paper: Mehmet Ekici, Emel Bulcun, Aydanur Ekici, Yakup Turkel. Revision of paper: Emel Bulcun, Yakup Turkel, Omer Oguzturk, Ersel Dag, S. Visal Buturak. All of authors read and approved the final manuscript.

Ethics

Local Ethics Committee of Kirikkale University Hospital approved this study.

pituitary-adrenal (HPA) axis. Release of endogenous glucocorticoids, as a consequence, may play a prominent role in altering the airway immune homeostasis. Despite substantial corticosteroid and catecholamine plasma levels, chronic psychosocial stress evokes asthma exacerbations (7).

Provided that psychological disturbances are recognized and treated in these patients, the asthma-related morbidity might be significantly reduced (8–10). Indeed, patients with chronic asthma spend their lifetime coping with the symptoms of their disease (11).

Living with asthma may affect psychological state of patients. Psychological distress of patients with asthma may be reduced when they learned to live with their illness. Asthma can change the psychological and personality characteristics. Minnesota multiphasic personality inventory (MMPI) is a basic test that can be used to determine the psychosocial state and personality characteristics in daily practice. We aim to investigate the psychological and personality characteristics of patients with asthma using MMPI.

Methods

Consecutive patients diagnosed with asthma, admitted to the out-patient clinic in the Department of Chest Disease at Kırıkkale University between January 2012 and December 2012, were included in this study. Asthma diagnosis was made according to the American Thoracic Society criteria with symptoms of episodic wheezing, cough and shortness of breath responding to bronchodilators and reversible airflow obstruction documented in at least one previous pulmonary function study (12).

Twenty age and gender matched healthy older adults were recruited from the visitors to the patient. They did not have asthma or any respiratory complaints. Healthy older adults and patients with asthma were lifelong non-smokers and none of them reported a present or previous history of exposure to hazardous airborne substances. The exclusion criteria for the asthma patients and healthy controls were: acute asthma attacks, other pulmonary diseases history such as chronic obstructive pulmonary disease, interstitial lung disease, or severe systemic diseases such as severe renal disorders, severe cardiovascular diseases, uncontrolled hypertension, malignancy, subjects using of any medication for a psychiatric disorder, and the presence of any organic disorders that might affect the psychiatric assessment. To prevent any bias and side effects of medication, we excluded asthma patients hospitalized or discharged from the hospital in the previous 4 weeks.

Generally, inhaled steroids and long-acting β_2 -agonists were used as medication. No patients took intravenous, nebulized, or oral β_2 -agonist, or intravenous aminophylline, or systemic corticosteroids or immunosuppressive therapy during the the previous 4 weeks.

Patients also had to be exacerbation-free during this period. Only patients and controls that voluntarily filled in the questionnaire and fulfilled all the questions were included.

Local Ethics Committee approved the study and all subjects enrolled in the study gave their written informed consent. All patients and controls were lifelong non-smokers.

At the same time, after measuring the height, clinician performed spirometry on each subject with a portable dry rolling spirometer (MIR spirometer, Rome, Italy) according to the recommendations of the American Thoracic Society, and calculated the results on the basis of predicted values (13, 14). FVC, FEV₁, and FEV₁/FVC were recorded.

For this study, we chose 10 years as the cutoff value in the differentiation of recent-onset asthma with longstanding asthma. Education levels of patients with asthma and control group were calculated with scala. Education level was classified as none = 1; primary education = 2; high school = 3; university: 4. Education level was evaluated score as 1–4. In Table 1, education was changed as education level.

Psychometric evaluation

Each patient underwent psychometric evaluation using the Turkish version of the MMPI (15, 16) which consists of 566 statements answered as “true” or “false,” as applies to the patient. The scoring results in a standard profile, which consists of three “validity scales” and 10 “personality scales.” The validity scales consist of lie, fake and defensive responses and they validate each profile. Subjects scoring beyond predetermined limits on these scales have answered the test with a bias, thus, invalidating the results of the personality scales. In this study, there were no biased profiles. The personality scales score characteristics were based on psychodiagnostic categories. Although, they are not considered indicators of psychopathology *per se*, the personal characteristics are moderately related to the content description of the category.

