

1 **Effects of the COVID-19 pandemic on psychology and disease activity in patients**
2 **with ankylosing spondylitis and rheumatoid arthritis**

3 **Abstract**

4 **Background/aim:** The COVID-19 outbreak is known to increase stress levels of most
5 patients with chronic diseases. Patients with Ankylosing Spondylitis (AS) and
6 Rheumatoid Arthritis (RA) are highly susceptible to environmental stress. In the current
7 study, we aimed to determine how the COVID-19 pandemic psychologically affected
8 patients with chronic progressive diseases such as AS and RA and the effects of these
9 psychological factors on disease activity.

10 **Materials and methods:** Age and gender-matched patients with AS (n=80), RA (n=80),
11 and healthy controls (n=80) were included in the study. All participants were evaluated
12 with the “Perceived COVID-19 Threat Form (PCTF)”, “Suicide-Ideation Scale (SIS)”,
13 “Hospital Anxiety and Depression Scale (HADS)”, “The Ability to Cope with Trauma
14 (PACT)” and “Psychological General Well-Being Index (PGWB)” scales. BASDAI was
15 used in patients with AS and DAS28 was used in patients with RA to assess disease
16 severity.

17 **Results:** Compared to healthy individuals, patients with RA and AS had lower PGWB
18 scores and higher HADS depression and anxiety subscale scores. Almost all psychometric
19 assessment test scores were worse in AS patients with high-disease activity compared to
20 those in low-disease activity. PACT scores were higher in patients with moderate RA
21 compared to patients with mild RA ($p=0.006$). While a positive correlation was identified
22 between BASDAI and most of the psychometric assessment test scores ($r=0.36$ for
23 PCTF, $r=0.53$ for depressive scores, $r=0.54$ for anxiety scores, $r=0.57$ for suicidal

1 ideation), DAS28 scores were found to be associated only with PACT total and PACT
2 perceived forward-focused subscale scores ($r = -.26$ and $r = .33$, respectively).

3 **Conclusion:** Psychologically, AS and RA patients were found to be worse off compared
4 to healthy controls. The perceived COVID threat and psychological status were
5 associated with disease activity in AS, but not RA patients. Patients with chronic illnesses
6 may be more vulnerable to the psychological effects of the pandemic, which can worsen
7 disease activity.

8 **Key words:** COVID-19, ankylosing spondylitis, rheumatoid arthritis, psychological
9 well-being, disease activity, coping ability

10 **1. Introduction**

11 Rheumatoid arthritis (RA) and ankylosing spondylitis (AS) are the two most common
12 rheumatological diseases worldwide [1]. It is known that psychiatric symptoms such as
13 depressive mood and anxiety are more widespread in patients with rheumatological
14 diseases than healthy individuals [2-5]. According to data from The United States of
15 America, the lifetime prevalence of psychiatric disorders in RA patients was 63.6% [6].
16 In a long-term comprehensive longitudinal Swedish cohort study, psychiatric symptoms
17 / illnesses were reported to be more common in patients with AS compared to patients
18 with RA [7]. A significant relationship was reported between psychiatric syndromes and
19 disease activity scores such as Bath Ankylosing Spondylitis Disease Activity Index
20 (BASDAI), Bath Ankylosing Spondylitis Functional Index (BASFI), pain and fatigue in
21 patients with AS [8]. Complaints of anxiety and depression are frequently encountered in
22 these patients [9]. A significant relationship between the scale Disease Activity Score in
23 28 Joints (DAS28), as well as other disease activity scores and psychiatric syndromes
24 such as anxiety and depression have also been reported in RA [10].

