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Temperament and character traits in young men diagnosed with idiopathic scoliosis

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ABSTRACT

Introduction: The aim of this study is to examine whether the temperament and character traits of young men diagnosed with idiopathic scoliosis (IS), known as the three-dimensional deformity of the spine and trunk, which begins to emerge during the growth period and progress with changes in the quality of life in adulthood, are different from those without idiopathic scoliosis.

Material and Method: A total of 162 IS and 162 healthy male individuals were included in the study. Scoliosis level was evaluated with the Cobb method and temperament and character traits were evaluated with the Temperament and Character Inventory. The data were evaluated with SPSS ver.22.0 program and $p<0.05$ was considered significant in the analyses.

Results: In our study, no significant difference was found between the groups according to the total/subscale scores of temperament dimensions of harm avoidance, novelty seeking and reward dependence. Persistence and novelty seeking-disorderliness subscale scores were significantly lower in study group compared to the healthy control group. There was no significant difference between groups in character trait scores.

Conclusion: The findings of our study revealed that there are differences in temperament and character traits between young men with idiopathic scoliosis and the control group. More studies are needed to determine this difference in women with idiopathic scoliosis and symptomatic individuals.

Keywords: Character, idiopathic scoliosis, novelty-seeking, persistence, personality, temperament

INTRODUCTION

Idiopathic scoliosis (IS) is a three-dimensional deformity of the spine and that becomes noticeable during growth and progresses with changes in quality of life in adulthood. Diagnosis is made when the large curve of the spine (Cobb angle) is more than 10° in anteroposterior X-ray image taken while standing (1, 2). The prevalence of IS is between 0.35% and 5.2%, and its incidence in girls is three times higher than in boys during adolescence (3, 4, 5).

The cause of 85% of IS is unknown and its etiology focuses on biomechanical, neural, metabolic, hormonal changes, and genetic and environmental factors (6). Most of the cases are asymptomatic and some of them may have body shape disorders (2), neck and back pain, decreased lung capacity due to deformity level, weakness of respiratory muscles and decreased exercise capacity (7).

In adult patients, scoliosis is divided into four groups according to the configuration of the Cobb angle (8). Type I is primary degenerative scoliosis. It is mostly found in the thoracolumbar or lumbar spine. Type II is progressive idiopathic scoliosis. It is found in the thoracic, thoracolumbar and/or lumbar spine. Type III is secondary degenerative scoliosis. Type IIIa is scoliosis that occurs in the context of pelvic obliqueness following idiopathic or other types of scoliosis, or due to leg length discrepancy, hip pathology, or lumbosacral transition anomaly. It is mostly found in the thoracolumbar, lumbar, or lumbosacral spine. Type IIIb is scoliosis secondary to metabolic bone disease (mostly osteoporosis) with asymmetric arthritis disease and/or vertebral fractures.

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Body shape disorder in idiopathic scoliosis can cause psychosocial problems such as dissatisfaction with the physical appearance (7), limitations in social activities (1), problems in parent and peer relationships (9), deterioration in body image, decrease in self-esteem (10) and decrease in quality of life (11).

Body appearance in scoliosis plays an important role in personality traits and physical self-perception (12). Interesting findings have emerged in studies examining personality traits and related factors in scoliosis patients. In studies investigating the personality traits of patients with IS, it has been reported that depressiveness and neuroticism are more common in patients with scoliosis, they have lower self-esteem (13, 14, 15), they exhibit feelings of insecurity and inferiority (14), they have mild introversion and mild neurotic tendencies (16), personality disorders, and increased levels of psychotic symptoms (17). In a systematic review study, it was reported that thoughts about negative body image were associated with higher levels of neuroticism and lower levels of extraversion and conscientiousness in individuals with scoliosis (18). In addition to body appearance, treatment approaches in idiopathic scoliosis also affect personality traits. In a study (19), more self-criticism was reported in patients with IS who were treated conservatively than in healthy individuals, while more self-criticism, neuroticism, and depressiveness were reported in those who received surgical treatment.

