Original Article

Impulsivity and ankylosing spondylitis: Is there a relationship?

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ABSTRACT

Objectives: This study aims to evaluate psychological disorders such as impulsivity, alexithymia, depression, and anxiety and to analyze the relationship between psychiatric disorders and disease activity, fatigue and quality of life in ankylosing spondylitis (AS) patients.

Patients and methods: Between May 2016 and January 2017, a total of 70 AS patients (30 females, 40 males; mean age 42.9±10.5 years; range, 22 to 70 years) and 56 healthy controls (27 females; 29 males; mean age 44.8±13.0 years; range, 21 to 70 years) were included. Demographic characteristic, laboratory analyses, disease activity, quality of life, functionality, fatigue, and psychological disorders were assessed. The Ankylosing Spondylitis Disease Activity Score (ASDAS), Bath Ankylosing Spondylitis Functional Index (BASFI), Bath Ankylosing Spondylitis Metrology Index (BASMI), Nottingham Health Profile (NHP) and Ankylosing Spondylitis Quality of Life (ASQOL), Fatigue Severity Scale (FSS), Beck Depression Inventory (BDI), Beck Anxiety Inventory (BAI), Toronto Alexithymia Scale (TAS-20), Eating Attitude Test (EAT), and Barratt Impulsiveness Scale-11 (BIS-11) were used. Significant predictors for anxiety, depression and impulsiveness were evaluated using multivariate analyses.

Results: The BDI (13.88±8.99; 9.78±8.34), BAI (14.58±10.02; 10.53±8.99), and non-planning impulsivity (26.00±4.57; 24.28±3.77) scores were higher in the AS group than controls (p=0.01; p=0.01; p=0.02 respectively). Non-planning impulsivity was correlated with fatigue, social isolation, and depression (p=0.03; p=0.01; p=0.01 respectively). Multivariate analyses showed that fatigue scores were positively associated with non-planning impulsiveness.

Conclusion: Impulsivity may be one of the psychiatric disorders associated with AS, such as the more commonly known anxiety and depression. Fatigue is considered as a critical target for increased impulsivity.

Keywords: Ankylosing spondylitis, fatigue, impulsiveness, psychiatric disorders.

Ankylosing spondylitis (AS) is a progressive rheumatic disease characterized by axial inflammation, peripheral arthritis, and various extra-articular manifestations such as enthesitis, uveitis, and pulmonary or cardiovascular involvement.[1,2] It is more commonly seen in males at early adulthood and may lead to many structural deformities and functional disabilities.[3-5] Chronic inflammation and pain may cause decrease in physical activity, impaired quality of life, sleep disorders, and psychological consequences including depression and anxiety.[1,5,6]

Psychological distress is considered to have adverse effects on quality of life, work productivity and to be important with regard to outcome measurements in patients with AS and spondyloarthritis. Depression and anxiety in AS patients have been noted in recent years.[1,2,7-10] Depression in AS patients has been found more common than healthy population and ranges between 20 and 55.5%.[1-12] Until now, several studies have reported increased depression and anxiety rates and a significant association between psychological consequences, quality of life and disease activity in AS patients.[6-15] On the other hand, the number of studies about different psychiatric disorders is limited in the literature. Alexithymia, schizophrenia, bipolar disorder, psychiatric symptoms (i.e., somatization, paranoid indentation, obsessive-compulsive symptoms) and affective temperament profile were examined in a few studies.[5,9,10,15]

In the outpatient clinic, we observe that some AS patients have remarkably different personality traits. Impaired control of behavior and emotions in these

patients suggests the concept of increased impulsivity. Impulsivity is identified as a clinical feature of varied psychiatric disorders and may be accompanied by psychopathological alterations, including eating behaviors. To the best of our knowledge, no study have evaluated impulsivity and eating attitude in AS patients previously. Therefore, the aim of this study was to assess different disorders such as impulsivity, eating attitude, and alexithymia as well as depression and anxiety and to analyze the relationship between psychiatric disorders and disease activity, fatigue, and quality of life in AS patients.