The personality scales consist of hypochondriasis, depression, hysteria, psychopathic deviate, masculinity-femininity, paranoia, psychasthenia, schizophrenia, hypomania and social introversion. The results on the MMPI test are expressed in standardized *t* scores. Thus,

Table 1. Means (standard deviation) and percentage of sample elevated ($t > 65$) for MMPI clinical scales in patients with asthma and controls

MMPI clinical scale	Patients with asthma ($n = 33$)		Controls ($n = 20$)		<i>P</i> values*
	Mean \pm standard deviation	% Elevated	Mean \pm standard deviation	% Elevated	
Hypochondriasis	51.9 \pm 18.3	27.3	49.6 \pm 10.1	10.0	0.1
Depression†	57.0 \pm 11.7	27.3	50.3 \pm 7.8	5.0	0.04
Hysteria	51.0 \pm 20.9	30.3	43.6 \pm 7.4	0	0.006
Psychopathic deviate	48.6 \pm 14.1	15.0	48.9 \pm 10.5	15.2	0.9
Masculinity/femininity	55.1 \pm 8.8	9.1	59.5 \pm 9.0	25.0	0.1
Paranoia	52.9 \pm 17.3	27.3	51.2 \pm 10.6	10.0	0.1
Psychasthenia	54.1 \pm 15.3	24.2	48.1 \pm 9.5	0	0.01
Schizophrenia	49.6 \pm 10.1	6.1	47.6 \pm 10.3	10.0	0.5
Hypomania	50.9 \pm 13.6	9.1	53.1 \pm 7.7	10.0	0.9
Social introversion	55.1 \pm 11.3	27.3	51.9 \pm 7.3	5.0	0.04
MMPI mean <i>t</i> score	52.6 \pm 11.2		50.4 \pm 5.4		0.4

Significant *P* values are shown in the italics format.

*Comparison of percentage of sample elevated ($t > 65$) for MMPI clinical scales.

† $P = 0.02$.

MMPI, Minnesota Multiphasic Personality Inventory.

Bold numerals, statistically significant.

a scale score is considered indicative of psychological dysfunction when the *t* value is > 65 . We dichotomously classified each individual subject in terms of whether or not each scale fell in the clinically elevated range. Elevation was defined as a *t* score > 65 . Absolute scores were the mean of standardized *t* scores.

Statistical methods

All clinical parameters were expressed as mean \pm standard deviation, as well as percentages (for categorical variables). The patients with asthma and healthy controls were compared using a one-way ANOVA for continuous parameters and the chi-squared test for categorical parameters. Multiple stepwise linear regression was performed to determine the relative contribution of possible confounding factors to MMPI mean *t* score. A *P* value of < 0.05 was considered to be statistically significant.

Results

The ages of the patients ranged between 27 and 73 years, and the mean 48.3 ± 14.0 age was years, whereas the ages of the control patients ranged between 25 and 60 years and the mean age was 44.8 ± 9.0 years.

No statistically significant difference was found between the patient and the control groups in terms of the mean ages and gender (f/m, 23/10 vs 14/6, $P > 0.05$, respectively).

Education levels of patients with asthma was slightly lower than the control groups (1.7 ± 0.6 vs 2.1 ± 0.5 , $P = 0.04$, respectively).

Patients with asthma compared with the controls have significantly higher the rate of clinical elevation on depression, hysteria, psychasthenia and social introversion (Table 1).

In addition, patients with asthma compared with the controls have significantly higher absolute scores on depression (Table 1).

Patients with recent-onset asthma compared with long-standing asthma have similar mean age (46.9 ± 14.3 vs 49.8 ± 13.9 , $P = 0.5$, respectively) and similar gender distribution (n:7/10;41.2% vs n:3/13;18.8% $P = 0.1$, respectively).