1 The novel coronavirus 2019 (COVID-19) outbreak, which started in Wuhan in January
2 2019 and then spread worldwide, has been declared a pandemic and its repercussions are
3 continuing. Data from the COVID-19 outbreak as well as previous pandemics have
4 shown that large-scale outbreaks have a wide spectrum of psychosocial effects. In
5 particular, patients with chronic diseases are more susceptible to psychosocial stressors,
6 both physically and psychologically. Symptoms of psychosocial effects such as intense
7 stress, nervousness, anxiety, fear, complaints of depression, decreased tolerance, anger,
8 post-traumatic stress disorder, and psychosomatic complaints are often observed
9 [11,12,13]. Additionally, individuals may obtain incorrect information related to chronic
10 diseases during the pandemic, both through social media and their relatives and friends.
11 This may cause an increase in anxiety levels and a decrease in coping strategies to reduce
12 psychological well-being overall [14].

13 Complaints such as depression, sleep disorders, loss of appetite, and fatigue, which are
14 difficult to adapt to and make it harder to maintain social communication, can be seen
15 more frequently in patients with chronic diseases [15]. Interestingly, the risk of COVID-
16 19 was reported to not be higher in RA and AS patients with no effect on the clinical
17 course of these diseases during the pandemic [16,17]. However, patients with
18 rheumatological diseases, who are prone to psychological disorders, are likely to be easily
19 psychologically affected by the COVID-19 outbreak. Recent studies have shown that
20 patients with RA, Axial Spondyloarthritis, Lupus, and Behçet Disease were severely
21 affected by the COVID-19 pandemic [18-21].

22 In the current study, we aimed to determine how the COVID-19 pandemic
23 psychologically affected patients with chronic progressive diseases such as AS and RA
24 and the effects of these psychological factors on disease activity.

1 **2. Materials and methods**

2 **2.1. Participants**

3 Age and gender-matched patients with AS (n=80), RA (n=80), and healthy volunteers
4 (n=80) were recruited for the study. The AS and RA groups were comprised of patients
5 who were followed up at the Necmettin Erbakan University, Meram Medical Faculty,
6 Department of Rheumatology. Patients with AS were contacted by telephone first and
7 related documents were sent to their smart-phones via online communication
8 applications. We excluded patients with other co-morbid chronic diseases from the
9 current study. Similarly, the healthy control group was reached via online communication
10 applications. Relatives of patients with no chronic disease who applied to the internal
11 medicine outpatient clinic were included in the healthy control group. Data from RA
12 patients were obtained with face-to-face interviews at the hospital since blood analysis
13 results were necessary to calculate DAS28 scores. Participants who were under 18 years
14 old, over 70 years old, and with less than 5 years of formal education were not included
15 in the study. Additionally, the data of participants who did not complete all psychometric
16 assessment scales were excluded from the analysis. The sample size was calculated by
17 evaluating the effect size as 0.25, α -err as 0.05, and power as 0.90 with G Power 3.1.9.2
18 [22,23].

19 **2.2. Ethical Approval**

20 The Turkish Ministry of Health, General Directorate of Health Services approved the
21 study protocol (Approval Date/Number: 29.04.2020/ŞAKİR GICA-2020-04-29-
22 T16_26_23). The local Ethics Committee on human research also approved the study
23 (IRB Date/Number: 08.05.2020/2020-2485). Prior to the start of the study, all participants
24 received an informed consent form stating the details of the research, and participants

1 who consented to volunteer approved this form. The participants were accepted to the
2 study after they provided their written informed consent.

3 **2.3. Data Collection Tools**

4

5 *Personal Information Form*

6 This form was used to obtain demographic information about the participants.

7

8 *Perceived COVID-19 Threat Form (PCTF)*

9 This form was developed by Kavaklı et al [17]. The form has seven items and a five-point
10 Likert type scale ranging from never (score of 1) to always (score of 5). The developers
11 of this scale stated that the form has a one-factor structure according to parallel analysis.
12 The form aims to measure the participants' perceived COVID-19 threat levels; a higher
13 total score corresponds to a higher perceived threat from the COVID-19 pandemic.
14 Kavaklı et al. reported the Omega reliability score of the scale as .78 [24].

15 *Suicide Ideation Scale (SIS)*

16 The SIS is a self-reported test that was developed in 1989 by Levine et al. The SIS is
17 comprised of 17 questions that are answered in a yes/no manner and the total score of the
18 scale varies between 0-17. A high score means pronounced suicidal ideation. Nesrin et
19 al. performed the validity and reliability studies for the Turkish scale [25].