According to Cloninger's psychobiological model, four temperament and three character dimensions explain personality traits (20, 21). Temperament dimensions consists of novelty seeking (NS), harm avoidance (HA), reward dependence (RD), and persistence (P) develop with the effect of 40-60% genetic factors, while the character dimension consisting of self-directedness (SD), cooperation (CO), and self-transcendence (ST) develops with the effect of 15-30% environmental factors and 10-15% genetic factors. The character dimension of personality includes individual differences in self-concept about personal goals and values, in contrast to the temperament dimension, which includes differences in automatic emotional responses and habits. In other words, temperament traits reflect individual differences in perceptual dispositions and skills, are genetically homogeneous, and inherited independently, while character traits mature the personality with individual and social influences they produce with age (20, 21).

Many studies have been performed on personality traits handling temperament and character dimensions in diseases related to the musculoskeletal system (22, 23, 24, 25, 26). In a study in which personality traits were investigated in 46 patients with Classical Myotonic Dystrophy (22), it was found that the TCI harm avoidance dimension was significantly higher, lower scores on persistence, self-directedness, and cooperation dimensions, and it was stated that there was no significant relationship between the number of CTG repetitions and TCI scores. In a study investigating Temperament and Character Personality Dimensions in Patients with Non-Specific Musculoskeletal Disorders (23), it was reported that pain patients exhibited a personality profile with high harm avoidance and low self-directedness compared to the control group. It has been stated that patients with non-specific musculoskeletal pain disorders can be described as cautious, insecure and pessimistic, and these patients can be described as having difficulty in taking responsibility, lack of long-term goals, chronically low self-esteem and struggling with identity. It has also been shown that there is a strong correlation between personality dimensions and psychological distress and pain. Compared to controls, fibromyalgia patients had higher harm avoidance and persistence in the temperament dimension, lower self-directedness and higher self-transcendence levels in the character dimensions (24). In a study conducted with patients with ankylosing spondylitis, increased reward dependence and decreased self-directedness scores were detected despite self-transcendence (25). Kuloğlu et al. (25) reported that patients with multiple sclerosis had higher levels of harm avoidance and lower levels of self-directedness and persistence compared to the healthy control group.

Although there are studies in the literature with various personality scales in individuals with scoliosis (16, 17, 19), we did not come across any study using the Temperament and Character Inventory (TCI), which is frequently used in determining personality development levels. In this study, it was aimed to determine what the temperament and character traits in young men diagnosed with idiopathic scoliosis are and whether these personality traits differ between healthy and patient groups.

MATERIAL AND METHOD

The study was carried out with the permission of Clinical Research Ethics Committee of Istanbul Haydarpaşa Numune Training and Research Hospital (Date: 12.06.2017, Decision No: 2017/470). The patients included in the study were informed about the study and their written consent was obtained. All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

Military service is compulsory in Turkey and all men are referred to military health examinations by military service branches during the recruitment process. The health condition that is not suitable for military enlistment is decided by the health board in accordance with the military medicine directive and rejected.

The health board consists of specialist physicians in internal medicine, surgery, orthopedics, otolaryngology, ophthalmology, psychiatry, neurology and other specialties when necessary. Routine biochemical examinations of military candidates are performed at the examination of the health board, and chest X-ray and lumbosacral anteroposterior radiographs are taken.

This study was conducted by the orthopedics and traumatology department of our institution and the department of psychiatry between July 2017 and June 2018. The study group consisted of 162 male patients who applied to the orthopedics and traumatology department for a military health board examination on the specified dates, were diagnosed with idiopathic scoliosis in both clinical and radiological radiographs taken with the Cobb method, and accepted to participate in the study. Cases without a disease that could cause idiopathic scoliosis were included in the study. The participants did not have any complaints of idiopathic scoliosis or significant deformity.

The control group consisted of 162 healthy individuals who applied to the Orthopedics and Traumatology Department for examination by the military health board on the same days, were not diagnosed with idiopathic scoliosis in the examinations, had the same age and socio-demographic characteristics as the study group, and agreed to participate in the study. These individuals were evaluated by a psychiatrist according to DSM V diagnostic criteria. It was learned that he did not have any psychiatric disorders before.

