



# Is there a relationship between kinesiophobia, pain, depression, disease activity, functional status and quality of life in patients with ankylosing spondylitis?

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## Abstract

**Aim:** To evaluate the presence of kinesiophobia and its potential effects on pain, depression, disease activity and quality of life in patients with ankylosing spondylitis (AS).

**Materials and Methods:** The study included 58 AS patients and 55 healthy controls. Tampa Kinesiophobia Scale (TKS) was used to evaluate the presence of kinesiophobia, Visual Analogue Scale (VAS) for severity of pain, Beck Depression Index (BDI) for depression level, Bath Ankylosing Spondylitis Disease Activity Index (BASDAI) for disease activity, Bath Ankylosing Spondylitis Functional Index (BAS-FI) for functional status, and Ankylosing Spondylitis Functional Index (ASQoL) for Quality of life.

**Results:** In patient group, kinesiophobia rate was statistically significantly higher (68%) compared to the healthy control subjects (27%) ( $p < 0.001$ ). TKS score, VAS pain level, and BDI levels were significantly higher in patients with AS compared to the healthy controls (for all  $p < 0.001$ ). In the AS group, patients with high kinesiophobia score had higher VAS, BDI, BAS-FI, BASDAI, and ASQoL scores compared to the patients with low kinesiophobia score ( $p < 0.001$ ) and the relationships between kinesiophobia and VAS, BDI, BAS-FI, BASDAI, and ASQoL scores (for all  $p < 0.001$ ) were significant. In addition, there was no significant relationship found between kinesiophobia and age, and disease duration ( $p > 0.05$ ).

**Conclusion:** Kinesiophobia is more common in patients who had AS than in healthy control subjects, and presence of kinesiophobia is related to impaired quality of life and increased pain. Therefore, we propose that strategies to increase awareness of movement fear, cognitive behavioral therapy and physical activity should be involved in the treatment programs.



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## Introduction

Ankylosing spondylitis (AS) is a chronic and inflammatory rheumatic disease, which affects especially spinal and sacroiliac joints, causes low back pain and restrictions in spinal movements, and its cause is not fully known [1]. A form of seronegative spondyloarthropathies, AS is more commonly seen in men and between 20 and 40 years of age [2]. Although inflammatory low back pain, spinal involvement and morning stiffness are the main findings, peripheral involvements such as asymmetrical mono-oligoarthritis and enthesitis may also accompany the clinical picture. Furthermore, extraarticular involvements such as psoriasis, uveitis and inflammatory bowel disease (IBD) may also be seen [3].

Kinesiophobia is defined as extreme fear of physical activity and movement as a result of sensitivity developing in a patient against severe injury and re-injury. In patients with a tendency toward kinesiophobia, the belief that movement may cause re-injury or additional pain is considered a risk factor for the chronicity of pain. Kinesiophobia, which occurs as a result of pain, restricts activities and consequently decreases the physical capacity, strength, and flexibility of patients [4,5]. Previous few studies have stated that kinesiophobia is correlated with impaired functioning, increased pain, decreased physical activity level and increased physical and psychological disability in some disorders such as osteoarthritis, chronic nonspecific low back pain [6,7]. Despite this, there are not many studies on AS and kinesiophobia in the literature. In addition, our study is one of the rare studies comparing the relationship

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between kinesiophobia and healthy individuals and AS. Therefore, our study was planned due to the deficiencies in the literature.

In the present study, we aimed to investigate the level of kinesiophobia in patients with AS and evaluate the relationship between the level of kinesiophobia and pain intensity, disability, depression, and quality of life (QoL) in patients who had AS.

## Materials and Methods

Fifty-eight AS patients who presented to our clinic and 55 healthy controls were included in this study. Patients with a definitive diagnosis of AS according to the Modified New York criteria with disease duration longer than 1 year, who aged between 20-60 years and accepted to participate were included. The sample size was determined with G\*power software 3.1 (effect size:0.50,  $\alpha$ : 0.80, in each group had at least 51 people). The study was conducted in accordance with the ethical principles of the Declaration of Helsinki and approved by local ethics committee (Aksaray University Ethics Committee, Date: 26.09.2018, No:2018-175). Patients and control subjects who accepted to participate in the study signed informed consent forms before the participation.

