

Temperament and stress coping styles in bronchial asthma patients

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Abstract

Introduction: Temperament, defined as the formal characteristics of behavior, is a personality trait which can influence the clinical presentation and course of bronchial asthma. It determines susceptibility to stress as well as stress coping styles.

Aim: The aim of the study was to assess whether healthy subjects differ from bronchial asthma patients with regard to temperamental variables and stress coping styles, and whether these factors may also differentiate patients with severe asthma from those with the milder form. The study also assesses whether the results of flow volume curve analysis correlate with temperamental traits and stress coping styles.

Material and methods: The study was conducted in a group of 65 asthma patients and 62 healthy controls. All underwent flow volume curve examination and psychological tests: Formal Characteristics of Behavior – Temperament Inventory (FCB-TI) and Coping in Stress Situations (CISS) questionnaire.

Results: Bronchial asthma patients were characterized by a lower level of briskness (“agility”) than healthy subjects (13.35 ± 4.48 vs. 14.97 ± 3.98 , $p = 0.031$). The remaining temperamental traits and stress coping styles did not differ between the groups. Additionally, the forced expiratory volume in 1 s (FEV_1) value was found to correlate negatively with the intensity of the emotion-oriented stress coping style, whereas FEV_1 and forced vital capacity (FVC) were found to positively correlate with briskness, emotional reactivity and endurance, while a negative correlation was found with activity.

Conclusions: Briskness differentiates healthy subjects from bronchial asthma patients. The values obtained in FEV_1 and FVC pulmonary function tests were also found to correlate with some temperamental variables.

Key words: asthma, temperament, stress coping.

Introduction

Strelau and Zawadzki define temperament as the formal characteristics of behavior, or “how the subject does things”, in contrast to other dimensions of personality describing aspects associated with the relationship between the subjects and themselves, other people and the world [1, 2]. Temperament, according to Strelau, has six factors: briskness, perseverance, sensory sensitivity, emotional reactivity, endurance, and activity. These six dimensions of temperament have been identified by

factor analysis. The terms describing the above factors correspond approximately to their colloquial meanings.

In contrast to other models of temperament which approximate more closely the personality concepts presented by Eysenck, Cloninger and Zukerman [1, 2], the concept defined by Strelau and Zawadzki is markedly associated with the physiological excitability of the nervous system. In this sense, temperament is a personality component dependent on biologically determined properties of the central nervous system and manifests

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itself even in young children and animals [1, 2]. Genetic factors are important in the formation of temperament. The studies of correlations between the temperament and somatic diseases indicate that depressiveness, hostility, emotional reactivity are risk factors for the development of ischemic heart disease or a tumor of the lungs [1, 2]. Temperament has also been found to play a role as a stress moderator in the development of negative consequences of extreme stress, including posttraumatic stress disorder (PTSD) [3, 4]. Other studies have also addressed the associations between temperamental factors and the progression of symptoms in Alzheimer's disease [2], risk of developing affective disorders [5], personality disorders [2] and quality of life in the course of schizophrenia [6]. Assuming that Eysenck's concept of personality is the concept of temperament, even more research works concerning the role of temperamental factors in the pathogenesis and clinical presentation of various somatic diseases and mental disorders have been performed [1, 2].

Bronchial asthma is a chronic inflammatory disease of the respiratory tract which is often secondary to allergic inflammation, but not in all cases [7]. Paroxysmal, reversible bronchospasms induced by the effects of numerous mediators secreted by allergic inflammatory cells on the bronchial smooth muscle are characteristic of the course of asthma [8]. The bronchospasm and the associated attack of dyspnea, often perceived as life threatening, are potent stressors which significantly affect the quality of life.

On the other hand, strong subjective feelings of stress induced by any factors unrelated to the disease are known to potentially induce severe dyspnea in bronchial asthma patients [9]. One of the mechanisms of dyspnea induction in asthma patients exposed to stressful factors is hyperventilation, which, together with the overlapping bronchial hyperreactivity typical of the pathophysiology of asthma, causes severe bronchospasm and a paroxysm of dyspnea. It is a vicious circle, in which the disease is a source of severe and chronic stress, and vice versa: the stress is a factor inducing the symptoms of the disease. Hence, asthma is a disease with marked psychosomatic determinants despite unequivocally inflammatory pathogenesis [10]. As a moderator of the individual's susceptibility to stress, temperament, may, at least in theory, influence the clinical presentation and the course of bronchial asthma [1, 2]. Therefore, it seems to be interesting whether there are correlations between temperament, stress coping styles and severity of bronchial asthma and the level of control of the disease. Although such research has been conducted based on Cloninger's model of temperament, the concept of temperament very popular in Western Europe [11], no studies discuss the role of the six temperamental factors distinguished by Strelau and Zawadzki in the clinical presentation of bronchial asthma. Temperament exerts a significant in-