PATIENTS AND METHODS

This cross-sectional study was conducted at the Physical Medicine and Rehabilitation Clinic between May 2016 and January 2017. A written informed consent was obtained from each participant. The study protocol was approved by the local Ethics Committee (No. 1085/2016). The study was conducted in accordance with the principles of the Declaration of Helsinki.

A total of 70 AS patients (30 females, 40 males; mean age 42.9±10.5 years; range, 22 to 70 years) and 56 healthy controls (27 females; 29 males; mean age 44.8±13.0 years; range, 21 to 70 years) were included. The AS patients met the modified New York criteria for AS.[16] *Exclusion criteria were as follows: (i)* <18 years old. *(ii)* Any diagnosis of psychiatric disorders and receiving psychiatric treatments, and cognitive dysfunctions. *(iii)* Concomitant disorders which were diagnosed at the relevant clinic, requiring follow-up and/or medication (serious infectious, cardiac, neurological, endocrine, respiratory, gastrointestinal disease), as they may change disease activity scores and test results about psychological status.

Demographic characteristics including age, sex, working status, and education duration were collected. Physical examination and anthropometric measurements were made by a single physician for all AS patients and controls. All participants completed questionnaires under physician supervision. Baseline values were used in the analyses.

Clinical and health status assessment

Disease duration was recorded. Laboratory assessments for erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) values were obtained.

Pain was scored using the Visual Analog Scale (VAS, 0-10 cm). The Ankylosing Spondylitis Disease Activity Score (ASDAS) was used to evaluate disease activity. A score of ASDAS <1.3 is considered as remission, 1.3-2.1 as moderate disease activity, 2.1-3.5 as high disease activity, and >3.5 as very high disease activity.[17]

The functional status was determined using the Turkish version of the Bath Ankylosing Spondylitis Functional Index (BASFI) that comprises 10 items about daily living activities over the past month.[18] The Bath Ankylosing Spondylitis Metrology Index (BASMI) that includes tragus-wall distance, lumbar flexion, cervical rotation, lumbar side flexion, and intermalleolar distance was calculated.[19]

The Nottingham Health Profile (NHP) and Ankylosing Spondylitis Quality of Life (ASQOL) questionnaires with Turkish validity and reliability were used to assess the quality of life.[20,21]

The Fatigue Severity Scale (FSS) with nine-item and the total score ranging from 1 to 7 was used. The cut-off value for pathological fatigue was established as ≥4.[22]

Psychological assessment

The Beck Depression Inventory (BDI) consists of 21 questions with a total score between 0 and 63 and BDI scores are classified as 10-18 mild, 19-29 moderate, and 30-63 severe depression. The cut-off value of the Turkish version is 17.[23]

The Beck Anxiety Inventory (BAI) is a 21-item Likert-type scale that measures the anxiety symptoms experienced by the individual and total score ranges between 0-63.[24]

Alexithymia is defined as the difficulty in expressing, differentiating, and recognizing emotions and was evaluated with 20-item Toronto Alexithymia Scale (TAS-20). Total score ranges from 20 to 100 and a score with ≥61 indicates alexithymia.[25]

The eating attitudes of the participants were evaluated using the Eating Attitude Test (EAT) consisting of 40 questions. It measures eating behaviors and attitudes of anorexia patients; and possible eating attitude disorders in normal individuals. A maximum of three points can be taken from each question in the scale (total 120 points) and >30 points show eating attitude disorders.[26]

The Barratt Impulsiveness Scale-11 (BIS-11) which comprises three subscales as attention, motor, and non-planning impulsiveness was used to assess the patients and controls.[27]

All psychiatric assessment scales in this study were tested for validity and reliability in Turkey.