20

21 *Hospital Anxiety and Depression Scale (HADS)*

22 The HADS was developed by Zigmond and Sinaith to determine risk groups by
23 evaluating anxiety and depression in a brief time in people with physical illness. It is a

1 self-reported scale comprising 17 questions and 2 sub-dimensions. Its validity and
2 reliability in the Turkish have been conducted by Aydemir et al [26].

3

4 *The Perceived Ability to Cope with Trauma scale (PACT)*

5 The PACT is a 5-point Likert-type self-reported scale developed by Bonanno et al. (2011)
6 to test the perception of coping with trauma in life [27]. The Turkish form of the scale is
7 comprised of 20 items and has a 2-factor structure. There are no inverse items on the
8 scale. Cronbach's alpha internal consistency coefficient was calculated as 0.79 for trauma
9 focus, 0.90 for future focus, and 0.79 for the total scale. Ari et al. reported the validity
10 and reliability of the scale in Turkish [28].

11

12 *Psychological general well-being index score (PGWB)*

13 The PGWB score is a self-reported test that was developed by Diener et al. The score is
14 comprised of eight items that define important elements of human function from positive
15 relationships to feelings of efficacy and a meaningful life [29]. The scores range from 8
16 (I do not agree with all items absolutely) to 56 (I agree with all items absolutely). A top
17 score indicates the presence of psychological resources and powers in the patient. The
18 adaptation of the scale into Turkish was carried out by Telef et al. [30].

19

20 *Bath Ankylosing Spondylitis Disease Activity Index (BASDAI)*

21 BASDAI is used in the clinical evaluation of AS patients and is comprised of 6 questions.
22 The patient is asked to answer the questions by considering events during the past week
23 [31] and scores the first five questions between 0-10 with 0 corresponding to "absent"
24 and 10 corresponding to "very severe". The BASDAI score is calculated by summing the

1 average of the scores obtained from the fifth and sixth questions and the scores obtained
2 from the first four questions and dividing the latter score by five. Akkoc et al. reported
3 the validity and reliability study of the Turkish version of the scale [32].

4 *Disease Activity Score-28 (DAS28)*

6 The DAS28 is used to evaluate the severity of RA by calculating the swollen, sensitive
7 joint number, “Erythrocyte Sedimentation Rate (ESR)” and “Visual Analogue Scale
8 (VAS)” data together. In some studies, “C-Reactive Protein (CRP)” is also used instead
9 of ESR [33].

10 **2.4. Procedure**

11 After obtaining ethical approval, the data from the study participants were gathered online
12 in the interest of maintaining social distancing during the COVID-19 pandemic. All
13 participants received an informed consent form stating the details about the study, and
14 individuals who volunteered to take part approved this form. Then, a questionnaire
15 booklet was created with considerations of the order effect. The data of patients with RA
16 were obtained with face-to-face interviews since data from blood analysis were needed
17 to calculate the DAS28 score.

18 **2.5. Statistical Analysis**

19 Descriptive variables are reported as mean \pm SD, median (range), n, and percentage. The
20 evaluate whether the variables had a normal distribution, visual (histogram and
21 probability graphs) and analytical (Kolmogorov Smirnov and Shapiro-Wilk) tests were
22 conducted. The Kruskal Wallis test was used for comparison of the suicidal ideation scale
23 scores between the multiple independent groups. The level of statistical significance in
24 nonparametric multiple comparisons was determined with the Bonferroni correction (p