Patients with history of surgical intervention for the spine or pelvis, systemic infectious or other inflammatory rheumatic diseases other than AS, malignancy, pregnancy, fibromyalgia, neurological disease were excluded from the study. Also those that had received a lumbar injection and/or physical therapy within the last three months were excluded. Personal information related to the participants, including age, gender, body mass index (BMI) and educational status, additional disease, medication use, and history of trauma or surgical operation was recorded in the evaluation form. Severity of pain was evaluated using the Visual Analogue Scale (VAS), presence of kinesiophobia with the Tampa Scale of Kinesiophobia (TSK), Quality of Life level with the Ankylosing Spondylitis Quality of Life (ASQoL) questionnaire, disease activity with the Bath Ankylosing Spondylitis Disease Activity Index (BASDAI), functional status with the Bath Ankylosing Spondylitis Functional Index (BAS-FI), and depression level with Beck Depression Inventory (BDI).

### Evaluation scales

#### Tampa Scale of Kinesiophobia (TSK)

Tampa Scale of Kinesiophobia is a 17-question survey with 4-point Likert scale used to evaluate fear and anxiety of physical activity and re-injury. A total score higher than 37 is evaluated as positive in terms of kinesiophobia [8].

#### Visual Analogue Scale (VAS)

VAS is used in the measurement and follow-up of pain severity. Zero means "no pain" on one end and 10 means "there is very severe pain" on the other end of a 10 cm line. Patients mark the point reflecting their pain severity. Numerical value shows pain level of the patients. High scores indicate severe pain [9].

#### Ankylosing Spondylitis Quality of Life (ASQoL) questionnaire

ASQoL consists of 18 questions investigating quality of life within the last week as yes/no. Total score (0-18) is calculated according to yes (1 point) and no (0 points) answers. Increasing score is considered as 'deteriorating quality of life' [10].

#### Beck Depression Inventory (BDI)

Beck Depression Inventory is a depression scoring scale including 21 questions with each question scored between 0-3 points. The total score is obtained by sum of the scores given to each question. Scores  $\geq 10$  points are considered in favour of depression [11].

#### Bath Ankylosing Spondylitis Disease Activity Index (BASDAI)

BASDAI is a 6-question index, which questions main symptoms of AS such as fatigue, spinal pain, arthritis, entesopati and morning stiffness and is considered gold standard in evaluation of disease activity [12].

#### Bath Ankylosing Spondylitis Functional Index (BAS-FI)

BAS-FI is a 10-question questionnaire evaluating functioning and disability in AS patients. It is associated with quality of life and inability to perform daily activities. High scores have been associated with a low quality of life [13].

#### Statistical analysis

This study was analyzed with SPSS (Statistical Package for the Social Sciences) IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp. The sample size was determined with G\*power software 3.1 (effect size: 0.50,  $\alpha$ : 0.80, in each group had at least 51 people). Kolmogorov-Smirnov was used for test of normality. Normally distributed data were determined as mean  $\pm$  standard deviation (SD). Frequencies of some data were given as percentages (%). Between two independent groups was analysed with Student-T test and correlations analysed with Pearson's test.  $p < 0.05$  were considered as statistically significant.

## Results

Fifty-eight AS patients (22 female, 36 male) and 55 healthy controls (30 female, 25 male) were included in the study. The age mean was 39.27 (22-52) years in AS patients and 39.30 (22-49) years in healthy controls. Sociodemographic data of AS patients and healthy controls are shown in Table 1.