Statistical analysis

Statistical analysis was performed using the PASW for Windows version 18.0 package program (SPSS Inc., Chicago, IL, USA). The effect size "Cohen's d value" was calculated 0.43 for mean differences of two groups with independent two sample t-test. The effect size was small-medium according to Cohen.[28] Post-hoc power analyses were performed using G* power software version 3.9.1.2 (Heinrich-Heine University, Düsseldorf, Germany). Power of the study $(1-\beta)$ is 0.66 for two sample t-test according to our sample size (α coefficient is 0.05 and effect size is 0.43). The Shapiro-Wilk test was used to test normality. Descriptive statistics were expressed in mean ± standard deviation (SD) and median (min-max) for continuous variables. Categorical data were expressed in number and percentage. The Student's t-test, Mann-Whitney U test, and chi-square test were used to compare continuous and nominal variables between the groups. The Spearman's correlation coefficient was used to analyze the association between psychological assessments and clinical findings. The correlation coefficient ranges in value from -1 to +1. Coefficient was accepted as: 0-0.10 negligible correlation; 0.10-0.39 weak correlation; 0.40-0.69 moderate correlation; 0.70-0.89 strong correlation, and 0.90-1.00 very strong correlation.[29] Significant predictors for anxiety, depression, and impulsiveness were evaluated with univariate analyses and at least moderately significant variables were selected for multivariate analyses. Regression analyses met the assumptions including linear relationship between the outcome variable and the independent variables; appropriate sample size; homoscedasticity; independence of observations. The backward method was used in the selection of variables. A p value of <0.05 was considered statistically significant.

RESULTS

Demographic and clinical characteristics of AS and control groups are summarized in Table 1. There were no significant differences between the AS and control groups in terms of age, sex, training duration, and employment status. All of the patients with AS continued to follow-up visit regularly and were using non-steroidal anti-inflammatory drugs or/and disease-modifying anti-rheumatic drugs. The ASDAS value of 51 (72.85%) AS patients was >2.1.

Psychological assessment showed that depression, anxiety, and non-planning impulsiveness scores were higher in AS patients. In the present study, 40% and 41.4% of AS patients had suffered from moderate-to-severe depressive and anxiety symptoms, respectively. Quality of life scores of AS patients were worse than controls (Table 2).

The BIS-11 non-planning impulsivity, BDI, and BAI scores were worse in the patients with AS, compared

Table 1. Demographic and clinical characteristics of ankylosing spondylitis patients and control group

	AS group (n=70)					Control group (n=56)					
	n	%	Mean±SD	Median	Min-Max	n	%	Mean±SD	Median	Min-Max	p
Age (year)			42.85±10.46					44.75±13.04			0.368
Sex											0.548
Female	30					27					
Male	40					29					
Training duration (year)			5.90±3.25	5	1-15			6.30±4.24	5	1-16	0.705
Unemployed	28	40				21	37.5				0.775
Disease duration (year)			8.67±6.19	6.5	2-27						
VAS pain			4.22±2.99	5	0-10						
ASDAS-CRP			2.64±0.99								
BASFI			3.16±0.30	2.85	0-9.20						
BASMI			6.78±0.18	6	5-10						
ESR ≥20 (mm/h)	21	30.0									
CRP ≥5 (mm/h)	39	55.71									

AS: Ankylosing spondylitis; SD: Standard deviation; Min: Minimum; Max: Maximum; VAS: Visual Analog Scale; ASDAS: Ankylosing Spondylitis Disease Activity Score; CRP: C-reactive protein; BASFI: Bath Ankylosing Spondylitis Functional Index; BASMI: The Bath Ankylosing Spondylitis Metrology Index; ESR: Erythrocyte sedimentation rate.

Table 2. Psychological assessment and quality of life of ankylosing spondylitis patients and control group