1 <0.05 / number of comparisons). One-way ANOVA was used for statistical evaluation of
2 the normally distributed numerical data between multiple independent groups. For one-
3 way ANOVA, homogeneity was determined with Levene's Statistic test, followed by a
4 post hoc Least Significant Difference (LSD) test. The RA patients were divided into two
5 groups: a remission or mildly active group ($DAS28 < 3.2$) and a moderate to high activity
6 group ($DAS28 \geq 3.2$) [34]. The AS patients were grouped into high disease activity score
7 ($BASDAI \geq 4$) and low-disease activity score ($BASDAI < 4$) according to the BASDAI
8 scores [35]. Based on the parametric distribution of the data, psychometric assessment
9 scales of remission/mild and moderate RA patients were compared with Students t-test
10 and AS patients at remission or non-remission were compared with Mann-Whitney U
11 test. Chi-square test and Fisher's Exact test were used to compare categorical variables
12 between the groups. If both variables fit the normal distribution, the relationship between
13 the numerical variables was evaluated using Pearson correlation analysis, and if at least
14 one of the variables did not fit the normal distribution, the variables were evaluated using
15 Spearman correlation analysis. For statistical significance, a total type-1 error level of 5%
16 was used.

17 **3. Results**

18 Comparative data on sociodemographic characteristics and clinical features of patients
19 with AS, RA, and the healthy control group is shown in **Table 1**. The mean BASDAI
20 score of patients with AS was found to be 5.3 ± 2.6 and the mean DAS28 score of RA
21 patients was found to be 3.0 ± 0.9 . The age and gender of the patient with AS, RA, and
22 control groups were statistically similar. The disease duration in AS patients was $9.0 \pm$
23 7.0 years and the same in RA patients was 7.8 ± 6.9 years ($p=0.567$). No significant
24 difference was found between the groups in terms of the presence of psychiatric disorders,

1 smoking, pain level, and regular exercise. The level of education was found to be lower
2 in the RA patients compared to AS patients and the control group ($p < 0.001$). A significant
3 difference in working status was found between the groups ($p = 0.001$).

4 A comparison of psychometric assessment scale scores of patients with AS, RA and the
5 healthy control group is shown in **Table 2**. Compared to the control group, patients with
6 RA or AS had lower PGWB scores and higher HADS depression and anxiety subscale
7 scores ($p = 0.024$ and $p = 0.044$ for RA patients; $p = 0.001$ and $p = 0.044$ for AS patients,
8 respectively). There was no significant difference in PCTF, SIS, PACT trauma-focused
9 coping scores between the groups. PACT perceived forward-focused subscale scores
10 were significantly lower in RA patients compared to the control group and AS patients.

11 All psychometric assessment scales were found to be significantly different between AS
12 patients with high-disease activity score and low-disease activity score except the PACT
13 forward-focused sub-dimension. A significant difference was identified only in the PACT
14 total and PACT forward-focused sub-dimension scores between RA patients with mildly
15 active or in remission versus RA patients with moderate to high active. The comparative
16 psychometric assessment scale scores of AS and RA patients according to disease severity
17 are shown in **Table 3**.

18 Correlation analyses indicated the presence of a significant relationship between the
19 BASDAI total score and scores of most of the psychometric assessment scales used. The
20 DAS28 scores were found to be significantly associated only with PACT total and PACT
21 perceived forward-focused subscales scores. Correlation analyses between the
22 BASDAI/DAS28 and psychometric assessment scales are shown in **Table 4**. Patients
23 with AS showed a negative correlation between PCTF scores and PGWB scores ($r = -$
24 0.41 , $p < 0.001$) and a positive correlation between PCTF and SIS, HADS-depression

1 subscale, and HADS-anxiety subscale ($r=0.40$, $p<0.001$; $r=0.36$, $p=0.001$; $r=0.39$,
2 $p<0.001$, respectively). However, no correlation was found between PCTF and PGWB
3 scores in patients with RA. Nevertheless, similar to patients with AS, a positive
4 correlation was found between PCTF and SIS, HADS-depression subscale, and HADS-
5 anxiety subscale ($r=0.34$, $p=0.003$; $r=0.23$, $p=0.005$; $r=0.48$, $p<0.001$, respectively) in
6 patients with RA.