fluence on the styles of coping with stress. Three basic stress coping styles have been distinguished by factor analysis: task-oriented coping, emotion-oriented coping and avoidance-oriented coping. The latter in turn, can be further divided into two subcategories: distraction, i.e. seeking alternative activities to avoid confrontation with the stressful situation, and social diversion i.e. engaging in social activities to seek help and support.

Aim

The aim of the study was to assess whether healthy subjects differ from bronchial asthma patients in temperamental traits and stress coping styles, and whether these factors differentiate patients with severe asthma from those with milder forms of the disease.

Material and methods

The study was carried out on a group of 65 bronchial asthma patients, randomly selected from a population of 220, treated in the Norbert Barlicki Memorial University Teaching Hospital No. 1, Outpatient Department of Allergology and Lung Diseases, Medical University of Lodz. The exclusion criteria included diagnosed diabetes, disorders of the thyroid gland, malignancies, chronic obstructive pulmonary disease, autoimmune disorders, renal insufficiency, unstable angina pectoris, NYHA class III and IV heart failure, or any other severe systemic disease. Similarly, a lack of consent to participate in the study or to undergo psychological tests, impossibility to perform pulmonary function tests (flow volume loop), or the presence of infectious exacerbation at the time of the study were grounds for exclusion. A questionnaire designed by the authors was used to select patients for the study and to obtain demographic data.

The severity of bronchial asthma and the level of control of the disease was assessed according to international standards (GINA) [12]. The Formal Characteristics of Behavior – Temperament Inventory (FCB-TI) was used to assess the temperament [13]. Stress coping styles were investigated by means of the Coping in Stress Situations (CISS) questionnaire [14]. All the patients underwent standard flow volume loop examination (spirometry).

Of the 65 patients, 43 demonstrated mild or moderate bronchial asthma, and 22 severe. Women accounted for 65% of the patient group. Due to the large size of the patient group, bronchial asthma patients were divided into two groups to allow reliable statistical analysis: one comprising patients with severe and the other with non-severe disease. The control group consisted of 62 age-matched healthy subjects without any signs of bronchial asthma with a similar gender profile. The mean age was 45.9 ± 16.1 in the control group and 49.2 ± 17.0 in the group of asthma patients. No statistically significant difference was observed between these results.

The study was approved by the Medical University of Lodz Bioethics Committee (approval document No. RNN/133/09/KE as amended).

Statistical analysis

Means, variances and standard deviations and correlation coefficients were calculated for the analyzed variables. A licensed StatSoft package, purchased by the Medical University of Lodz, was used for the calculations.

Results

Among the six temperamental factors studied, only briskness was found to have a lower level in bronchial asthma patients than in healthy controls (Table 1). Briskness is understood as a tendency to react quickly, maintain high pace of activities, and adapt easily one's reactions (behavior) in response to changes of environmental conditions [1, 2]. No other differences were observed between the groups, and stress coping styles were not found to differ between the group of bronchial asthma patients and the controls (Table 2).

In the asthma group, no difference was found between severe and non-severe asthma patients with regard to the mean values of results obtained for both the temperamental factors and for the stress coping styles (Tables 3 and 4). Interestingly, the forced expiratory volume in 1 s (FEV_1) was found to correlate negatively with the intensity (prevalence) of emotion-oriented coping style (Table 5). The value of forced vital capacity forced vital capacity (FVC) also correlated negatively with emotion-oriented coping, avoidance-oriented coping, distraction and social diversion. Forced expiratory volume in 1 s and FVC of the lungs were found to correlate positively with briskness, emotional reactivity and endurance, but negatively with activity (Table 6).

Discussion

The most important conclusion to be drawn from our research is that the level of briskness in bronchial asthma patients is lower than in healthy controls. A question arises whether the low level of briskness results from long-term illness, or whether it is a constitutional risk factor for the development of bronchial asthma. Although our research does not answer this question, both options appear probable. Genetic factors play a considerable role both in the development of bronchial asthma [15] (susceptibility to atopy and allergy) and in the formation of temperamental traits, which are components of personality manifested as the behavior of the child from birth [2, 16]. Of all the personality traits, temperament is the component of the personality structure which is inherited to the greatest extent [2].

