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Original Article

Affective temperament profile in ankylosing spondylitis patients using TEMPS-A

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Abstract. [Purpose] This study aimed to compare the most common dominant affective temperaments in Ankylosing Spondylitis patients and investigate the relationship between the dominant affective temperaments and pain levels, disease activity, quality of life, current depression, and anxiety level in Ankylosing Spondylitis patients. [Subjects and Methods] Fifty-one patients diagnosed with axial spondiloartropathy and forty-two age- and gender-matched control subjects were included in this study. Disease duration, erythrocyte sedimentation rate, serum C-reactive protein, pain by the Visual Analog Scale, disease activity by the Bath Ankylosing Spondylitis Disease Activity Index, functional status by the Bath Ankylosing Spondylitis Functional Index; psychological status by the Beck Depression Inventory, Beck Anxiety Inventory and overall health assessment by the Ankylosing Spondylitis Quality of Life Scale were assessed in patients. The Turkish version of the Temperament Evaluation of Memphis, Pisa, Paris and San Diego Auto Questionnaire was used to determine the dominant affective temperament. [Results] There was no statistical difference in the distribution of temperament subtypes between patients with Ankylosing Spondylitis and the controls. Depressive, anxious, and cyclothymic temperament scores were higher in patients with high values on the Bath Ankylosing Spondylitis Functional Index and Visual Analog Scale. There was a correlation between anxious subtypes of affective temperament scores and the value of Ankylosing Spondylitis Quality of Life Scale. Correlation analysis also found depressive, cyclothymic, irritable, and anxious temperament and psychiatric symptoms to be significantly related. [Conclusion] Affective temperament may contribute to symptoms of depression and anxiety in patients with Ankylosing Spondylitis and may increase disease activity and may reduce their quality of life.
Key words: Ankylosing spondylitis, Affective temperament, Disease activity

INTRODUCTION

Ankylosing spondylitis (AS) is a chronic, progressive disease, manifesting with inflammation of the sacroiliac joints and entheses. This disease may lead to structural and functional disorders[1] and may be a significant cause of sleep disorders and reduced quality of life and ability to work[2, 3], with consequent negative effects on family and social relationships[4, 5]. The prevalence of psychiatric symptoms has been found to be higher in AS patients than in the general population; the most common psychological symptoms are depression and anxiety[6]. Depression and anxiety form the infrastructure of temperament. The concept of temperament is related throughout the lifetime of a relatively stable individual to the emotions, cognitive

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functions, and behaviors experienced in the home at a young age[7].

Akiskal, who developed the modern concept of affective temperament, suggested that affective temperament had the potential risk of behavioral disorder[8]. Five dominant affective temperaments have been defined: depressive, hyperthymic, cyclothymic, irritable, and anxious. Depression and anxiety may be subtypes of temperament or may develop as comorbidities of AS disease. In recent years, the relationship between chronic auto-inflammatory and auto-immune diseases and the temperament of patients has attracted the attention of researchers[9–12]. The psychiatric status of the patient can affect the disease process, prognosis and even treatment results[13]. Therefore, the investigation and treatment of affective temperament in AS patients may not only reduce patient concerns and problems, but may also provide alternative approaches to treatment and should be taken into consideration when planning treatment for these patients[14]. To date, there has been no controlled study evaluating affective temperament in AS patients and examining the relationship between existing depression and/or anxiety and dominant affective temperament.

In this study, we aimed to determine and compare the most common dominant affective temperaments in AS patients and in a healthy control group using the Temperament Evaluation of Memphis, Pisa, Paris and San Diego Auto Questionnaire (TEMPS-A) and to examine the relationship in AS patients between existing depression and anxiety levels and levels of pain, disease activity, and quality of life and the dominant affective temperament.

SUBJECTS AND METHODS

Fifty-one patients diagnosed with axial spondiloartropathy (SpA) and forty-two age- and gender-matched control subjects were included in this study. The radiographic arm of the Assessment of Spondyloarthritis International Society (ASAS) identification was used for identification of axial SpA.

Baseline assessments were completed by trained investigators using identical questionnaires that included demographic information (age, gender, and education), disease duration, medications (non-steroidal anti-inflammatory drugs (NSAIDs), anti-tumor necrosis factor (TNF)), serum C-reactive protein level (CRP), erythrocyte sedimentation rate (ESR), pain by visual analog scale (VAS), and measurements for disease activity, functional status, psychological status, health assessment, and affective temperament.