Kinesiophobia was found in 68% of AS patients and 27% of healthy controls. There were statistically significant differences between the two groups in terms of the mean TSK score and the rate of kinesiophobia ( $p < 0.001$ ). Similarly, VAS-pain and BDI results were significantly higher in the AS group than in the control subjects ( $p < 0.001$ ). The details of clinical parameters such as VAS, Kinesiophobia, TSK, BDI, BAS-FI, BASDAI, ASQoL and age of all participants were given in Table 2.

**Table 1.** Demographic data of the ankylosing spondylitis and control groups.

	AS ( n:58)	Control (n:55)
<b>Gender</b>		
Female	22 (38%)	30 (54%)
Male	36 (62%)	25 (46%)
<b>Marital Status</b>		
Married	41 (70.3%)	39 (67.3%)
Single	17 (29.7%)	16 (32.7%)
<b>Educational Status</b>		
Primary	15 (25.9%)	28 (50.9%)
Middle	4 (6.9%)	4 (7.3%)
High	18 (31%)	7 (12.7%)
College	21 (36.2%)	16 (29.1%)
<b>Profession</b>		
Deskjob	23 (39.7%)	11 (20%)
Physicalpower	18 (31.0%)	22 (40%)
Not working	17 (29.3%)	22 (40%)
<b>Comorbidity</b>		
Yes	14 (24%)	5 (9%)
No	44 (76%)	50 (91%)

**Table 2.** Evaluation of pain, kinesiophobia, depression, disease activity and functional status in AS patients and control groups.

	Ankylosing Spondylitis (n:58) ( mean±SD )	Control (n:55) (mean ±SD)	p
Age (years)	39.28±8.44	39.31±8.10	>0.05
Disease duration (years)	10.82±5.93	----	
VAS	5.75±2.33	1.80±1.06	<b>&lt;0.001</b>
BAS-FI	4.08±1.98	----	
BASDAI	4.12±1.83	----	
ASQoL	10.67±4.92	----	
BDI	13.24±7.21	5.05±3.29	<b>&lt;0.001</b>
TSK	40.70±11.93	27.47±8.94	<b>&lt;0.001</b>

AS: Ankylosing Spondylitis, VAS: Visual Analogue Scale, BDI: Beck Depression Inventory TSK: Tampa Scale of Kinesiophobia, BASDAI: Bath Ankylosing Spondylitis Disease Activity Index, BAS-FI: Bath Ankylosing Spondylitis Functional Index, ASQoL: Ankylosing Spondylitis Quality of Life Questionnaire.

In AS patients; statistically significant strong positive correlations were observed between kinesiophobia severity and VAS ( $r=0.845$ ,  $p<0.001$ ), BASDAI ( $r=0.813$ ,  $p<0.001$ ), BAS-FI ( $r=0.694$ ,  $p<0.001$ ), ASQoL ( $r=0.815$ ,  $p<0.001$ ) and BDI ( $r=0.771$ ,  $p<0.001$ ) scores, while no significant correlation was observed between kinesiophobia severity and age ( $r:0.029$ ,  $p>0.05$ ) and disease duration ( $r:0.077$ ,  $p>0.05$ ). Correlations between TSK score and other clinical findings in AS patients are summarized in Table 3.

Of all AS patients, 68% (n=39) had kinesiophobia, while

32% (n=19) had not. Evaluating AS patients who had kinesiophobia and those who had no kinesiophobia in themselves; no statistically significant difference was observed between the two groups in terms of disease duration and age (both  $p>0.05$ ), while VAS, BAS-FI, BASDAI, ASQoL and BDI results were significantly higher in AS patients with kinesiophobia. Correlations with clinical parameters in AS patients with and without kinesiophobia are shown in Table 4.

## Discussion

AS is a progressive rheumatic disease that progresses with spinal, peripheral and systemic findings along with chronic inflammation and pain. As the disease progresses, skeletal and extra-skeletal findings, advanced deformities and physical limitations emerge, these symptoms increase pain of the person, causing her/him avoiding movement, hamper engagement to physical activity, leading to functional restriction and decreases in quality of life [14].