Inclusion criteria were 18 years of age and older, adequate level of education (at least primary school graduates) and capable of taking the tests and structured interview form, agreed to participate in the study, diagnosed with IS and did not have any psychiatric follow-up and treatment history. Individuals who were younger than 18 years of age, did not accept to participate in the study, had psychiatric disorders according to DSM V diagnostic criteria, additional medical disorders, and who were not at the level of education to take the tests and structured interview form were excluded from the study.

Those with idiopathic scoliosis (n=162) were confirmed with thoraco-lumbar standing radiographs as a result of orthopedic and radiological examination. Normal spinal curvature was considered a Cobb angle of less than 10 degrees. Individuals who were younger than 18 years of age, did not agree to participate in the study, had psychiatric disorders according to DSM V diagnostic criteria, had additional medical diseases, and were not at the level of education to read and understand the tests and the structured interview form were excluded from the study.

Data Collection Tools

Socio-demographic data form: This form developed by the researchers to determine the socio-demographic characteristics of the participants (age, education level, marital and occupational status, suicide attempt, substance use, smoking and alcohol use etc.) in accordance with the purpose of the study.

Measurement of Cobb angle: The Cobb angle is determined according to the Cobb method by measuring the angle between two horizontal lines are drawn on an X-ray parallel to the upper end-plate of the superior vertebra and the inferior end-plate of the inferior vertebra of the curve (26).

Temperament and character inventory (TCI): It is a self-assessment scale consists of 240 items developed based on Cloninger's theory of personality (21). TCI includes questions that assess four temperament dimensions (novelty seeking, harm avoidance, reward dependence, and persistence, and three-character dimensions (self-directedness, cooperativeness, and self-transcendence). In the temperament dimension, NS has four subscales (NS1: exploratory, NS2: impulsiveness, NS3: extravagance, NS4: disorderliness), HA has four subscales (HA1: anticipatory worry, HA2: fear of uncertainty, HA3: shyness, HA4: fatigability), RD has three subscales (RD1: sentimentality, RD2: attachment, RD3: dependence). In the character dimension, SD has five subscales (SD1: responsibility, SD2: purposefulness, SD3: resourcefulness, SD4: self-acceptance, SD5: congruence), CO has five subscales (CO1: social acceptance, CO2: empathy, CO3: helpfulness, CO4: compassion, CO5: integrated conscience), ST has three subscales (ST1: self-forgetfulness, ST2: trans-identification, ST3: spiritual acceptance). Scales consist of the sum of all subgroups (20, 21). Turkish validity and reliability study of TCI in our country was carried out by Köse et al. (27).

Statistical Analysis

Statistical analysis was performed using the SPSS (ver.22.0, Chicago, II, USA) program. Frequency, percentage, mean value and standard deviation were used to define the data. Whether the data were suitable for normal distribution was examined with the Kolmogorov Smirnov test, with the help of which it was decided to examine the scale scores with parametric tests. Chi-square test was used to compare categorical variables, and one-way analysis of variance (ANOVA) was used to compare numerical values. Independent sample t-test was used to compare the subscale scores of the patient and control groups. In statistical interpretations, $p<0.05$ values were considered significant at the 95% confidence interval.

RESULTS

The mean age of the individuals participating in the study was 22.86±1.73 in young men diagnosed with idiopathic scoliosis and 22.77±1.62 in the healthy control group. The minimum age was 19 and the maximum age was 27. The table containing the findings regarding the variables of age, education level, marital status and income level of the participants are given below (**Table 1**).

Table 1. Sociodemographic information of the participants

Variables	Scoliosis		Control	
	Frequency (n)	Percent (%)	Frequency (n)	Percent (%)
Marital status				
Married	4	2.5	4	2.5
Single	158	97.5	158	97.5
Education status				
Primary education	27	16.7	26	16.0
High school	63	38.9	44	27.2
University	69	42.6	91	56.2
Other	3	1.9	1	.6
Income				
Low	48	29.6	37	22.8
Middle	109	67.3	124	76.5
High	5	3.1	1	.6
Age (Me./S.D.)	22.86±1.73		22.77±1.62	

Me: Mean, S.D.:Standard deviation.

