

## Relationship between kinesiophobia and pain, quality of life, functional status, disease activity, mobility, and depression in patients with ankylosing spondylitis

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**Background/aim:** Our aim was to investigate the association of kinesiophobia with pain, quality of life, clinical measures, and depression in patients with ankylosing spondylitis (AS).

**Materials and methods:** Patients with AS (n: 163) were enrolled in the study. Kinesiophobia was evaluated with the Tampa Scale of Kinesiophobia (TSK), pain with a visual analog scale (VAS), mobility with Bath Ankylosing Spondylitis Metrology Index (BASMI), disease activity with the Bath AS Disease Activity Index (BASDAI), functional status with the Bath AS Functional Index (BASFI), depression level with Beck's Depression Inventory (BDI), and quality of life with the AS Quality of Life Questionnaire (ASQoL). Besides correlation analysis, outcome measures were compared between patients with (TSK  $\geq$  37) and without (TSK < 37) kinesiophobia.

**Results:** Kinesiophobia was found to be common with a percentage of 66.6%. TSK scores were correlated with VAS, BASFI, ASQoL, and BDI scores ( $r = 0.259$ ,  $r = 0.294$ ,  $r = 0.392$ , and  $r = 0.398$ , respectively;  $P < 0.05$  for each). There were no correlations between TSK and the BASDAI and BASMI scores ( $r = 0.142$ ,  $r = 0.198$ , respectively;  $P > 0.05$ ). Patients with kinesiophobia had more pain and poorer BASFI, ASQoL, and BDI scores than patients without kinesiophobia ( $P < 0.05$ ).

**Conclusion:** Our study is the first study that investigated the relationship between kinesiophobia and other clinical measures in AS patients. Pain and psychological status have an impact on fear of movement and thus functional status and quality of life.

**Key words:** Ankylosing spondylitis, quality of life, kinesiophobia, functional status

### 1. Introduction

Ankylosing spondylitis (AS) is an inflammatory disorder of the spine that affects skeletal and extraskeletal structures (1). It is characterized by pain and stiffness of the back and sacroiliac joints. The burden of illness in AS results from the pain, reduced spinal mobility and function, and impaired well-being (2). The aims of treatment in AS are reduction of pain and stiffness and prevention of structural deformities and long-term complications, thereby improving the quality of life (3,4).

Kinesiophobia is defined as an excessive, irrational, and debilitating fear of physical movement and activity resulting from a feeling of vulnerability to painful injury or reinjury (5). The role of the fear of movement in musculoskeletal pain disorders was examined in studies of acute and chronic low back pain syndrome. Participation of patients and thus the continuity of treatment is important in exercise applications recommended for the

treatment of such chronic diseases. In studies conducted on various diseases, the negative impacts of kinesiophobia on rehabilitation processes involving exercise programs, and consequently its importance in the clinical course, were reported (6,7).

The most appropriate treatment of AS to increase and maintain long-term quality of life occurs with the combinational use of pharmacological and nonpharmacological treatments. Assessment of SpondyloArthritis and the European League Against Rheumatism strongly noted the importance of physiotherapy applications in addition to regular exercise and patient education in all steps of the treatment scheme (4). In patients with AS, in order to achieve success and continuity in treatment, it is important that clinicians be informed about the presence of kinesiophobia and the factors that increase kinesiophobia, which have not been investigated to date.

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The aim of this study is to determine the level of kinesiophobia in patients with AS and to analyze the correlation between kinesiophobia and quality of life, functional status, disease activity, pain, and depression.

## 2. Materials and methods

The protocol of this study was approved by the Gazi University Clinical Research Ethics Committee. All participants gave their informed consent prior to the study.