Majority of the studies on kinesiophobia are about chronic musculoskeletal system diseases (osteoarthritis, chronic lower back pain) and there is no sufficient studies on AS in which pain is involved in general symptoms [6,7]. Therefore, our study is one of the rare studies investigating kinesiophobia levels in AS patients, and evaluating compared with a healthy control group, and examining its correlation with the other clinical parameters. According to our results, 68% of the patients had kinesiophobia, while 32% had not. Kinesiophobia, pain and depression levels were significantly higher in AS patients compared to the healthy controls. In addition, significant correlations were found between pain severity, depression, disease activity, functional status and quality of life, and kinesiophobia in AS patients. In addition, the parameters of pain, disability, quality of life and depression were found to be statistically significantly different in patients who had AS with kinesiophobia than in those those without kinesiophobia.

Kori et al. [15] defined kinesiophobia as fear of movement, which causes avoiding physical activity, as a result of extreme sensitivity occurring against the possibility of painful injury/re-injury. In the studies by Wu et al. [16], it was stated that fear-avoidance behaviours and associated avoiding physical activity may be seen as a result of the fear of movement and/or injury due to central sensitization, inflammatory pain and stiffness in AS which is a disorder characterized by inflammation and chronic pain. In a study by Oskay et al. [17] evaluating 163 AS patients, high level kinesiophobia (TSK>37) was found in 66.6% of the patients. In another study by Er and colleagues [18] evaluating 31 patients with AS, a high level of kinesiophobia was observed (mean TSK score > 41). Consistent with the above-mentioned studies, we found a high rate of kinesiophobia (68%) with a significant difference between the patient and control groups.

Pain, which is in the nature of rheumatic diseases, emerges due to inflammation and continues chronically. So, what about pain severity and its effects on QoL? The most common symptom among patients diagnosed with AS is pain, which should be considered as a multidimensional feeling [19]. In a study by Fongen et al. investigating the factors increasing and decreasing physical activity in AS patients,

**Table 3.** Correlations between TSK and other clinical findings in AS patients.

		Age	Disease duration	VAS	BASFI	BASDAI	ASQoL	BDI
TSK	R	-0.029	0.077	0.845	0.694	0.813	0.815	0.771
	P	>0.05	>0.05	<b>&lt;0.001</b>	<b>&lt;0.001</b>	<b>&lt;0.001</b>	<b>&lt;0.001</b>	<b>&lt;0.001</b>

AS: Ankylosing Spondylitis, VAS: Visual Analogue Scale, BDI: Beck Depression Inventory, TSK: Tampa Scale of Kinesiophobia, BAS-FI: Bath Ankylosing Spondylitis Functional Index, BASDAI: Bath Ankylosing Spondylitis Disease Activity Index, ASQoL: Ankylosing Spondylitis Quality of Life Questionnaire.

**Table 4.** Correlations between clinical parameters in AS patients with and without kinesiophobia.

	Kinesiophobia (+) (n:39) (mean±SD)	Kinesiophobia (-) (n:19) (mean ±SD)	p
Age (years)	39.87±8.52	38.05±8.12	>0.05
Disease duration (years)	11.82±5.72	8.78±4.26	>0.05
VAS	7.23±2.17	2.73±0.76	<b>&lt;0.001</b>
BAS-FI	5.38±1.30	1.41±1.13	<b>&lt;0.001</b>
BASDAI	5.26±1.14	1.78±0.13	<b>&lt;0.001</b>
ASQoL	13.87±3.30	4.10±1.84	<b>&lt;0.001</b>
BDI	17.53±5.72	4.42±2.49	<b>&lt;0.001</b>

AS: Ankylosing Spondylitis, VAS: Visual Analogue Scale, BDI: Beck Depression Inventory, TSK: Tampa Scale of Kinesiophobia, BASDAI: Bath Ankylosing Spondylitis Disease Activity Index, BAS-FI: Bath Ankylosing Spondylitis Functional Index, ASQoL: Ankylosing Spondylitis Quality of Life Questionnaire.