Patients with any kind of collagen tissue disorders or any other inflammatory diseases, malignancies, diseases of the central nervous system, chronic kidney disease, chronic liver disease and thyroid diseases besides the AS were excluded. Patients who were being treated for a psychiatric disorder or who had a lifetime history of psychiatric disorder, patients with mental retardation, and patients who had diseases of the brain or central nervous system, fibromyalgia, diabetes mellitus, hypertension, or were pregnant were also excluded.

All assessments were made by the same physician and standardized case report forms were filled out. For all patients, written informed consent was obtained, and the protocol of the study was approved by the local Ethics Committee of Namık Kemal University (No: 2014/116).

Disease activity and functional status; The Bath Ankylosing Spondylitis Disease Activity Index (BASDAI) is an index used to determine the activity of AS. The index includes six questions about the levels of neck, back, lower back, and hip pain, fatigue, pain and swelling at peripheral joints, tenderness with palpation at several areas of the body, and morning stiffness, including its duration. The mean value of the last two questions is calculated together and the mean value of the resulting five items is then obtained. A value≥4 is accepted as an indication of active disease[15].

The Bath Ankylosing Spondylitis Functional Index (BASFI) was used to assess patient function. This scale is based on 10 questions about daily functioning, each scored on a 10-cm visual analogue scale (VAS), reflecting status over the past month. The score is generated as the mean of the 10 scales, with '10' denoting worst possible functional status. The Moroccan version of this scale has been assessed for its validity and reliability[16]. The reliability and validity of the Turkish version of BASDAI and BASFI have already been demonstrated[17, 18].

Pain; In the VAS, the two extremes of the parameter being assessed are written at the edges of a 100-mm line, and the patient is asked to draw a line to or put a mark at the place that would indicate his or her status. For pain, "no pain" is written at one edge and "very severe pain" at the other edge. The distance from the point of "no pain" to the patient's mark defines his or her pain level. The mean value of all results has been used for the evaluation. This test has proven itself over a long period of time and is widely accepted in the literature. It is reliable and easy to apply[19].

Psychological status; Affective temperament, The Turkish version of the TEMPS-A scale was used to determine the dominant affective temperament of the subjects. Volunteers were asked to complete the TEMPS-A. The validity and reliability of TEMPS-A has been proven in many languages, including in Turkish by Vahip et al[20]. The Turkish version of the scale consists of 99 items. It requires 15–45 min to complete the scale. This scale is a self-report instrument consisting of five subscales. Its 99 constituent items inquire about the subject's life-long traits along depressive, cyclothymic, hyperthymic, irritable, and anxious lines. Individuals answer 'yes' or 'no' when considering their life experience. Cutoff scores to determine the dominant temperament are 13 for depressive mood (18 items), 18 for cyclothymic (19 items), 20 for hyperthymic (20 items), 13 for irritable (18 items), and 18 for anxious (24 items). It is possible to have more than one dominant affective temperament[8, 20, 21].

The Beck Depression Inventory (BDI) is a self-report inventory that measures the severity of depression[22]. The BDI

includes 21 items scored between 0 and 3. The Turkish version was validated by Hisli[23]. The Beck Anxiety Inventory (BAI) is a self-report inventory consisting of 21 items scored between 0 and 3 that measures the frequency of physiological and other symptoms of anxiety experienced during the previous week[24]. The Turkish version was validated by Ulusoy[25].

Measure of the quality of life; Disease-related quality of life was measured using the Ankylosing Spondylitis Quality of Life (ASQoL) scale[26]. The reliability and validity of the Turkish version of this questionnaire was determined by Duruöz et al[27]. This questionnaire consists of 18 items with dichotomous responses (yes/no) and is reliable and valid for measuring the health-related quality of life in patients with AS. ASQoL has a total score ranging from 0 to 18, with lower scores representing better AS-specific quality of life

Measures of laboratory variables; The erythrocyte sedimentation rate (ESR) was measured using the Wintergreen method (mm/h), and serum C-reactive protein (CRP) level was measured by nephelometry (mg/dl).