	AS group (n=70)					Control group (n=56)					Statistic	p*
	n	%	Mean±SD	Median	Min-Max	n	%	Mean±SD	Median	Min-Max		
Toronto Alexithymia Scale			54.84±12.96					54.32±11.12			t=0.239	0.642
Eating Attitude Test			21.74±15.18	16.5	8-83			22.01±13.24	20.5	4-73	Z=-0.693	0.488
Barratt Scale												
Attention impulsiveness			15.68±3.25					15.21±3.25			t=0.867	0.593
Motor impulsiveness			19.62±4.28					18.92±4.23			t=0.915	0.312
Non-planning impulsiveness			26.00±4.57					24.28±3.77			t=2.257	0.021
Beck Depression Inventory			13.88±8.99	13	0-43			9.78±8.34	8	0-34	Z=-2.726	0.006
Back depression inventory (≥17)	28	40				11	19.6				χ^2=6.034	0.014**
Mild depressive symptoms (BDI 10-16)	20	28.6				12	21.4					
Moderate depressive symptoms (BDI 17-29)	27	38.6				8	14.3					
Severe depressive symptoms (BDI 30-63)	1	1.4				2	3.6					
Beck anxiety inventory			14.58±10.02	13	0-41			10.53±8.99	8	0-41	Z=-2.445	0.014
Beck anxiety inventory (≥16)	29	41.4				16	28.6				χ^2=4.860	0.044**
Mild anxiety symptoms (BAI 8-15)	20	28.6				15	26.8					
Moderate anxiety symptoms (BAI 16-25)	19	27.1				13	23.2					
Severe anxiety symptoms (BAI 26-63)	10	14.3				3	5.4					
NHF-domains												
Energy			58.06±40.79	66.60	0-100			41.64±38.78	33.30	0-100	Z=-2.200	0.028
Pain			46.47±34.90	43.75	0-100			32.58±31.50	31.50	0-100	Z=-2.236	0.025
Emotional reaction			41.06±34.90	33.30	0-100			31.72±26.31	22.20	0-100	Z=-1.998	0.019
Sleep			44.57±32.86	40.00	0-100			26.42±27.79	20.00	0-80	Z=-3.125	0.002
Social isolation			21.42±30.32	0.00	0-100			7.85±16.48	0.00	0-60	Z=-3.054	0.002
Physical abilities			32.85±26.59	37.50	0-87.50			32.36±83.82	12.50	0-62.50	Z=-2.069	0.039
Fatigue severity scale			5.37±2.32	5	1.20-7			5.50±1.95	5	1.80-7	Z=-0.160	0.873
ASQOL			7.31±5.75	7	0-18							

AS: Ankylosing spondylitis; SD: Standard deviation; Min: Minimum; Max: Maximum; BDI: Beck Depression Inventory; BAI: Beck Anxiety Inventory; NHP: Nottingham Health Profile; ASQOL: Ankylosing Spondylitis Quality of Life; * Results are presented as mean ± SD, median (min-max) and were analyzed with student T test and Mann-Whitney U test according to normality tests. "Z" was used for Mann Whitney U test, "t" was used for student T test, χ^2 was used for chi square value; ** P values analyzed with Chi-square test.

Table 3. Correlations between psychological scores, disease parameters, and quality of life

	Non-planning impulsiveness		Beck depression inventory		Beck anxiety inventory	
	r	p	r	p	r	p
Age	-0.046	0.633	0.119	0.360	0.151	0.213
Education duration	-0,014	0,925	-0,055	0,638	-0,087	0,483
Disease duration	0.037	0.760	0.079	0.515	0.061	0.615
VAS pain	0.188	0.120	0.379	0.001*	0.369	0.002*
CRP	-0.028	0.816	0.235	0.050	0.085	0.487
ESR	-0.137	0.258	0.257	0.031*	0.165	0.172
ASDAS-CRP	0.103	0.396	0.499	<0.001*	0.476	<0.001*
BASFI	0.120	0.323	0.499	<0.001*	0.647	<0.001*
BASMI	0.163	0.178	0.212	0.078	0.227	0.059
Fatigue severity scale	0.247	0.007*	0.630	<0.001*	0.713	<0.001*
ASQOL	0.196	0.103	0.734	<0.001*	0.705	<0.001*
NHP domains						
Energy	0.158	0.201	0.479	<0.001*	0.458	<0.001*
Pain	0.098	0.420	0.589	<0.001*	0.675	<0.001*
Emotional reaction	0.221	0.061	0.761	<0.001*	0.679	<0.001*
Sleep	0.179	0.132	0.573	<0.001*	0.513	<0.001*
Social isolation	0.313	0.001*	0.613	<0.001*	0.498	<0.001*
Physical abilities	0.170	0.143	0.676	<0.001*	0.703	<0.001*
Beck depression inventory	0.221	0.013*	1		0.680	<0.001*
Beck anxiety inventory	0.114	0.215	0.689	<0.001*	1	

VAS: Visual Analog Scale; CRP: C-reactive protein; ESR: Erythrocyte sedimentation rate; ASDAS: Ankylosing Spondylitis Disease Activity Score; BASFI: Bath Ankylosing Spondylitis Functional Index; BASMI: The Bath Ankylosing Spondylitis Metrology Index; ASQOL: Ankylosing Spondylitis Quality of Life; NHP: Nottingham health profile.