7 **4. Discussion**

8 A pandemic that has spread to large masses worldwide and has caused nearly 2 million
9 deaths will inevitably have a psychological impact on many individuals, including
10 patients with chronic diseases such as RA and AS. In the present study, we investigated
11 the effect of the pandemic on the psychological status and relationship of the latter with
12 disease activities in patients with RA and AS. When compared to healthy controls, we
13 found that patients with RA as well as AS had low levels of well-being and high levels of
14 depression; patients with RA had low ability to cope with trauma, while patients with AS
15 had high anxiety levels. A statistically significant relationship was identified between
16 disease activity and ability to cope with trauma, suicidal ideation, depression, and anxiety
17 levels in patients with AS. AS patients with high disease-activity differ from AS patients
18 with low-disease activity in all psychometric areas. In patients with RA, a significant
19 relationship was identified only between disease activity and the ability to cope with
20 trauma. The ability to cope with trauma of patients with moderate to high active RA was
21 higher than patients with remitted or mildly active RA. We found a positive correlation
22 between perceived COVID-19 threat and suicidal ideations, level of depression, and
23 anxiety in both RA and AS patients. However, a strong correlation was identified between

1 perceived COVID-19 threat and psychological well-being in patients with AS, but not in
2 patients with RA.

3 Psychiatric disorders such as anxiety, depression, and stress can often be seen in patients
4 with AS and RA [36,37] and can significantly reduce their quality of life by negatively
5 affecting their day to day living [1]. However, psychiatric symptoms may differ in
6 patients suffering from these diseases, and the prevalence of psychiatric symptoms may
7 vary. Sundquist et al. reported that patients with AS had a higher prevalence of psychiatric
8 symptoms compared to patients with RA [7]. In a German study, the frequency of
9 depressive symptoms in patients with axial spondyloarthritis was found to be similar to
10 patients with RA [38]. The HADS anxiety and depression scale scores of both RA and
11 AS patients were reported to be higher than healthy controls [9, 39]. The psychological
12 well-being of patients with RA was found to be lower than healthy controls [40]. To our
13 knowledge, ours is the first study evaluating the psychological well-being of AS patients
14 using the PGWB score.

15 Many patients with rheumatological diseases are likely to be psychologically affected by
16 the ongoing COVID-19 pandemic. Mancuso et al. reported that the psychiatric complaints
17 of patients with rheumatological diseases (a total of 112 patients with Systemic Lupus
18 Erythematosus (SLE), RA, and Spondyloarthritis) increased significantly during the
19 pandemic [18]. On the other hand, Kucuk et al. found that patients with Behçet Disease
20 were psychologically affected by the pandemic, and their PGWB scores were low
21 compared to healthy controls, while the HADS anxiety and depression scores were
22 significantly higher [19]. Tee et al. detected moderate levels of anxiety, depression, and
23 stress in patients with RA during the pandemic [20] but reported that patients with SLE
24 were affected more by the pandemic than patients with RA [20]. Similarly, Picchianti

1 Diamanti et al. found that patients suffering from rheumatological diseases such as RA
2 and AS experienced severe anxiety during the pandemic [21]. Interestingly, Seyahi et al.
3 reported that patients with a rheumatologic disease had lower anxiety and depression
4 levels than hospital workers in a large study involving hospital and academic staff [41].
5 Previous studies have already shown that healthcare workers experience a high degree of
6 anxiety and fear [42,43]. In contrast to the study by Picchianti Diamanti et al. [21], the
7 current study found that levels of perceived COVID threat between AS and RA patients
8 and healthy controls were similar. These data suggest that the healthy individuals who
9 participated as controls in the study also perceived a similar level of threat of the COVID-
10 19 pandemic as the patients. In our study, the general psychological well-being of patients
11 with AS and RA was worse with higher complaints of anxiety and depression compared
12 to healthy controls. Additionally, a correlation between perceived COVID threat and the
13 suicidal ideation, level of depression, and anxiety were identified in patients with AS and
14 RA suggesting that these patients were severely affected by the COVID-19 pandemic. In
15 fact, the association of a perceived threat with distress and lower levels of well-being has
16 been reported in previous studies conducted on healthy individuals [44]. Similarly, in
17 population studies with large sample sizes, COVID-19 has been reported to increase the
18 frequency of the presence of anxiety and depressive symptoms [45].
19 Whether the follow-up, treatment, and disease activity of rheumatological diseases
20 changed during the pandemic has been the subject of many studies [46,47]. Lopez et al.
21 investigated whether the disease activity scores of patients with RA and axial
22 spondyloarthritis changed during the pandemic period and observed that 37.4% of the
23 patients showed worsening of disease activity. [46]. On the other hand, Ciurea et al. found
24 that disease activity of patients with neither RA nor AS increased significantly during the

