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Comparison of kinesiophobia in patients with rheumatoid arthritis and systemic lupus erythematosus

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Abstract. – OBJECTIVE: Patients with rheumatic disease often experience arthritis and chronic joint pain, which can lead them to avoid movement, known as kinesiophobia. This may result in decreased mobility and endurance, as well as social isolation and depression. This study aimed to assess and compare the prevalence of kinesiophobia among patients with rheumatoid arthritis (RA) and systemic lupus erythematosus (SLE), and its association with disease activity, functional status, fear of falling, and fatigue.

PATIENTS AND METHODS: A cross-sectional study was conducted with 124 RA, 76 SLE patients, and 87 healthy controls. The tampa kinesiophobia scale (TKS) was used to assess kinesiophobia. The disease activity was assessed using Disease Activity Score 28 (DAS28) in RA, and systemic lupus erythematosus Disease Activity Index 2000 (SLEDAI-2K) in SLE patients. The Health Assessment Questionnaire (HAQ) was used to assess functional status, the Falls Efficacy Scale International (FES-I) was used to assess fear of falling, and the Fatigue Severity Scale (FSS) was used to assess fatigue levels.

RESULTS: Kinesiophobia was significantly more prevalent in RA patients compared to SLE patients [77.4% *vs.* 63.2%, odds ratio (OR): 2, 95% CI: 1.07-3.75; $p<0.05$]. The mean TKS score was 41.42±6.95 in RA patients, and 37.84±8.85 in SLE ($p=0.005$). TKS scores were positively correlated with DAS28 in RA patients; however, no correlation was found between SLEDAI-2K in SLE patients. A positive correlation was observed between TKS scores and the HAQ, FSS, and FES-I, both in RA and SLE patients.

CONCLUSIONS: RA patients exhibited significantly higher kinesiophobia scores compared to SLE patients. The higher rate of kinesiophobia levels in RA patients compared to SLE patients suggests an association between kinesiophobia and the more destructive course of RA, indicating that tight control of the disease is important. Kinesiophobia was associated with functional impairment, fear of falling, and fatigue. Timely identification and intervention for patients with kinesiophobia are essential to prevent progression, mitigate long-term consequences, and maintain functional capacity.

Key Words:
Disease activity, Fatigue, Kinesiophobia, Rheumatoid arthritis, Systemic lupus erythematosus.

Introduction

Rheumatoid arthritis (RA) is an inflammatory disease that causes synovial tissue hyperplasia, pannus development, and extraarticular symptoms. It mostly affects the metacarpophalangeal and proximal interphalangeal joints, as well as the lower extremity joints[1]. Inflammation of the joints leads to a variety of clinical symptoms, such as joint pain, swelling, and prolonged morning stiffness, causing a gradual path toward deforming polyarthritis, which can result in severe functional debility. RA patients often experience severe pain during exacerbation periods, leading to a predisposition to avoid painful joint movements. Although this adaptive behavior aims to protect, it limits daily function and impacts quality of life[2].

The musculoskeletal system is often involved in systemic lupus erythematosus (SLE), a chronic, systemic, autoimmune disease, and is commonly one of the initial manifestations. SLE affects various organ systems, including the skin, kidneys, lungs, heart, and neurological system, and may be severe enough to threaten the organ or patient's life[3]. Joint manifestations such as arthralgia and arthritis, as well as fatigue and depression resulting from a chronic and severe disease, may contribute to a reduction in physical activity over time in SLE patients[4,5].

Kinesiophobia is a fear-avoidance behavior caused by persistent pain and hypersensitivity

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to re-injury[6]. Patients may develop a cycle of avoidance, leading to disability and poor outcomes[7]. The frequent occurrence of arthritic episodes or chronic pain in patients with RA and SLE may serve as a potential risk factor for the subsequent development of kinesiophobia.

Several factors can lead to the development of kinesiophobia in patients with rheumatic diseases, including fatigue, fear of falling, and disease-related symptoms. Approximately 40-80% of RA patients have severe fatigue, and 16-67% perceive fear of falling[8,9]. Similarly, two-thirds of SLE patients experience fatigue, and one-third of these patients experience severe levels of fatigue[10]. In previous studies[11,12], patients with RA exhibited a high prevalence of kinesiophobia. There are very few studies[5] examining the presence of kinesiophobia in SLE.

Despite their distinct pathophysiology and clinical manifestations, RA and SLE frequently share similar psychological and functional effects on patients. To the best of our knowledge, there has been no study conducted to compare the levels of kinesiophobia between patients with RA and SLE. Thus, this study aims to determine and compare the prevalence of kinesiophobia among RA and SLE patients and to identify contributing factors, such as fatigue, fear of falling, functionality, and disease activity.

Patients and Methods

This study was designed as cross-sectional. The study included 124 RA patients diagnosed using the 2010 American College of Rheumatology (ACR) criteria[13] and 76 SLE patients diagnosed using the 2019 European League Against Rheumatism (EULAR)/ACR SLE classification criteria[14] who were applied to our rheumatology outpatient clinic between January 2023 and May 2023. As a healthy control group, the study included 87 age and gender-matched healthy individuals. Participants under the age of 18 and over the age of 70 were excluded. Patients with significant concomitant disorders that impair movement capacity (severe neurological, orthopedic, pulmonary, cardiac, etc.) were also excluded. Demographic data (age and gender), disease duration, extra-articular involvement, serology, height, weight, BMI, and medications used were all documented. Patients with RA and SLE were divided into two subgroups based on their BMI: those with a normal or low BMI (<25) and those with a BMI that was above normal (overweight or obese ≥25).