### 2.1. Participants

The study included patients that were being followed at the Gazi University Faculty of Medicine, Department of Rheumatology, and who were diagnosed with AS based on the modified New York criteria (8). All of the participants were included in the study by the same rheumatologist, confirming that they received the same medical protocol. None of the participants had received any exercise training before. The study group consisted of both female and male patients in the age range of 18–65 years. Accompanying systemic diseases (other rheumatologic diseases, hypertension, diabetes, thyroid issues, etc.) were investigated, and previous surgeries and illnesses were recorded. Patients who had musculoskeletal surgery in the last 12 months or impaired mobility due to a neurological or vestibular system disorder were excluded from the study. In addition, patients who were illiterate and would be unable to answer survey questions correctly were excluded from the study.

### 2.2. Assessment parameters

Initially, the age, height, weight, and sex of participants were recorded and their disease duration, occupation, tobacco and alcohol consumption, level of education, personal background, and family histories were questioned. Consecutive patients who were eligible to participate in the study according to the inclusion and exclusion criteria were evaluated. The evaluation consisted of assessment of pain and mobility and surveys that assessed the patients' kinesiophobia, disease activity, functionality, quality of life, and psychological conditions.

#### 2.2.1. Pain

Pain severity was measured with a visual analog scale (VAS). It consisted of a 100-mm line anchored by 'No Pain' written at one end and 'Worst Imaginable Pain' written at the opposite end. The distance in millimeters from the 'No Pain' end to the location of the mark gave a measurement of the pain.

#### 2.2.2. Mobility

Tragus to wall distance, modified Schober's test, thoracolumbar lateral flexion, cervical rotation, intermalleolar distance, and finger to floor distance as found in the Bath Ankylosing Spondylitis Metrology Index (BASMI) were used in the assessment of mobility (9).

#### 2.2.3. Functional level

The Turkish version of the Bath Ankylosing Spondylitis Functional Index (BASFI) was used to define and monitor physical functioning. The BASFI comprises ten tasks that assess the degree of difficulty of each task performed. In summary, tasks 1–10 assess putting on socks, bending forward to pick up a pen, reaching a high shelf, getting up from an armless chair, getting up from the floor from lying supine, standing unsupported, climbing steps without a handrail, looking over the shoulders, performing physically demanding activities, and doing a full day's activities. The total BASFI score is calculated by adding all ten scores and dividing by 10 (10).

#### 2.2.4. Disease activity

The Turkish version of Bath Ankylosing Spondylitis Disease Activity Index (BASDAI) was used to measure patient-reported disease activity. It consists of six questions related to five symptoms of AS: fatigue, spinal pain, joint pain and swelling, areas of local tenderness, and morning stiffness. A 10-cm VAS was used to measure the patient responses to each question. A score between 0 and 10 was obtained for each question, and the mean of two questions relating to morning stiffness was used. The resulting overall score was converted to a 0–10 scale in which 0 = good and 10 = bad (8,11).

#### 2.2.5. Kinesiophobia

Kinesiophobia was evaluated using the Turkish version of the Tampa Scale for Kinesiophobia (TSK). This scale comprises 17 questions developed in order to measure fear of movement and/or reinjury. The scale includes injury/reinjury and fear-avoidance parameters in occupational activities. The scale uses 4-point Likert scoring (1 = entirely disagree, 4 = entirely agree). A total score is calculated after inverting items 4, 8, 12, and 16. The individual obtains a total score ranging between 17 and 68. Higher scores show a high kinesiophobia level. A cut-off point of 37 was determined for the scale as  $\geq 37$  points indicate a high kinesiophobia level while  $< 37$  points indicate a low kinesiophobia level (12).

#### 2.2.6. Quality of life

Quality of life was assessed using the Turkish version of the Ankylosing Spondylitis Quality of Life Questionnaire (ASQoL). The questionnaire comprises 18 disease-specific yes/no questions that evaluate the quality of life of patients with AS. It assesses symptoms, functions, and concerns about the disease. The answer 'yes' is given a score of 1 point and 0 points are given to 'no' answers; the total score ranges between 0 and 18. Higher scores indicate a worse quality of life (13).