1 COVID-19 pandemic [47]. The current study did not evaluate whether the disease activity
2 of patients was affected by the pandemic directly. Rather, we found that AS patients with
3 high-disease activity were more affected by the COVID-19 threat compared to patients
4 with low-disease activity; their sense of well-being was lower, and their anxiety and
5 depression scores were higher. At the same time, a significant relationship was found
6 between the perceived threat of COVID-19 and disease activity in patients with AS.
7 Suicidal ideation, ability to cope with trauma, anxiety and depressive symptoms were
8 found to be related to disease activity in patients with AS. However, it was observed that
9 only the ability to cope with trauma was associated with disease activity in patients with
10 RA. There were no patients with severe RA in the current study. The score of coping with
11 trauma was the only difference identified between moderate RA and mild RA cases. The
12 fact that the proportion of AS patients with high-disease activity (68.75%) was higher
13 than the proportion of AS patients with low-disease activity may suggest that patients
14 with AS were more affected by the pandemic compared to patients with RA. Nonetheless,
15 the lack of patients with severe RA may explain the absence of a significant relationship
16 between RA disease activity and psychological parameters. On the other hand, it has been
17 previously reported that psychological symptoms were higher in patients with AS
18 compared to patients with RA [7]. Similarly, in previous studies, it has been reported that
19 disease activity was associated with psychological status in patients with AS [9].
20 Different clinical courses, age of onset, and gender distributions of the two diseases may
21 result in differences in psychological factors and symptoms. Levels of neurotransmitters
22 such as serotonin and noradrenaline, which play a role in the pathophysiology of
23 depression, anxiety, and pain, may also differ between patients with RA and AS [48–51].

1 Due to these differences, AS and RA patients may not be affected by the pandemic to the
2 same extent.

3 An important outcome of the current study is the finding of a more pronounced negative
4 correlation between coping skills and disease activity in patients with RA compared to
5 patients with AS. A significant relationship between the perception of pain and inability
6 to cope has previously been reported in patients with RA [52]. In the same study, it was
7 emphasized that passive coping skills were predictors of both depression and pain in
8 patients with RA, and because RA exacerbations are unpredictable, individuals with
9 inadequate coping skills interpret the disease as uncontrollable [52].

10 In conclusion, the current study showed that patients with AS and RA displayed a worse
11 psychological status compared to a healthy control group in response to the ongoing
12 COVID-19 pandemic. While the perceived COVID-19 threat was related to most
13 psychometric areas, both psychometric features and perceived COVID-19 threat were
14 related to disease activity in patients with AS. In patients with RA, only the perception of
15 coping with trauma was found to be associated with disease activity. Patients with AS
16 may be more vulnerable to the psychological effects of the pandemic, which can affect
17 disease activity.

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1 **Table 1.** Comparison of sociodemographic characteristics and clinical features of
 2 patients with AS, RA and healthy control group