The suppression of briskness may also be a reaction to a chronic disease such as asthma, which considerably impairs the subject's "agility". Briskness is understood as a tendency to react quickly, maintain a high pace of activities, and for these reactions (behavior) to be adapted in response to changes of environmental conditions [1, 2]. Asthma, as a chronic disease, may reduce the rate of changes in behavior in the context of changing environmental conditions. A sudden paroxysm of dyspnea in the course of bronchial asthma requires a change in the behavior strategy and forces the subject to seek assistance.

Other temperamental factors, as well as stress coping styles, do not differ between healthy subjects and asthma patients. Similarly, no differences between severe and non-severe asthma patients have been demonstrated, implying that neither stress coping styles nor formal characteristics of behavior (except for briskness) differ significantly between patients and healthy controls. Therefore, the remaining components of temperament and responses to stress do not differentiate

Table 1. Analysis of differences in temperamental traits according to the Regulatory Theory of Temperament between healthy subjects and patients with bronchial asthma ($*p < 0.05$)

Variable	Asthma patients (N = 65)		Healthy subjects (N = 62)		Student's <i>t</i> -test
	Mean	Standard deviation	Mean	Standard deviation	
Briskness	13.35	4.48	14.97	3.89	t(126) = 2.18; <i>p</i> = 0.031*
Perseverance	11.84	3.91	12.47	4.39	t(126) = 0.857; <i>p</i> = 0.393
Sensory sensitivity	14.16	3.41	14.44	3.10	t(126) = 0.484; <i>p</i> = 0.630
Emotional reactivity	11.24	4.40	11.03	5.10	t(126) = 0.251; <i>p</i> = 0.803
Endurance	7.24	4.96	8.44	5.25	t(126) = 1.325; <i>p</i> = 0.187
Activity	8.31	4.17	8.95	4.86	t(126) = 0.807; <i>p</i> = 0.421

Table 2. Analysis of differences in stress coping styles between healthy subjects and patients with bronchial asthma

Variable	Asthma patients (N = 65)		Healthy subjects (N = 62)		Student's t-test
	Mean	Standard deviation	Mean	Standard deviation	
Task-oriented coping	58.63	8.65	57.40	6.98	t(125) = 0.883; p = 0.379
Emotion-oriented coping	45.23	9.62	44.71	11.09	t(126) = 0.279; p = 0.781
Avoidance-oriented coping	46.45	9.64	45.86	9.31	t(126) = 0.351; p = 0.726
Distraction	20.45	6.14	20.62	5.46	t(126) = 0.165; p = 0.869
Social diversion	17.56	3.52	17.11	3.59	t(126) = 0.728; p = 0.468

Table 3. Analysis of differences in stress coping styles between groups differentiated on the basis of asthma severity assessment

Variable	Severe asthma (N = 22)		Non-severe asthma (N = 43)		Student's t-test
	Mean	Standard deviation	Mean	Standard deviation	
Task-oriented coping	59.32	9.19	58.58	8.44	t(63) = 0.323; p = 0.748
Emotion-oriented coping	45.91	4.01	45.23	7.84	t(63) = 0.226; p = 0.823
Avoidance-oriented coping	45.77	10.95	47.09	12.88	t(63) = 0.522; p = 0.604
Distraction	19.50	12.88	20.91	10.95	t(63) = 0.882; p = 0.381
Social diversion	17.23	5.99	17.98	6.28	t(63) = 0.784; p = 0.436

Table 4. Analysis of differences in temperamental traits according to the Regulatory Theory of Temperament between groups differentiated on the basis of asthma severity assessment

Variable	Severe asthma (N = 22)		Non-severe asthma (N = 43)		Student's t-test
	Mean	Standard deviation	Mean	Standard deviation	
Briskness	12.90	4.79	13.60	4.14	t(62) = 0.592; p = 0.556
Perseverance	10.90	3.71	12.30	3.58	t(62) = 1.310; p = 0.195
Sensory sensitivity	13.57	3.88	14.14	4.40	t(62) = 0.580; p = 0.564
Emotional reactivity	10.48	4.75	11.56	5.01	t(62) = 0.899; p = 0.372
Endurance	6.90	5.29	7.56	3.90	t(62) = 0.481; p = 0.632
Activity	7.05	4.60	9.07	4.26	t(62) = 1.835; p = 0.071

healthy subjects from asthma patients. Our research is the first attempt to assess the influence of temperament, understood as the formal characteristics of behavior, on bronchial asthma. Such studies have previously been conducted using Cloninger's model of temperament [11].