When **Table 1** is examined; 42.6% of those with IS were university graduates, 97.5% were single, and 67.3% had a middle-income level. It was determined that 56.2% of the individuals in the control group were university graduates, 97.5% were single, and 76.5% had a middle-income level. There was no statistically significant difference between the participants in terms of age, education level, marital and income status (p>.05).

There was no significant difference between the groups according to the total/subscale scores of novelty seeking, harm avoidance and reward dependence in temperament dimensions. (p>.05). However, the persistence score of individuals with IS was significantly lower than the healthy control group (p<.05). Compared to control group, there was a statistically significant difference only in the novelty seeking/disorderliness subscale (p<.05) for study group, while there was no statistically significant difference in the other subscale scores (p>.05, **Tables 2** and **3**).

There was no significant difference between the groups in the total/subscale scores of the character dimensions (p>.05, **Tables 2** and **3**).

Table 2. Comparison of the total scores given to the subscales of the Temperament and Character Inventory (TCI) scale by scoliosis group and healthy individuals.

	Scoliosis Me.±.S.D.	Control Me.±.S.D.	Statistical Analysis		
			t	df	p
Novelty seeking	15.03±3.66	15.56±3.85	1.273	322	.204
Harm avoidance	11.49±5.19	10.80±5.30	1.176	322	.241
Reward dependence	13.87±2.80	14.09±2.77	.698	322	.486
Persistence	5.89±1.37	6.20±1.38	2.019	322	.044*
Self-direction	31.27±5.59	31.54±5.85	.427	322	.670
Cooperativeness	32.40±4.27	32.15±5.61	.435	300.6	.664
Self-transcendence	19.44±5.21	19.07±5.03	.662	322	.509

*p<0.05, Me.:Mean, S.D.: Standard deviation, t: Independent sample t-test.

Table 3. Comparison of the scores of the sub-dimensions of the Temprament and Character Inventory (TCI) scales

	Scoliosis Me.±.S.D.	Control Me.±.S.D.	Statistical Analysis		
			t	df	p
Novelty seeking (NS)					
NS1	6.07±1.42	6.15±1.42	-.510	322	.611
NS2	2.98±1.43	2.81±1.78	.963	307.5	.336
NS3	3.37±1.67	3.60±1.61	-1.296	322	.196
NS4	2.61±1.55	3.00±1.79	-2.095	322	**.037***
Harm avoidance (HA)					
HA1	3.75±1.97	3.82±2.09	-.300	322	.764
HA2	3.02±1.51	2.82±1.63	1.166	322	.244
HA3	1.99±1.56	1.85±1.69	.811	322	.418
HA4	2.72±1.94	2.31±1.93	1.869	322	.063
Reward dependence (RD)					
RD1	6.50±1.96	6.25±1.83	1.102	322	.230
RD2	4.94±1.79	5.20±1.52	-1.371	313.7	.171
RD3	2.43±1.42	2.64±1.33	-1.414	322	.158
Persistence (P)	5.89±1.37	6.20±1.38	-2.019	322	**.044***
Self-direction (SD)					
SD1	5.81±1.64	5.85±1.79	-.195	322	.369
SD2	5.86±1.22	5.81±1.22	.364	322	.918
SD3	3.80±1.13	3.81±1.13	-.098	322	.520
SD4	6.46±2.47	6.43±2.28	.094	322	.292
SD5	9.33±1.72	9.62±1.63	-1.594	322	.383
Cooperativeness (C)					
C1	6.77±1.08	6.67±1.31	.740	322	.460
C2	5.06±1.21	5.04±1.46	.124	322	.901
C3	4.97±1.19	5.07±1.52	-.692	304.8	.489
C4	8.59±1.71	8.27±2.02	1.575	322	.116
C5	7.00±1.28	7.10±1.50	-.638	322	.524
Self-transdence (ST)					
ST1	6.06±1.87	5.87±1.95	.903	322	.367
ST2	6.28±1.80	6.36±1.87	.648	322	.717
ST3	7.10±2.79	6.84±2.64	.630	322	.391

*p<0.05, Me.:Mean, S.D.: Standard deviation, t: Independent sample t-test. NS1: exploratory, NS2: impulsiveness, NS3: extravagance, NS4: disorderliness, HA1: anticipatory worry, HA2: fear of uncertainty, HA3: shyness, HA4: fatigability, RD1: sentimentality, RD2: attachment, RD3: dependence, SD1: responsibility, SD2: purposefulness, SD3: resourcefulness, SD4: self-acceptance, SD5: congruence, C1: social acceptance, C2: empathy, C3: helpfulness, C4: compassion, C5: integrated conscience, ST1: self-forgetfulness, ST2: trans-identification, ST3: spiritual acceptance.