		Patients with AS (n=80)	Patients with RA (n=80)	Control (n=80)	p value
Age (years) (mean±SD)		41.5±8.8	44.4±9.0	42.4±10.3	0.140
Gender (M) (n, %)		42 (52.5%)	24 (30%)	33 (41.25%)	0.149
Disease duration (years) (median (min-max))		7.0(1-30)	5(0-37)		0.158
BASDAI score (median (min-max))		5.40 (0-10)			
DAS28 score			3.0±0.9		
Pain levels (mean±SD)		5.4±2.9	5.6±2.8		0.613
Smoking (n, %)		29 (36.25%)	18 (22.5%)	17 (21.25%)	0.858
Education (n, %) ^a	High school and below	49 (61.2%)	70 (89.7%)	0 (0%)	<0.001*
	College	31 (38.8%)	8 (10.3%)	80 (100%)	
Working status (n, %) ^b	Unemployed	29 (36.25%)	47 (58.75%)	3 (3.75%)	0.001*
	Employed	37 (46.25%)	24 (30%)	61 (76.25%)	
	Temporary incapacity	4 (5%)	3 (3.75%)	9 (11.25%)	
	Retired	10 (12.5%)	6 (7.5%)	7 (8.75%)	
Marital Status (n, %)	Married	70 (87.5%)	66 (82.5%)	68 (85%)	0.676
Individuals who exercise regularly (n, %)		14 (17.5%)	24 (30%)	18 (22.5%)	0.464
Individuals inmate with people at risk (n, %) ^d		47 (58.75%)	25 (31.25%)	45 (56.25%)	0.003*
Individuals applying to psychiatry at any time in their life (n, %)		34 (42.5%)	21 (26.25%)	22 (27.5%)	0.909
Individuals with psychiatric illness (n, %)	None	48 (60%)	60(75%)	60 (75%)	0.975
	Depression	5 (6.25%)	6 (7.5%)	5 (6.25%)	
	Anxiety	13(16.25%)	5 (6.25%)	8 (10%)	
	After any trauma	4(5%)	2 (2.5%)	4 (5%)	
	Obsessive-compulsive disorder	1 (1.25%)	0 (0%)	0 (0%)	
	Miscellaneous	9 (11.25%)	5 (6.25%)	3 (3.75%)	

3 *p<0.05, One way ANOVA, Chi- Square and Mann Whitney U tests were performed. AS: Ankylosing Spondylitis,
 4 RA: Rheumatoid Arthritis. M: Male, BASDAI: Bath Ankylosing Spondylitis Disease Activity Index, DAS28:
 5 Disease Activity Score-28

6 ^a In post hoc analysis of education level between 3 independent group p<0.001 for each analysis.

7 ^b p<0.001, when healthy and patients with Ankylosing Spondylitis group were compared; p<0.001, when healthy and
 8 patients with Rheumatoid Arthritis group were compared; p=0.020, when patients with Ankylosing Spondylitis and
 9 Rheumatoid Arthritis group were compared.

10 ^c p<0.001, when healthy and patients with Ankylosing Spondylitis group were compared; p<0.001, when healthy and
 11 patients with Rheumatoid Arthritis group were compared; p=0.580, when patients with Ankylosing Spondylitis and
 12 Rheumatoid Arthritis group were compared.

13 ^d p=0.749, when healthy and patients with Ankylosing Spondylitis group were compared; p=0.002, when healthy and
 14 patients with Rheumatoid Arthritis group were compared; p=0.001, when patients with Ankylosing Spondylitis and
 15 Rheumatoid Arthritis group were compared.

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Table 2. Comparison of psychometric assessment scale results of the patients with AS and RA, and control groups

	Control (n=80)	Patients with AS (n=80)	Patients with RA (n=80)	p ¹	p ²	p ³	p ⁴
PCTF(mean±SD)	19.4±5.6	20.5±7.1	19.2±6.5	0.429	0.284	0.908	0.242
PGWB(mean±SD)	45.7±6.9	42.6±10.0	42.1±10.1	0.024*	0.024*	0.014*	0.819
SIS(median [min-max])	1 (0-11)	2 (0-14)	2 (0-15)	0.215	0.141	0.118	0.881
PACT(mean±SD)	100.7±14.4	96.5±16.9	92.5±17.5	0.008*	0.105	0.002*	0.131
PACT trauma-focused coping(mean±SD)	63.8±13.1	60.7±14.5	59.7±14.7	0.160	0.168	0.067	0.636
PACT perceived forward-focused(mean±SD)	36.8±7.1	35.7±8.9	32.9±10.5	0.020*	0.439	0.007*	0.050*
HADS depression (mean±SD)	5.0±3.7	7.1±4.7	7.2±4	0.001*	0.002*	0.001*	0.873
HADS Anxiety (mean±SD)	6.1±3.7	7.5±4.4	7.8±5.2	0.044*	0.019*	0.054	0.679