#### 2.2.7. Psychological condition

The Beck Depression Inventory (BDI) is a multiple-choice self-report inventory consisting of 21 specific

categories. Each item is given a score ranging between 0 and 3. The highest possible score is 63. Higher total scores indicate more severe depressive symptoms (14).

### 2.3. Statistical analysis

IBM SPSS 22.0 software was used for statistical analysis. Student's t-test was used to compare the kinesiophobia groups, and Pearson's correlation test was adopted for establishing the correlation between parameters. Statistical significance was accepted as  $P < 0.05$ .

### 3. Results

A total of 163 patients participated in the study. High levels of kinesiophobia (TSK score of  $\geq 37$ ) were found in 66.6% of patients.

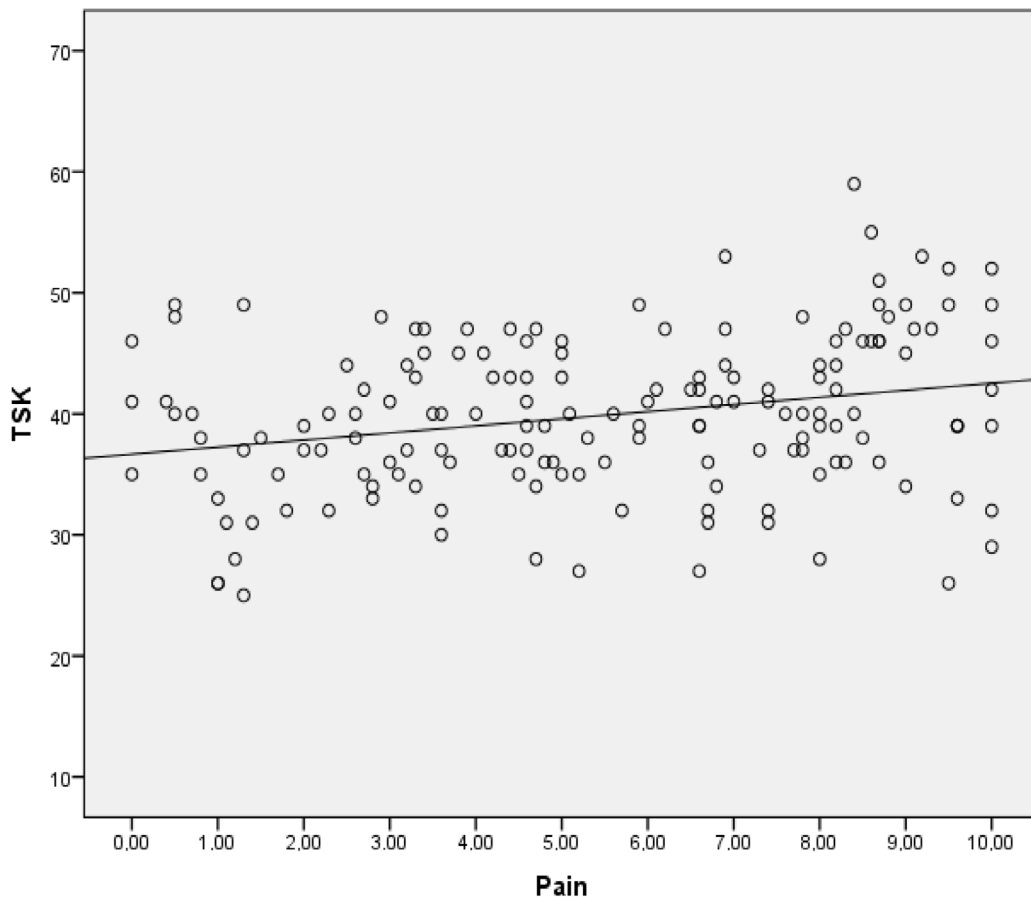
Kinesiophobia was found to be correlated with pain, BASFI, ASQoL, and BDI scores ( $P < 0.05$ ) (Figures 1–4), while no correlation was found with BASMI and BASDAI scores ( $P > 0.05$ ) (Table 1).