Table 4. Relationship between psychological and clinical variables

	B	SE	p*	95% CI	R²	F
Depression						
ASDAS-CRP	3.09	1.25	0.014	0.58 / 5.61		
Emotional reaction	0.09	0.02	<0.001	0.03 / 0.14	0.804	40.232
Social isolation	0.07	0.02	0.013	0.01 / 0.12		
Anxiety						
ASDAS-CRP	4.58	1.08	<0.001	2.42 / 6.74	0.529	37.354
Emotional reaction	0.07	0.03	0.044	0.01 / 0.15		
Non planning impulsiveness						
Fatigue	0.37	0.18	0.044	0.01 / 0.73	0.069	5.048

B: Regression coefficient; SE: Standard error; Cl: Confidence interval; ASDAS: Ankylosing Spondylitis Disease Activity Score; CRP: C-reactive protein; * Multivariate regression analyses. R²: Coefficient of determination; F: Significance of a multiple coefficient of correlation.

to the control group. The relationship between these psychological assessments, disease activity parameters, quality of life, and disease duration was evaluated in AS patients. The BDI and BAI scores were correlated with pain, ASDAS, BASFI, fatigue, ASQOL, and NHP scores. The BIS-11 non-planning impulsivity score was correlated with depression, fatigue, and social isolation subgroup of NHP, while there was no association with disease activity, pain, and function (Table 3).

In the multivariate analysis, we found significant predictors for depression, anxiety, and non-planning impulsiveness scores, which were worse in the AS patients. The ASDAS-CRP and emotional reaction scores were positively associated with both depression and anxiety, while social isolation scores were positively associated with depression and fatigue scores were positively associated with non-planning impulsiveness. The results were shown in Table 4.

DISCUSSION

In this study, we evaluated the frequency of some psychiatric disorders and relationship between disease

activity, quality of life, and psychological variables in AS patients. Our findings advocate that depression, anxiety, and impulsiveness were more common in AS patients, compared to healthy controls. Psychological problems were significantly correlated with the quality of life. While high disease activity was associated with depression and anxiety, we found no association with impulsiveness in our AS patients. Fatigue was found to be the most significant predictor for non-planning impulsiveness.

Psychiatric disorders in patients with AS were investigated in several studies, and higher depression and anxiety prevalence than healthy controls were shown.[1-3,6,7-15] In addition, different experts suggested that depression and anxiety rates were similar in AS and non-radiographic axial spondyloarthritis.[7,8] We found moderate-to-severe depression, and anxiety symptoms were 40% and 41.4% in patients with AS, respectively. Our findings which revealed higher depression and anxiety scores in AS patients are also consistent with previous study findings.[1-3,6,15]

Similar to many authors, we confirmed that depression and anxiety were correlated with pain, disease activity, functional status, and quality of life in AS patients, and we found a positive correlation between depression and CRP and ESR values.[1,3,6,8,10,12-14] In a Moroccan study, BASFI, vitality, and role limitations due to emotional problems were identified as the independent factors affecting depression with using multivariate logistic regression analyses.[12] Disease activity, function, and quality of life were also considered interrelating parameters in chronic arthritis. Rodriguez-Lozano et al.[30] showed that high disease activity was associated with increased depression and anxiety, and psychological problems might affect the disease acceptance in AS patients. After multivariate analyses, we found that ASDAS value was the strongest parameter influencing anxiety and depression. Based on these findings, we consider that depression and anxiety together with high disease activity increase functional impairment and reduce the quality of life in AS.