Statistical analyses; SPSS for Windows version 17.0 software was used for the statistical analyses of our study data. Mean standard deviation (SD) was used to identify the data related to the continuous variables, and number was used to identify the data related to the categorical variables. The Kolmogorov-Smirnov normalizing test was used to determine whether the continuous variable data fit a normal distribution. The comparison of the variables with normal distribution was carried using an unpaired t-test, and the comparison of the variables without normal distribution was carried out using the Mann-Whitney U-test. The comparison of categorical variables was done using Pearson's χ^2 test, and the relation among continuous variables was studied using Spearman Rank Correlation Analysis. Multiple linear regression analysis was used to explain the relationship between one continuous dependent variable from two or more independent variables. $P<0.05$ was considered statistically significant.

RESULTS

The data from 51 patients with AS (32 female) and 42 healthy controls (32 female) were analyzed. Demographic characteristics and clinical and laboratory features of the patients are summarized in Table 1. BAI values were higher in the AS group compared to the control group.

TEMPS-A scores of the patients and controls are shown in Table 2. There was no significant difference in the distribution of temperament scores between the AS and control groups (Table 2).

No difference was observed in patients between temperament, BDI, and BAI levels according to the use of anti-TNF therapy (Table 3).

Table 1. Demographic, clinical and laboratory variables

Variables	AS (n=51) mean ± SD	Control (n=42) mean ± SD
Age (years)	38.7 ± 10.4	37.8 ± 4.6
Gender F/M	32/19	32/10
CRP	7.3 ± 8.9	
ESR	25 ± 20.8	
HLA-B27 seropositivity n; %	27/3; 81.8	
VAS (0–100 mm)	47 ± 26.4	
BASFI	3.1 ± 2.5	
BASDAI	4.0 ± 1.8	
ASQOL	7.0 ± 4.4	
BDI	10.2 ± 9.7	7.5 ± 5.9
BAI	12.3 ± 12.2*	5.3 ± 3.2
Duration of symptoms (years)	12.2 ± 7.7	
Duration of education (years)	9.5 ± 3.3	
NSAID use n; %	41, 81.4	
Anti-TNF use n; %	36, 70.6	

ESR: erythrocyte sedimentation rate; CRP: C-reactive protein; VAS: Visual Analog Scale; BASDAI: Bath Ankylosing Spondylitis Disease Activity Index; BASFI: Bath Ankylosing Spondylitis Functional Index; BDI: Beck Depression Inventory; BAI: Beck Anxiety Inventory; ASQoL: Ankylosing Spondylitis Quality of Life; NSAID: non-steroid anti-inflammatory drugs
*Significant difference from the baseline value (p<0.05)

Table 2. Distribution of temperament scores in the AS and control groups

Variables	AS (n=51) mean ± SD	Control (n=42) mean ± SD
Depressive	6.2 ± 3.9	6.9 ± 3.3
Cyclothymic	7.8 ± 5.0	6.9 ± 4.3
Hyperthymic	9.6 ± 4.3	9.2 ± 4.4
Irritable	3.9 ± 4.1	4.0 ± 4.1
Anxious	7.4 ± 6.7	6.0 ± 4.9

*Significant difference from the baseline value (p<0.05)

Table 3. Temperament scores of patients according to the use of anti-TNF therapy and comparison of the BDI and BAI scores

Variables	Anti-TNF treatment (n=36) mean ± SD	Anti-TNF non-treatment (n=15) mean ± SD
Depressive	6.1 ± 4.4	6.6 ± 2.6
Cyclothymic	7.7 ± 5.3	8.0 ± 4.3
Hyperthymic	9.5 ± 4.8	9.8 ± 3.2
Irritable	3.8 ± 4.4	4.0 ± 3.4
Anxious	7.6 ± 6.8	7.0 ± 6.9
BDI	9.9 ± 9.8	11.1 ± 9.8
BAI	12.7 ± 13.4	11.4 ± 8.2

BDI: Beck Depression Inventory; BAI: Beck Anxiety Inventory
*Significant difference from the baseline value (p<0.05)

Temperament scores and BDI, BAI values were compared with gender, duration of symptoms, education, and disease activity. Depressive, cyclothymic and anxious temperament scores along with the values of BDI and BAI were higher in females. The increase in anxious temperament scores and BAI values was statistically significant (Table 4).

Temperament, BDI, and BAI scores, age, duration of symptoms, duration of education, BASDAI, ASQOL, and correlations with VAS are summarized in Table 5.

There was a negative correlation between depressive and anxious temperament, BDI and BAI scores, and the duration of education. Positive correlation was only found between irritable temperament scores and duration of symptoms. There was a positive correlation between the BASDAI and the depressive and cyclothymic scores. There was no correlation between the BASDAI and BAI and BDI scores. There was a positive correlation between ASQoL and the anxious temperament, BDI, and BAI scores. Depressive, cyclothymic, and anxious temperaments and BAI and BDI scores were positively correlated with VAS.