it was shown that majority of the patients had a higher physical insufficiency compared to the controls and pain was the most important cause limiting physical activity [20]. In the study by Er and colleagues that compared AS patients and healthy controls; sciatic pain and spinal pain were higher in individuals with AS and were significantly correlated with kinesiophobia ( $p < 0.05$ ) [18]. Similar to above mentioned study, in our study VAS pain level was higher in AS patients than in the healthy controls and there was a statistically significant correlation between kinesiophobia and pain level. We think that pain severity is higher in these patients since pain is chronic and inflammatory in AS. In addition, because pain is severe and continuous, patients show tendency to avoid physical movements and thus, kinesiophobia level increases.

In general psychological conditions are seen to develop secondary to existing chronic pain. The pain present in patients with AS may also have serious effects on the psychological conditions of the patients. These effects cause a state of fear in people and cause anxiety that some parts of their body will not be able to meet their disabled and economic needs [21]. In another study by Xu and colleagues [22] evaluating 103 patients with AS and 121 healthy controls; it was stated that the levels of anxiety and depression were higher in AS patients compared to the controls, and severity of pain and disease activity were higher in those who had a high depression level. In a study Aykut et al. [23] with AS patients, a higher depression level was found in the patient group compared to the control group and a positive correlation was found between kinesiophobia and

depression levels. In parallel with the previous studies, in our study depression rates were higher in AS patients than in the healthy control subjects, and there was a statistically significant positive correlation between kinesiophobia and depression levels. Therefore AS patients should be multidisciplinary, psychological assessment of these patients should be performed and related treatment should not be ignored.

Quality of life is one of the important outcomes in chronic diseases. Daily activities are limited and quality of life is decreased in AS patients because of inflammation, pain and stiffness. It has been found that the majority of AS patients had pain complaints and this is associated with disease activity, functional level and quality of life [23].

Functional limitation in AS is known to be resulted from pain and inflammation, and thus is associated with disease activity [17]. In another study by Zhao and colleagues with patients who have AS and were living in China, the strongest factors that correlated with ASQoL (quality of life) were found as BAS-FI, pain and BASDAI [24]. In another study by Öksüz et al. [25] with AS patients, a strong correlation was found between ASQoL and BASDAI, and a moderate correlation between TSK and BAS-FI. In the study by Oskay et al. [17] with AS patients, kinesiophobia was found to be correlated with pain severity and depression level as well as functional status (BAS-FI) and quality of life (ASQoL); however, no significant correlation was found with disease activity (BASDAI). In the study of Karşlı et al. [26], the level of kinesiophobia was found to be higher and the level of physical activity lower in patients with radiographic spondyloarthritis compared to non-radiographic and healthy controls. Similar to the above mentioned studies, in our study we also found a significant correlation between TSK and BAS-FI, BASDAI and ASQoL. This result was expected, because disease activity, quality of life and functional level are closely associated parameters in AS patients. We think that low level of ASQoL and functional limitations in the patients included in our study might be resulted from high levels of pain and kinesiophobia, long disease durations and delays in establishing the diagnosis.

As limitations of this study; number of patients was relatively small, the study was conducted in a single center. Similarly, the fact that our study is a cross-sectional study and does not include mid-long-term follow-up results can be considered as an important limitation. Another limitation of our study is that it was not specified with which treatment the AS patients were treated.

## Conclusion

In conclusion; the kinesiophobia observed in the most patients with AS should be taken into account as a risk factor for chronic pain, disability, poor quality of life, and depression, and patients who have AS should be screened for movement fear. Therefore, it will take a crucial place for the treatment of patients with AS to early identify and treat patients with kinesiophobia or to plan treatments for factors causing kinesiophobia such as pain and depression, and to educate patients on how to cope with kinesiophobia and pain.

## Ethical approval

Approval for this study was obtained from Aksaray University Ethics Committee (Date: 26.09.2018, No: 2018-175).

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