DISCUSSION

In this study, we evaluated personality traits in young men diagnosed with idiopathic scoliosis using TCI and compared them with the normal population. The main

finding of this study is that the persistence temperament dimension scores of study group are lower than those of healthy individuals. In addition, we found lower scores in the disorderliness, which is one of the subscales of novelty seeking. There was no significant difference in the other sub-dimensions of TCI compared to the control group. This situation can be explained by the fact that due to the TCI consists of 240 questions, takes about 30 minutes, and the participants will go to other clinics for the health board examination, they have to fill out the questionnaire randomly. In addition, the mean scores of the other sub-dimensions of TCI were not different from the normal group, since the participants did not have any symptoms suggestive of idiopathic scoliosis and the diagnosis of scoliosis was made by incidentally. To our knowledge, our study is the first to evaluate temperament and character traits with TCI in patients with IS.

Idiopathic scoliosis is more common in women (3-5). Interestingly, the participants in our study were young adults. The fact that the study was performed on young men may be associated with the homogeneity of the sample group. Young adulthood is a period in which the individuals enter the last steps of identity formation and seeks the identity that identifies with themselves. According to Arnett (29), although identity-related constructions begin in adolescence, basic research and experiences occur in adulthood. In addition to psychosocial, physical, affective, cognitive, and psychomotor development tasks, individuals in the young adulthood period are faced with fulfilling some developmental tasks such as identity crisis, adapting to social values and reaching social maturity (30). In our study, we found that there are differences in temperament and character traits in individuals with IS in this age group compared to control group.

In the literature, personality traits were evaluated with various personality tests in individuals with IS such as Maudsley Personality Inventory (16), Erich Mittenecker and Walter Toman Personality test (19), and Korean Military Multiphasic Personal Inventory (17). In our study, evaluation of personality traits in patients with idiopathic scoliosis was performed with TCI for the first time in literature. Thus, the personality traits of patients with IS were discussed from a different perspective.

Personality traits including temperament and character dimensions have been investigated in studies conducted in medical conditions involving the spine, such as classical myotonic dystrophy non-specific musculoskeletal disorders, fibromyalgia, multiple sclerosis, and ankylosing spondylitis (22-25, 28).

In a study conducted in patients with Classical Myotonic Dystrophy (22), it was reported that TCI was significantly higher in harm avoidance, lower scores in persistence, self-direction and cooperation, and there was no significant relationship between the number of CTG repetitions and TCI scores. In another study conducted in Patients with Non-Specific Musculoskeletal Disorders (23), it was reported that pain patients exhibited higher harm avoidance and lower self-directedness personality profile compared to the control group. It has been stated that patients with non-specific musculoskeletal pain disorders can be described as cautious, insecure and pessimistic, and these patients can be described as having difficulty in taking responsibility, lack of long-term goals, chronically low self-esteem and struggling with identity. It has also been shown that there is a strong correlation between personality dimensions and psychological distress and pain.

In a study performed in fibromyalgia patients, it was reported that harm avoidance and persistence levels were higher than the healthy control group. In this study, it has been suggested that fibromyalgia patients have a tendency to change their level of rigor in coping with life difficulties and continue their activities even if they are exhausted, and that high levels of persistence may adversely affect the coping strategies of fibromyalgia syndrome patients (24). In a study conducted in ankylosing spondylitis patients (25), a negative correlation was found between self-directedness and Bath ankylosing spondylitis activity index, and between reward dependence and visual analog scale scores. This showed that temperament and character dimensions in patients with ankylosing spondylitis were associated with disease activation and that the disease course was more severe in patients with low scores in these TCI dimensions. In a study with multiple sclerosis patients, it was reported that the patient group had higher levels of harm avoidance and lower levels of self-directedness and persistence compared to the healthy control group (28). It was stated that there were differences between the multiple sclerosis patients and the control group in terms of temperament and character traits. In our study, it was determined that the level of persistence decreased in individuals with IS compared to healthy controls.