Spinal mobility limitations are evaluated using the BASMI in patients with AS. Although spinal restriction is less commonly used measure on this topic; Matrindale et al.[13] showed that limited spinal mobility was effective on depression and anxiety, while no or weak association was reported between spinal mobility and psychological disorders in other studies.[1,6] In our study, we found no relationship between psychological disorders and BASMI scores. It is known that spinal restriction is a long-term outcome, and BASMI is an objective measurement assessed by the physician, while pain and functional status are patient reported outcome measures. In addition, patient-reported outcomes have been considered more valuable for disease management in recent years.

The number of studies performed with psychiatric disorders other than anxiety and depression are limited. Some topics include schizophrenia, bipolar disorder, symptoms of somatization, phobic anxiety, and hostility.[2,9] Alexithymia, which is defined as the trait associated with difficulty in identifying and describing thoughts and emotions, was investigated in a study with AS patients. Solmaz et al.[5] studied alexithymia considering frequent coexistence with depression and found higher alexithymia scores in patients with AS. In our study population, alexithymia did not differ between the AS patients and controls. We believe that further studies are needed to shed light into this issue.

Impulsivity, defined as acting without thinking, is one of the important clinical features of many different psychiatric disorders. In the overall population, impulsivity has been found to be a contributing factor for depression, anxiety, aggression, self-injury, suicide attempts, and antisocial personality disorder.[31] Its prevalence has been reported higher in depression and may cause future complications and treatment failure.[27,31] We analyzed impulsiveness, considering the irritable AS patients, impulsive behavioral patterns, increased depression and anxiety. To the best of our knowledge, this is the first study to assess the relationship between impulsivity, disease activity, function, fatigue, and quality of life in patients with AS. Our results indicated increased non-planning impulsiveness in patients with AS consistent with our observations in the outpatient clinic. We also found a positive correlation between non-planning impulsiveness, fatigue, social isolation, and depression scores. Opposed to depression and anxiety, there was no association between impulsivity with disease activity and functional status. Of note, social isolation and fatigue correlated with impulsivity have come into prominence. Social isolation is known as the feeling of being separated from other individuals. Social isolation scores deteriorate similar to other parameters of quality of life in painful chronic diseases and depression.[32,33] In the present study, social isolation was correlated with depression, anxiety, and impulsivity. This parameter is associated with psychiatric comorbidities and it may directly or indirectly influence the treatment compliance.

It has been reported that social participation should be acquired to achieve the goal of treatment. Therefore, preservation and normalization of social participation have been specifically addressed in the current guidelines.[34]

Fatigue is common in arthritis and it is known that this complaint is more central than peripheral and more psychological. Carneiro et al.[35] showed a significant correlation between fatigue, quality of life, anxiety, and depression in psoriatic arthritis. Bartlett et al.[36] reported that fatigue had a greater impact on participation in social roles and quality of life. In our study, multivariate analyses revealed that fatigue was the only parameter influencing non-planning impulsivity, drawing attention as a critical target for increased impulsivity. Decreasing fatigue in AS patients may, thus, prevent impulsivity and improve social relations and treatment compliance. In addition, we consider that coexistent impulsivity may reduce treatment success and may affect the dialogue between the patient and physician. Therefore, detailed evaluation of the patients and treatment of concomitant psychiatric disorders would improve management outcomes and quality of life in AS patients.

Furthermore, increased eating disorders have been reported to be associated with depression and impulsivity.[37,38] Diogo et al.[38] showed that patients with eating disorders had higher levels of pain and anxiety among dancers. We used EAT in AS patients due to the higher depression rates and increased impulsivity; however, we found no difference between the AS patients and controls. Eating habits may be associated with emotional status, although it would be useful to examine this topic in further large-scale studies.

On the other hand, relatively small sample size is the main limitation of our study; therefore, longitudinal studies in larger samples are needed to confirm our preliminary findings.

In conclusion, impulsivity may be one of the psychiatric disorders associated with AS, such as more commonly known anxiety and depression. Therefore, psychiatric disorders other than depression and anxiety should be considered and the importance of struggle with fatigue in AS patients for the future complications should be kept in mind.

Declaration of conflicting interests

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

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