Temperament, BASFI, BDI, and BAI scores have been found to have no correlation between HLA B27 seropositivity, sedimentation, and CRP values.

Depressive, cyclothymic, irritable, and anxious temperament scores were positively correlated with BAI and BDI (Table 6).

DISCUSSION

This study, in which the Turkish version of TEMPS-A was used, is the first study to evaluate affective temperament in Turkish AS patients. No statistically significant difference was determined between the AS patients and the control group with respect to the distribution of temperament subtypes. The depressive, cyclothymic, and anxious temperament scores were higher in females. Various previous studies have shown similar results in the gender distribution of the five dominant affective temperaments, with females found to be more depressive, anxious, and cyclothymic[26, 28]. Males have been found to be more hyperthymic and irritable[29]. Individuals with a depressive temperament display low energy and emotional state and negative cognition. Those with an anxious temperament have a tendency to be overly concerned about the welfare of themselves and those close to them. A cyclothymic temperament shows rapid and unexpected swings between the polar

Table 4. Comparison of temperament, BDI, and BAI scores according to gender, duration of symptoms, education, and disease activity

Variables		Depressive	Cyclothymic	Hyperthymic	Irritable	Anxious	BDI	BAI
Gender	F	5.3 ± 3.8*	6.3 ± 5.0*	9.9 ± 4.7	3.4 ± 4.1	4.9 ± 5.9*	6.8 ± 7.9*	6.7 ± 7.0*
	M	7.8 ± 3.7	10.4 ± 3.8	9.1 ± 3.8	4.7 ± 4.0	11.7 ± 5.9	15.2 ± 10.2	20.6 ± 10.2*
Duration of education	≤ 8 years	7.3 ± 3.8*	8.6 ± 5.7	10.2 ± 4.2	4.4 ± 5.0	9.7 ± 7.4*	13.5 ± 8.8*	17.8 ± 13.6*
	> 8 years	4.2 ± 3.7	6.5 ± 4.7	9.3 ± 4.6	3.3 ± 3.6	5.0 ± 6.1	8.7 ± 9.4	7.5 ± 8.1
Duration of symptoms	< 10 years	6.0 ± 3.5	8.6 ± 4.4	10.4 ± 4.2	4.5 ± 3.4	8.1 ± 6.5	12.1 ± 11.1	14.7 ± 14.8
	> 10 years	6.3 ± 4.3	7.2 ± 5.4	8.8 ± 4.4	3.4 ± 4.6	6.8 ± 7.0	8.9 ± 8.6	10.4 ± 9.1
BASDAI	<4.0	5.4 ± 3.6	6.7 ± 5.0	9.9 ± 4.8	3.4 ± 3.6	6.0 ± 5.9	8.6 ± 8.9	11.1 ± 11.5
	≥4.0	7.0 ± 4.2	9.0 ± 4.8	9.2 ± 3.9	4.4 ± 4.5	9.0 ± 7.3	12.0 ± 10.5	13.6 ± 12.6
		0.189	0.085	0.630	0.347	0.133	0.380	0.216

BASDAI: Bath Ankylosing Spondylitis Disease Activity Index; BDI: Beck Depression Inventory; BAI: Beck Anxiety Inventory
*Significant difference from the baseline value (p<0.05)

Table 5. Correlation of temperament scores with the duration of symptoms, duration of education, and BASDAI

Variables		Age	Duration of symptoms	Duration of education	BASDAI	ASQOL	VAS
Depressive	r	0.152	−0.026	−0.470*	0.296*	0.250	0.280*
Cyclothymic	r	−0.132	−0.259*	−0.270	0.278*	0.115	0.408*
Hyperthymic	r	−0.224	−0.137	0.021	−0.129	−0.114	−0.266*
Irritable	r	−0.111	−0.295*	−0.226	0.178	−0.021	0.239
Anxious	r	0.058	−0.165	−0.433*	0.330*	0.294*	0.373*
BAI	r	0.187	−0.102	−0.522*	0.259	0.343*	0.42
BDI	r	0.151	−0.186	−0.367*	0.262	0.324	0.020

BASDAI: Bath Ankylosing Spondylitis Disease Activity Index; BDI: Beck Depression Inventory; BAI: Beck Anxiety Inventory. *Significant difference from the baseline value (p<0.05)

opposite emotional states of depressive and hyperthymic[30]. In the current study, the anxious and depressive temperament scores were higher in those with low levels of education and there was a significant positive correlation between the duration of symptoms and irritable temperament. In a study by Litaem, it was reported that as the duration of the disease increased, the irritable and hyperthymic temperament scores were found to be significantly higher[10].