Patients with recent-onset asthma compared with long-standing asthma have significantly higher the rate of clinical elevation on depression, hysteria, psychopathic deviate, psychasthenia and social introversion (Table 2).

Patients with recent-onset asthma compared with long-standing asthma have significantly higher absolute scores on depression, hysteria, hypochondriasis, psychasthenia and social introversion (Table 2).

Patients with recent-onset asthma compared with long-standing asthma have significantly higher values on FEV₁ as percentage predicted (93.0 ± 16.5 vs 77.4 ± 15.9 , $P = 0.01$, respectively) and liter (2.7 ± 0.6 vs 1.8 ± 0.5 , $P = 0.001$, respectively).

Table 2. Means (standard deviation) and percentage of sample elevated ($t > 65$) for MMPI clinical scales in patients with long standing and recent-onset asthma

MMPI clinical scale	Patients with long-Standing Asthma (duration ≥ 10 years; $n = 16$)		Patients with recent-onset asthma (duration < 10 years; $n = 17$)		P values*
	Mean \pm standard deviation	% Elevated	Mean \pm standard deviation	% Elevated	
Hypochondriasis†	46.3 \pm 10.2	12.5	57.2 \pm 22.6	41.2	0.06
Depression‡	48.6 \pm 6.3	0	65.0 \pm 10.0	52.9	0.001
Hysteria§	42.0 \pm 16.8	6.3	59.6 \pm 21.1	52.9	0.004
Psychopathic deviate	45.4 \pm 7.2	0	51.7 \pm 18.1	29.4	0.01
Masculinity/femininity	55.1 \pm 8.2	6.3	55.1 \pm 9.6	11.8	0.5
Paranoia	52.5 \pm 11.0	18.8	53.2 \pm 22.0	35.3	0.2
Psychasthenia¶	46.1 \pm 11.4	0	61.7 \pm 14.9	47.1	0.002
Schizophrenia	46.9 \pm 9.3	0	52.2 \pm 10.4	11.8	0.1
Hypomania	51.8 \pm 6.8	0	50.1 \pm 18.1	17.6	0.07
Social introversion**	49.9 \pm 8.4	6.3	60.0 \pm 11.6	47.1	0.009
MMPI mean t score	48.5 \pm 5.2		56.6 \pm 13.9		0.03

Bold numerals, statistically significant.

*Comparison of percentage of sample elevated ($t > 65$) for MMPI clinical scales.

† $P = 0.04$.

‡ $P = 0.001$.

§ $P = 0.002$.

¶ $P = 0.001$.

** $P = 0.003$.

MMPI mean t score in patients with recent-onset asthma compared with long-standing asthma was higher (Table 2).

Symptom duration in patients with asthma was negatively associated with the MMPI mean t score in multivariate model (Table 3). However, there was not relation between the MMPI mean t score and sex, age, education, FEV1%.

Discussion

Present study indicated that patients with asthma compared to control group had significantly higher the rate of clinical elevation on depression, hysteria, psychasthenia and social introversion. Accordingly, patients with asthma have more inactivity, anergia, guilt, pessi-

mism, non-specific physical complaints, irrational fears and introvert. In a study conducted in Turkey, as different than ours, asthma patients compared with the healthy controls had more personality disorders (PDs), avoidant and obsessive-compulsive PDs being as the most common. In addition, there was not any statistical differences between the asthma patients with PDs and severity of disease (17). Many factors including patient selection, disease severity, inclusion and exclusion criteria could be responsible for this disparity.