Another clinical feature of IS is the patients' dissatisfaction with their body appearance (18). Body appearances can cause individuals to have difficulties in expressing themselves, in their relationships with their peers and parents, and may cause differences in their personality traits (31). In studies conducted in obese individuals, in which dissatisfaction with their body appearance was clearly felt, differences were found in temperament and character traits compared to the control group (32, 33). In some studies, it has been reported that obese individuals have higher levels of harm avoidance and

persistence (32). In another study, it was stated that while novelty seeking levels increased, there was a decrease in persistence and self-management levels (33).

Individuals with a high level of persistence show continuity in their behaviors against fatigue and shyness. On the other hand, people with low persistence are inactive, lazy, easily giving up, modest, unsuccessful and defeatist (33). The findings of our study confirm that individuals with IS are with low persistence scores, even if they are asymptomatic, they built up a sedentary life by adapting to their current medical conditions compared to the control group. Moreover, a low persistence score may be associated with the asymptomatic or progressive course of idiopathic scoliosis, as well as with decreased resilience of patients in response to difficulties due to physical and emotional destruction. From this point of view, low level of persistence can be considered as a determining feature in terms of the psychosocial status of patients with IS during diagnosis and treatment.

As can be seen, there are differences between temperament and character traits in studies on some diseases related to the musculoskeletal system. These differences may be related to the sample group of the study, the number of samples, the severity of the disease, whether it is treated or not, whether they cause appearance and deformity, and whether they affect the quality of life. While the findings of our study show parallelism with the findings of some studies (22,28,33), they differ with the findings of some studies (23,25,32).

Another finding of our study is that there is a decrease in the level of regularity-disorderness (NS4), one of the subscales of novelty seeking, in scoliosis patients compared to healthy controls. In a study by Mancuso et al. (34), it was reported that those with body dysmorphic disorder (BDD) had lower novelty seeking scores than those without. These data suggest that BDD patients can be described as slow-tempered, unquestioning, patient, thoughtful, frugal, tolerant of monotony, and tending to be orderly (20,21).

Those who score high on the NS4 subscale tend to be irritable and disorganized, and often vent their anger when they don't get what they want and when they want it. They often prefer activities without strict rules and regulations. They are not prescriptive. They avoid situations that are physically or psychologically frustrating, boring, or uncomfortable for them. In contrast, individuals scoring low on this subscale tend to be organized, orderly, methodical, and systematic, and often prefer activities with strict rules and regulations. They may delay gratification when disappointed for longer than most people. They react slowly in projecting their anger outward (21). In our study, individuals with IS had a lower level of NS4 subscale compared to the control group, indicating that these individuals tended more towards activities that do not force them too much and have clear rules. This may be evidence of the limited social activities of individuals with scoliosis, their use of systematic methods to improve themselves, and the psychosocial problems they experience.

There are some limitations in our study. First, the study participants consisted of young adult males. Therefore, we could not compare temperament and character traits in young adults according to gender. Second, the findings may not allow for generalization because the participants were all male and the study design was cross-sectional. Finally, the TCI is a self-report test and may be affected by environmental conditions. Some items of this scale may be difficult for patients to read and understand, and the support of the researcher may be needed.

CONCLUSION

As a result, it is seen that young men diagnosed with idiopathic scoliosis have low levels of persistence and novelty seeking/disorderness subscale. Idiopathic scoliosis is a disease that affects individuals' body image, motivation levels, self-confidence, quality of life and personality development. It is important for the prognosis of the disease that clinicians dealing with these individuals consider their personality traits during the diagnosis and treatment process. Since the deformity levels of scoliosis affect personality traits, studies evaluating the personality traits of scoliosis patients with different deformity levels are needed.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of Clinical Research Ethics Committee of Istanbul Haydarpaşa Numune Training and Research Hospital (Date: 12.06.2017, Decision No: 2017/470).

Informed Consent: All patients signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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