The patients were classified into 2 groups regarding their TSK scores. Patients with TSK scores of 37 and above were classified as the high kinesiophobia group (Group 1), while those with scores of less than 37 were

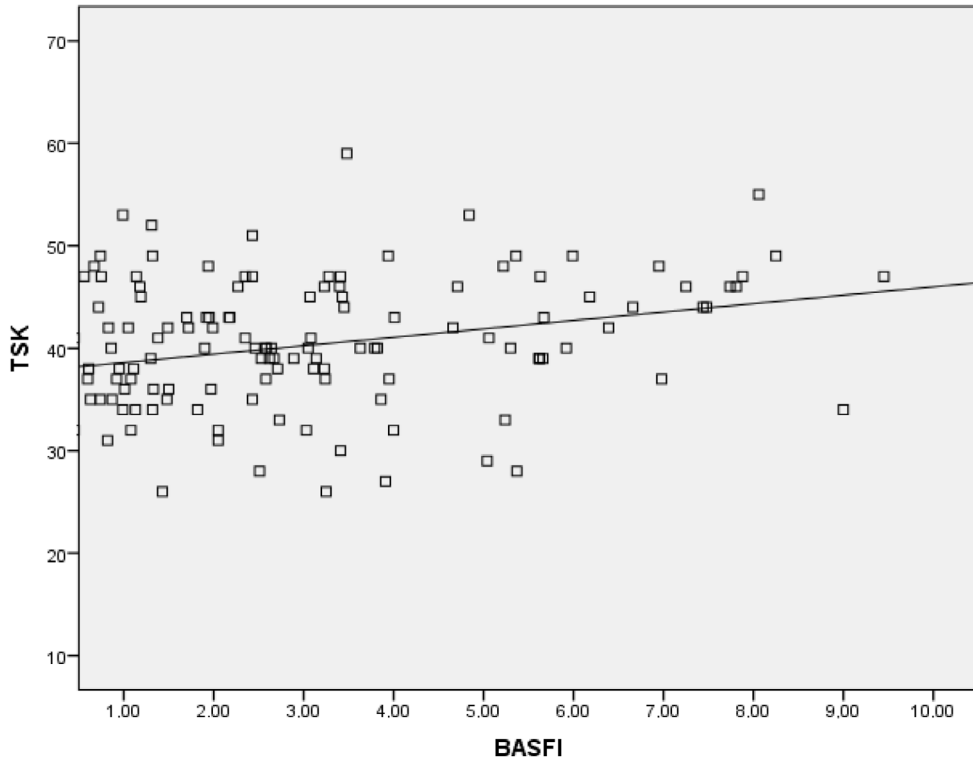
classified as the low kinesiophobia group (Group 2). No differences were found in age and body weight among the groups ( $P > 0.05$ ) (Table 2). The BASFI, pain, ASQoL, and BDI scores and kinesiophobia levels of Group 1 were found to be higher compared to Group 2 ( $P < 0.05$ ) (Table 2). However, there was no difference in the high and low kinesiophobia groups for BASDAI and BASMI scores ( $P > 0.05$ ) (Table 2).