As a striking finding in our study, patients with recent-onset asthma compared with long-standing asthma had significantly higher the rate of clinical elevation on depression, hysteria, psychopathic deviate, psychasthenia and social introversion. Moreover, psychological distress measured by the MMPI mean t score in patients with recent-onset asthma was higher than patients with long-standing asthma. Furthermore, in multivariate model, an important association between psychological distress and asthma duration provides additional evidence for the proposed relation. Accordingly, patients with long-standing asthma may have the better coping behaviour with the disease. Therefore, psychological distress of patients with asthma may be reduced when they learned to live with and adapt to the symptoms of their illness. People newly diagnosed with a chronic illness may have more psychological distress with their own emotional reactions than the illness itself until they go through

Table 3. The predictors of psychopathology in patients with asthma in multivariate model

	MMPI mean t score		R2
	Beta	P value	
	18%		
Intercept		0.0001	
Sex	-0.03	0.8	
Age	-0.004	0.9	
Education level	0.22	0.2	
FEV1%	0.26	0.1	
Symptom duration	-0.42	0.02	

Bold numeral, statistically significant.

an adaptation process and accept the new person they have become through the illness (18). Studies investigating the relationship between disease duration with the personality characteristics of patients with asthma showed conflicting results. In contrast to our study, in moderately asthmatic men, those with a longer duration of disease had significantly higher levels of depressive symptomatology and social introversion on MMPI scale than controls and those with shorter disease durations (19). In another study, in patients with asthma, those with a longer duration of disease had significantly higher levels of hysteria and hypochondriasis scores on MMPI scale than those with shorter disease durations (20).

In present study, patients with recent-onset asthma compared with long-standing asthma had significantly higher values on FEV1. On the other hand, studies investigating the relationship between disease severity with the psychological characteristics of patients with asthma revealed interesting results. A study in 36 outpatient asthmatics (12 females; age range: 18–52 year) indicated that moderate/severe asthmatic patients had more hypochondriasis traits than mild or moderate patients, thus, showing the worst coping behaviour with the disease (21). An study in patients who had suffered life threatening episodes of asthma indicated that there were no differences in psychiatric morbidity when compared with a control group of asthmatic patients (22). Twenty patients with “brittle” asthma had greater psychiatric disorder than those with less severe asthma, but that their personality profiles (according to the Eysenck Personality Inventory) are similar (23). In a study in the Netherlands, patients with prednisone-dependent asthma had more anxiety and depression symptoms as compared to patients with severe non-prednisone dependent or mild-moderate asthma. In addition, there were no differences in personality traits (neuroticism, extraversion, openness, agreeableness, conscientiousness) between the three groups (24). Differences in our study may be a result of acceptance sense in the religious belief in our society. It can be difficult to interpret the different results of different studies. Unlike the literature, in our study, patients with long-standing asthma have more severe disease but less psychological distress. We thought that patients with long-term disease becomes more accepting due to the religious beliefs of our society’s and therefore they encounter less with psychological problems due to illness.

There was some limitation in this study. The major criticism about the study is the small sample size. However, our results reached statistical significant. Another limitation, we did not examine economic status of the subjects. However, we studied education sta-

tus of all subjects. Generally, socio-economic situation parallels with the education in society. Besides, education levels of patients with asthma was lower than the control groups. However, symptom duration in patients with asthma was negatively associated with the MMPI mean *t* score in multivariate model independently from education level. Furthermore, We were unable to provide information about asthma control levels. We determined the severity of asthma according to the PFT values. However, no patient had to be exacerbation during this period. All patients were included to this study in stable period.

In conclusion, patients with asthma had relatively greater psychopathology than healthy controls, associated with depressed mood, low self-esteem, non-specific physical complaints, irrational fears and introvert. Patients with long-standing asthma have less psychological distress, suggesting that they use positive coping styles. Further studies in larger samples are needed to explain personality traits in patients with asthma.