*p<0.05, One way ANOVA and Kruskal Wallis test were performed. For One-Way ANOVA test, homogeneity was determined with Levene Statistic test and LSD test was applied in post-hoc analysis.

p¹ p value of One way ANOVA or Kruskal Wallis Test

p² Healthy controls vs. patients with Ankylosing Spondylitis

p³ Healthy controls vs. patients with Rheumatoid Arthritis

p⁴ patients with Ankylosing Spondylitis vs. patients with Rheumatoid Arthritis

Abbreviations: AS: Ankylosing spondylitis, RA: Rheumatoid Arthritis, PCTF: perceived COVID-19 threat form, PGWB: psychological general well-being index, SIS: suicide ideation scale, PACT: the perceived ability to cope with trauma scale, HADS: hospital anxiety and depression scale.

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Table 3: Comparison of psychometric assessment scores of patients with AS and RA according to disease activity scores

	Ankylosing Spondylitis			Rheumatoid arthritis		
	Low-ASDAS Group (n=25)	High-ASDAS Group (n=55)	p	Remitted or Mildly Active Group (n=45)	Moderate or High Active Group (n=34)	p
PCTF	17 (7-35)	21 (7-35)	0.017*	18.6±6.9	20.2±6.08	0.300
PGWB	48 (8-56)	43 (17-56)	0.031*	42.8±9.8	41.1±10.5	0.470
SIS	1 (0-6)	2 (0-14)	0.007*	2 (0-12)	2 (0-15)	0.385
PACT	104 (5-133)	96 (48-140)	0.030*	87.9±18.1	98.8±14.8	0.006*
PACT trauma-focused coping	71 (30-84)	59 (24-84)	0.005*	57.2±16.7	63.0±11.0	0.091
PACT perceived forward-focused	34 (11-49)	36 (16-56)	0.259	30.7±10.2	35.8±10.3	0.035*
HADS depression	3 (0-17)	8 (1-18)	<0.001*	6.6±4.0	8.05±3.9	0.135
HADS Anxiety	4 (0-17)	8 (1-21)	<0.001*	6.8±4.4	8.4±4.3	0.119

* p<0.05. Student T and Mann-Whitney U tests were performed.

Abbreviations: ASDAS: Ankylosing Spondylitis Disease Activity Score, PCTF: perceived COVID-19 threat form, PGWB: psychological general well-being index, SIS: suicide ideation scale, PACT: the perceived ability to cope with trauma scale, HADS: hospital anxiety and depression scale

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2 **Table 4.** Correlation analysis results between BASDAI / DAS28 scores and
3 psychometric assessment scale scores

	BASDAI		DAS28	
	r	p	r	p
PCTF	0.36	0.002	0.03	0.773
PGWB	-0.20	0.088	-0.20	0.078
SIS	0.57	<0.001	0.21	0.063
PACT	-0.15	0.362	-0.26	0.026
PACT trauma-focused coping	-0.26	0.027	0.05	0.655
PACT perceived forward-focused	0.14	0.203	0.33	0.003
HADS depression	0.53	<0.001	0.17	0.144
HADS Anxiety	0.54	<0.001	0.19	0.108

4 Pearson and spearman (rho) correlation tests were performed.

5 Abbreviations: BASDAI: Bath Ankylosing Spondylitis Disease Activity Index, PCTF: perceived COVID-19 threat
6 form, PGWB: psychological general well-being index, COVID-19: novel coronavirus 2019, SIS: suicide ideation scale,
7 PACT: the perceived ability to cope with trauma scale, HADS: hospital anxiety and depression scale.

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