### 4. Discussion

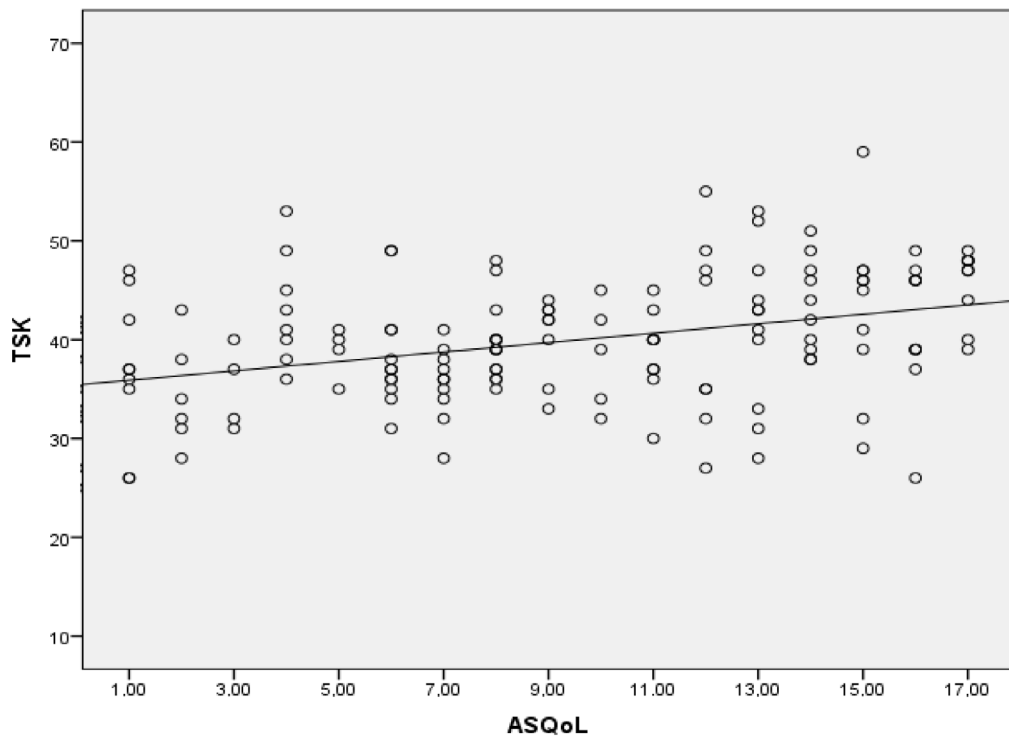
This study is the first to examine the level of kinesiophobia and its correlation with other clinical variables in patients with AS. Based on the results of our study, 66.6% of AS patients had high levels of kinesiophobia. Furthermore, there was a positive correlation between kinesiophobia and physical function, pain, and depression levels. However, kinesiophobia was not correlated with disease activity or mobility levels. Quality of life and functional levels of patients with high kinesiophobia were lower as compared to patients with low kinesiophobia, and their pain and depression levels were found to be high. However, disease activity and mobility levels were found to be similar.



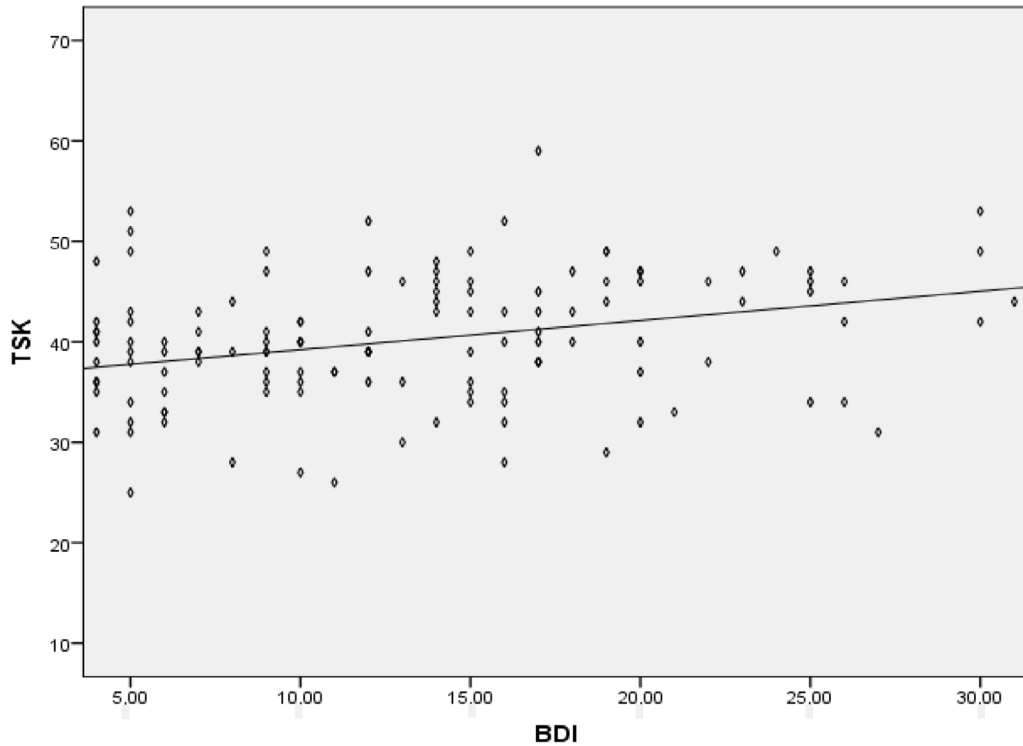
**Figure 1.** The relationship between TSK and pain scores.  $r: 0.259$ ,  $P: 0.001$ ; TSK: Tampa Scale for Kinesiophobia.