The interpretation of the relationship between FEV₁ and FVC values and temperamental factors is relatively easy. Higher FEV₁ and FVC values correlate with a better clinical condition. Consequently, such patients are brisker, more reactive emotionally and enduring. The fact that a poorer clinical

Table 5. Analysis of correlations between the flow volume curve parameters and stress coping styles

Parameter		TOC	EOC	AOC	D	SD
FEV ₁	Rho Spearman	0.119	-0.211*	-0.160	-0.173	-0.123
	P-value	0.181	0.017	0.072	0.051	0.165
	N	127	128	128	128	128
FEV ₁ %	Rho Spearman	-0.131	-0.115	-0.063	-0.068	0.007
	P-value	0.143	0.197	0.478	0.448	0.938
	N	127	128	128	128	128
FVC	Rho Spearman	0.167	-0.255*	-0.209*	-0.222*	-0.199*
	P-value	0.060	0.004	0.018	0.012	0.024
	N	127	128	128	128	128
FVC %	Rho Spearman	-0.136	-0.120	-0.066	-0.106	0.024
	P-value	0.126	0.178	0.461	0.233	0.784
	N	127	128	128	128	128

* $p < 0.05$, FEV₁ – forced expiratory volume in 1 s expressed in liters, FEV₁ % – percentage of the normal value of forced expiratory volume, FVC – forced vital capacity of the lungs, FVC % – percentage of the normal forced vital capacity value achieved by the patient, TOC – task-oriented coping, EOC – emotion-oriented coping, AOC – avoidance-oriented coping, D – distraction, SD – social diversion.

Table 6. Analysis of correlations between the flow volume curve parameters and temperamental traits according to Strelau and Zawadzki's Regulatory Theory of Temperament

Parameter		BR	PE	SS	ER	EN	AC
FEV ₁	Rho Spearman	0.370*	0.072	0.081	0.319*	0.246*	-0.220*
	P-value	< 0.001	0.420	0.367	< 0.001	0.005	0.013
	N	127	127	127	127	127	127
FEV ₁ %	Rho Spearman	0.105	0.111	0.027	0.122	0.012	0.047
	P-value	0.241	0.216	0.765	0.171	0.896	0.602
	N	127	127	127	127	127	127
FVC	Rho Spearman	0.419*	-0.036	0.079	0.375*	0.255*	-0.327*
	P-value	< 0.001	0.692	0.377	< 0.001	0.004	< 0.001
	N	127	127	127	127	127	127
FVC %	Rho Spearman	0.141	0.083	0.063	0.116	0.019	0.041
	P-value	0.114	0.353	0.481	0.196	0.834	0.643
	N	127	127	127	127	127	127

* $p < 0.05$, FEV₁ – forced expiratory volume in 1 s expressed in liters, FEV₁ % – percentage of the normal value of forced expiratory volume, FVC – forced vital capacity of the lungs, FVC % – percentage of the normal forced vital capacity value achieved by the patient, BR – briskness, PE – perseverance, SS – sensory sensitivity, ER – emotional reactivity, EN – endurance, AC – activity.

cal condition triggers modes of active coping with a difficult situation may account for the negative correlation observed with activity. The correlation between clinical condition (FEV₁ and FVC values) and stress coping style is quite comprehensible: lower FVC scores, corresponding to a worse clinical condition as perceived from a longer time perspective, are associated with a greater tendency for the patient to be focused on avoidance, distraction and social diversion: i.e. to seek support and assistance.

The size of the group was too small for variations in sex to be used as objects of analysis. The FCB-TI test is

a normalized test. In the process of its normalization, the changes in gender were taken into account when testing the norms.

In our opinion, the psychological interpretation of these correlations demands that more in-depth research of the mental aspects of bronchial asthma be performed. The results obtained in our study should be treated as preliminary data. To more clearly elucidate the observed correlations, further research should encompass a population of the order of 1000 subjects and include a statistical analysis of the pathways.

Conclusions

Briskness differentiates healthy subjects from bronchial asthma patients. The remaining temperamental traits and stress coping styles do not differ between the groups. There are no differences in temperamental factors and stress coping styles between patients with severe asthma and those with milder forms of the disease. There is a negative correlation between the FEV value and the intensity of emotion-oriented stress coping style. Forced expiratory volume in 1 s and FVC correlate positively with briskness, emotional reactivity and endurance, but negatively with activity.

Conflict of interest

The authors declare no conflict of interest.

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