References

- Centanni S, Di Marco F, Castagna F, Boveri B, Casanova F, Piazzini A. Psychological issues in the treatment of asthmatic patients. *Respir Med.* 2000;94: 742–9.
- Brown ES, Khan DA, Mahadi S. Psychiatric diagnoses in inner city outpatients with moderate to severe asthma. *Int J Psychiatry Med.* 2000;30: 319–27.
- Nejtek VA, Brown ES, Khan DA, Moore JJ, Van Wagner J, Perantie DC. Prevalence of mood disorders and relationship to asthma severity in patients at an inner-city asthma clinic. *Ann Allergy Asthma Immunol.* 2001;87: 129–33.
- Ten Brinke A, Ouwerkerk ME, Bel EH, Spinhoven P. Similar psychological characteristics in mild and severe asthma. *J Psychosom Res.* 2001;50: 7–10.
- Van Scott MR, Reece SP, Olmstead S, Wardle RR. Effects of acute psychosocial stress in a nonhuman primate model of allergic asthma. *J Am Assoc Lab Anim Sci.* 2013;52: 157–64.
- Ritz T, Steptoe A, DeWilde S, Costa M. Emotions and stress increase respiratory resistance in asthma. *Psychosom Med.* 2000;62: 401–12.
- Haczku A, Panettieri RA. Social stress and asthma: the role of corticosteroid insensitivity. *J Allergy Clin Immunol.* 2010;125: 550–8.
- Rubin NJ. Severe asthma and depression. *Arch Fam Med.* 1993;2: 433–40.
- Ten Brinke A, Ouwerkerk ME, Zwinderman AH, Spinhoven P, Bel EH. Psychopathology in patients with severe asthma is associated with increased health care utilization. *Am J Respir Crit Care Med.* 2001;163: 1093–6.
- Dyer CAE, Hill SL, Stockley RA, Sinclair AJ. Quality of life in elderly subjects with a diagnostic label of asthma from general practice registers. *Eur Respir J.* 1999;14: 39–45.

11. Rimington LD, Davies DH, Lowe D, Pearson MG. Relationship anxiety, depression, and morbidity in adult asthma patients. *Thorax*. 2001;56: 266–71.
12. American Thoracic Society. Standards for diagnosis and care of patients with chronic obstructive pulmonary diseases (COPD) and asthma. *Am Rev Respir Dis*. 1987; 136: 225–44.
13. American Thoracic Society. Standardization of spirometry, 1994 update. *Am J Respir Crit Care Med*. 1994;152: 1107–36.
14. Quanjer PH, Tammeling GJK, Cotes JE, Pederson OF, Peslin R, Yernault JS. Lung volumes and forced ventilatory flows. *Eur Respir J*. 1993;
15. Savaşır I. *Minnesota Çok Yönlü Kişilik Envanteri-Elkitabı (Türk Standardizasyonu)*. Ankara, Sevinç Matbaası, 1981.
16. Erol N. *Ülkemizde psikiyatrik hastalarda Minnesota Çok Yönlü Kişilik Envanterinin geçerlik araştırması*. Doktora Tezi. AÜ. DTCF Psikoloji Kürsüsü, 1982.
17. Yılmaz A, Cumurcu BE, Etikan I, Hasbek E, Doruk S. The effect of personality disorders on asthma severity and quality of life. *Iran J Allergy Asthma Immunol*. 2014;13: 47–54.
18. Lewis KS. Emotional adjustment to a chronic illness. *Lippincott's Prim Care Pract*. 1998;2: 38–51.
19. Tovt-Korshynska MI, Dew MA, Chohey IV, Spivak MY, Lemko IS. Gender differences in psychological distress in adults with asthma. *J Psychosom Res*. 2001;51: 629–37.
20. Jones NF, Kinsman RA, Schum R, Resnikoff P. Personality profiles in asthma. *J Clin Psychol*. 1976;32: 285–91.
21. Chetta A, Gerra G, Foresi A, et al. Personality profiles and breathlessness perception in outpatients with different gradings of asthma. *Am J Respir Crit Care Med*. 1998; 157: 116–22.
22. Yellowlees PM, Haynes S, Potts N, Ruffin RE. Psychiatric morbidity in patients with life-threatening asthma: initial report of a controlled study. *Med J Aust*. 1998; 149: 246–9.
23. Garden GM, Ayres JG. Psychiatric and social aspects of brittle asthma. *Thorax*. 1993;48: 501–5.
24. Amelink M, Hashimoto S, Spinhoven P, et al. Anxiety, depression and personality traits in severe, prednisone-dependent asthma. *Respir Med*. 2014;108: 438–44.