Irritable temperament forms with a highly variable mixture of dysthymic and hyperthymic features and manifests with habitual complaining, excessively critical attitudes, and outbursts of anger[30]. There may be a relationship between high irritable temperament scores and longer duration of symptoms. The biological and psychological results of a chronic disease such as AS may predispose an individual to the development of an irritable temperament. Studies have shown that depressive and anxiety symptoms were found at high levels in AS[31, 32]. In the current study, only the rates of anxiety were determined to be statistically significantly high compared to the control group. The BDI and BAI values were high in females and those with less than 8 years of education. Previous studies have shown a higher rate of depression in female AS patients[33].

There is known to be a relationship between disease activity in AS and a patient's psychological status and quality of life[34]. Several studies have found a positive correlation between an increase in disease activity and depression and anxiety symptoms and a reduction in quality of life[35]. In those with high BASDAI and VAS values in the current study, the depressive, cyclothymic, and anxious temperament scores were higher. This shows that the affective temperament in AS patients was affected by disease activity and pain. The correlation between the ASQoL values and the anxious temperament subtype scores demonstrates that anxious affective temperament affected quality of life. In a study by Janowski, a relationship was also determined between temperament and quality of life in psoriasis patients[36].

The role of stress in the etiology of AS has not yet been fully understood, but the temperament characteristics of the patient may affect the success of the struggle against stress[10]. Affective temperament can be included in the factors creating a predisposition to the development of affective disorders such as depression[37]. Therefore, just as depression and anxiety symptoms could be a significant comorbidity in AS patients, it could also be form of the infrastructure of temperament.

The results of this study have shown a significant relationship between BAI and BDI scores and depressive, cyclothymic, irritable, and anxious temperaments. This result suggests that affective temperament could be a risk factor for depression and anxiety in AS patients (Table 7).

This comparative study is the first to evaluate affective temperament in AS patients by evaluating the relationship between the dominant affective temperament and existing depression and/or anxiety. Patients with additional diseases such as diabetes mellitus, hypertension, or fibromyalgia were not included in the study. Therefore, it was possible to evaluate the relationship between pain, disease activity, disability, and temperament. It was determined that as the depressive and anxiety symptoms of affective temperament increased in patients with AS, so disease activity increased and quality of life deteriorated. Therefore, the importance of psychosocial support for AS patients must be considered in the prognosis, and it can be suggested that the determination of the affective temperament of AS patients would be helpful for clinicians in the treatment and motivation of patients. The factors explaining physical activity are unclear for axSpA patients: is physical activity related to disease characteristics, e.g. disease activity, severity, or treatment, or to patient-related characteristics? Whether the level of physical activity is related to disease activity is uncertain, some studies finding no correlation[38], others reporting that patients with high disease activity exercised less[39, 40] or reversely, more[41]. Furthermore, other factors such as patients' willingness and motivations to exercise may be more important to explain physical activity. A better knowledge of physical activity levels and their causes or related factors in axSpA would allow physicians to target this aspect of disease management.

This study has some limitations. The number of cases included in this study was relatively low and it was a cross-sectional study. There is a need for further prospective studies to evaluate the effects of temperament on AS patients.

Table 6. Association of temperament scores with BAI and BDI

		BAI	BDI
Depressive	r	0.579*	0.454*
Cyclothymic	r	0.582*	0.506*
Hyperthymic	r	−0.156	−0.106
Irritable	r	0.450	0.449*
Anxious	r	0.691	0.576*

BDI: Beck Depression Inventory; BAI: Beck Anxiety Inventory; VAS: Visual Analog Scale. *Significant difference from the baseline value (p<0.05)

Table 7. Multiple linear regression analysis of temperament scores with BAI and BDI

	BAI	BDI
Constant	4.426	4.555
Depressive	0.442	0.299
Cyclothymic	−0.095	0.122
Hyperthymic	−0.209	−0.312
Irritable	−0.959	0.321
Anxious	1.628*	0.687*

BAI: Beck Anxiety Inventory; BDI: Beck Depression Inventory. *Significant difference from the baseline value (p<0.05)

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