**Figure 2.** The relationship between TSK and BASFI scores.  $r: 0.294, P < 0.00$ ; TSK: Tampa Scale for Kinesiophobia; BASFI: Bath AS Functional Index.



**Figure 3.** The relationship between TSK and ASQoL scores.  $r: 0.392, P < 0.00$ ; TSK: Tampa Scale for Kinesiophobia; ASQoL: AS Quality of Life Questionnaire.



**Figure 4.** The relationship between TSK and BDI scores.  $r: 0.398, P < 0.00$ ; TSK: Tampa Scale for Kinesiophobia; BDI: Beck Depression Inventory.

**Table 1.** Analysis of the correlation between kinesiophobia and pain, BASFI, ASQoL, BDI, BASMI, and BASDAI total scores.

	TSK score	
	r	P
Pain	0.259	0.001
BASDAI	0.116	>0.05
BASFI	0.294	<0.001
ASQoL	0.392	<0.001
BDI	0.398	<0.001
BASMI	0.102	>0.05

TSK: Tampa Scale for Kinesiophobia, BASFI: Bath Ankylosing Spondylitis Functional Index, ASQoL: Ankylosing Spondylitis Quality of Life Questionnaire, BDI: Beck Depression Index, BASMI: Bath Ankylosing Spondylitis Metrology Index, BASDAI: Bath Ankylosing Spondylitis Disease Activity Index.

Most studies on kinesiophobia that were carried out on chronic musculoskeletal diseases with spinal involvement revealed a prevalence as high as 50% (15,16). Interestingly, kinesiophobia in patients suffering from back pain was higher compared to two other rheumatic disease,

fibromyalgia and osteoarthritis (16). In this study, 66.6% of AS patients had kinesiophobia, which is much higher than rates reported for other musculoskeletal disorders.

In this study we found that kinesiophobia in patients with AS was correlated with pain and depression levels. In addition, patients with higher levels of kinesiophobia had significantly higher pain and depression levels compared to patients with lower levels of kinesiophobia. In previous studies carried out in different disease groups, a correlation was put forth between level of pain and kinesiophobia (17–19). In another study conducted on patients with rheumatoid arthritis, it was concluded that the feelings of fear and avoidance of activity had a significant correlation with pain (20). Parallel to our results, as noted by Leeuwe et al., fear of pain, fear of movement, and fear of reinjury were frequently reported in diseases with pain components such as AS (21). As noted in the definition, kinesiophobia results and develops from the response to previously experienced significantly painful movement (22). It is speculated that the learned fears and pain that AS patients experience may lead to a further increase in kinesiophobia.

Psychological states observed in relation to chronic pain generally develop secondary to pain. Chronic pain accompanies anxiety, insomnia, worry, and, mostly, depression. Depression increases symptoms and lowers the pain threshold. It is suggested that patients concentrate

**Table 2.** Age, body weight, pain, disease activity, functionality, quality of life, psychological condition, and mobility levels in low and high kinesiophobia groups

	<b>Group 2: low kinesiophobia (n = 59)</b>	<b>Group 1: high kinesiophobia (n = 102)</b>	<b>P</b>
<b>Age</b>	38.6 ± 12	37.6 ± 10	ns
<b>Body weight (kg)</b>	70.6 ± 13.2	74.7 ± 13.1	ns
<b>Pain (VAS)</b>	4.73 ± 2.78	5.93 ± 2.82	0.01
<b>BASDAI</b>	1.06 ± 0.75	1.34 ± 0.96	>0.05
<b>BASFI</b>	1.67 ± 1.92	3.08 ± 2.38	<0.001
<b>ASQoL</b>	6.98 ± 4.81	10.76 ± 5.11	<0.001
<b>BDI</b>	8.81 ± 7.07	14.29 ± 9.18	<0.001
<b>BASMI</b>	2.44 ± 1.44	2.71 ± 1.73	>0.05

TSK: Tampa Scale for Kinesiophobia; BASFI: Bath Ankylosing Spondylitis Functional Index, ASQoL: Ankylosing Spondylitis Quality of Life Questionnaire, BDI: Beck Depression Inventory, BASMI: Bath Ankylosing Spondylitis Metrology Index, BASDAI : Bath Ankylosing Spondylitis Disease Activity Index, ns: nonsignificant.

on their pain and decrease their concentration on positive events in their lives and thus alter their perception of pain (23). Depression is known to contribute to momentary pain sensitivity or pain sensitivity even after 6–12 months (17). Depression is a frequently observed symptom in rheumatologic diseases (24). It has been stated before that in AS patients who have chronic pain, symptoms of depression are frequently encountered (25). In a study conducted by Baysal et al. the correlation between chronic pain and depression in patients with AS was clearly demonstrated (26). Moreover, severity of depression was increased by the severity and duration of pain (27). In a study conducted on patients with chronic pain, it was reported that avoidance of activity was also affected by depression and pain was also correlated with kinesiophobia (28). We have observed similar associations in our study.

Another significant result of our study is the association of kinesiophobia and functional status. Functional limitation in AS was shown to be correlated with axial and peripheral joint lesions, pain, and soft tissue inflammation, and thus overall with disease activity (29). Like kinesiophobia, increase in the severity of disease and decrease in spinal mobility are also factors affecting physical activity and function in AS. Thus, what was expected as a result of our study was kinesiophobia being correlated with an increase in disease activity and a decrease in the level of mobility. However, kinesiophobia was correlated neither with disease activity nor with mobility in our study, suggesting that kinesiophobia in patients with AS is a direct result of body pain and depression.

In light of our results, it is still doubtful if these patients prefer moving despite their high kinesiophobia levels. This could be assessed ideally by measuring the physical activity level. However, we could not discuss this state as it is out of the scope of this study and further studies may contribute to this topic.

Exercise is the sine qua non of AS treatment (30). Kinesiophobia is one of the pivotal factors that impair participation of AS patients in exercise programs. Therefore, to increase the patients' compliance to the exercise programs, strategies must be developed to improve the factors that induce or worsen kinesiophobia, such as pain and depression. For this reason, exercises that would trigger pain during the treatment of patients with AS should be avoided and patients should be taught methods of coping with pain. In this regard, exercises suggested for treatment should not be established through a general approach but should be specific for each patient. In patients suffering from pain with a high level of kinesiophobia, it was acknowledged that patient education centered on kinesiophobia and activity avoidance decreased the fear of movement that developed due to pain and also pain sensitivity, and increased physical activity levels (31,32). Although experimenting is necessary, we believe that such types of training programs might contribute to decreasing kinesiophobia in AS. In addition, it should be considered that each patient is a biopsychosocial individual. Not only physical insufficiencies but also the psychological issues they may be suffering from can reduce the patients' skills to cope with the disease and lead to a decrease in voluntary and active participation in treatment.

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