Kinesiophobia was evaluated using the Tampa Scale for Kinesiophobia, a 17-item self-report questionnaire[15]. The overall score ranged from 17 to 68, with higher scores indicating stronger fear-aversion beliefs. The scores above 37 suggest the presence of kinesiophobia. Tunca et al[16] established the validity and reliability of the Turkish version of the TKS.

The disease activity of patients with RA was assessed by the 28 joint Disease Activity Score (DAS28)[17]. RA patients were divided into two groups based on DAS28 scores: those with low disease activity (<3.2) and those with moderate to high disease activity (≥3.2). The SLEDAI-2K was used to evaluate disease activity in SLE patients[18]. SLE patients were divided into two groups: those with SLEDAI-2K scores of 20 or higher and those with scores below 20.

The health assessment questionnaire (HAQ) was used to assess functionality[19]. The Falls Efficacy Scale International (FES-I) was used to evaluate the fear of falling[20]. Each of the 16 questions is scored between 1 and 4, with 1 denoting not at all concern and 4 denoting great interest. The total score ranges from 16 (no concern) to 64 (extreme concern). Scores above 24 were regarded as indicators of the presence of a fear of falling. Turkish validity and reliability of the FES-I were established by Ulus et al[21]. The Fatigue Severity Scale (FSS) was used to evaluate the fatigue levels of the patients[22]. The study was approved by the Mersin University Clinical Research Ethics Committee (date: 07/07/2022, approval number: 2022/466). The research was carried out according to the Helsinki Declaration. Informed consent forms were signed by all participants.

Statistical Analysis

IBM SPSS for Windows version 22.0 (IBM Corp., Armonk, NY, USA) was used for statistical analysis. Descriptive data were shown as mean and standard deviations (SD). Numbers (n) and percentages (%) are used to represent categorical variables. To determine the distribution of numerical data, the Kolmogorov-Smirnov test was used. Pearson's correlation test was used if the correlation between the data was normally distributed; otherwise, Spearman's correlation test was used. The Student's *t*-test or Mann-Whitney U test was used to assess group differences according to the distribution of the data. The

Chi-square test or Fisher's exact test was used for comparing categorical data. A p-value<0.05 was deemed statistically significant.

Results

A total of 124 patients with RA, 76 patients with SLE, and 87 healthy controls were included in the study. Table I shows the baseline demographic and clinical characteristics of RA and SLE patients and the healthy control group. In the RA group, 55.6% (n=69) were female; in the SLE group, 69.7% (n=53) were female, whereas in the healthy group, 57.5% (n=50) were female, with steroids used by 77 of the RA patients (62.1%) and 44 of the SLE patients (57.9%) (χ^2=0.348, p=0.555).

The kinesiophobia score of RA patients has been found to be statistically significantly higher than that of SLE patients and the healthy group (41.42±6.95 *vs.* 37.84±8.85 *vs.* 26.75±7.87; p<0.001, respectively).

Individuals with a TKS score of 37 or higher were classified as having kinesiophobia. Kinesiophobia rate was found in 77.4% (n=96) of RA patients, 63.2% (n=48) of SLE patients, and 17.2% (n=15) of healthy controls. The rate of kinesiophobia in RA patients was significantly higher than that in the SLE patients [odds ratio (OR)=2, 95% confidence interval (CI)=CI: 1.07-3.75, p<0.05] and that in the healthy control group (OR=16.46, 95% CI: 8.19-33.06, p<0.05). When a sub-analysis was done excluding SLE patients without musculoskeletal involvement, the rates of kinesiophobia were also found to be higher in RA patients compared to SLE patients (OR=2.2, 95% CI: 1.23-4.02, p<0.05). In the comparative analysis between the SLE and healthy group, the OR was found to be 8.23 (95% CI: 3.88-33.06, p<0.05).

TKS scores were positively correlated with age, DAS28, HAQ, FES-I, and FSS scores (r=0.233, r=0.281, r=0.333, r=0.377, r=0.366, respectively, and p<0.05 for all) in RA patients. In patients with SLE, a positive correlation was observed between TKS scores and the HAQ, the FSS, and the FES-I (r=0.356, p=0.002; r=0.612, p<0.001; r=0.377, p<0.001, respectively). However, no significant correlation was found between TKS scores and disease activity (r=0.016, p=0.892) (Table II).

Patients were divided into two groups based on their TSK scores: those with high kinesiophobia scores (TSK≥37) and those with low kinesiophobia scores (TSK<37). Mean DAS28, FES-I, HAQ, and FSS scores were higher in patients with high kinesiophobia than in the group with low kinesiophobia in RA patients (p=0.019, p=0.010, p=0.025, p=0.007, respectively). In SLE patients with high kinesiophobia, the average HAQ, FES-I, and FSS scores were found to be significantly higher (p=0.002, p=0.001, p=0.008, respectively). SLEDAI-2K scores, however, did

Table I. Demographic and clinical characteristics of the RA and SLE patients and healthy controls.

	RA (n = 124) mean (SD)	SLE (n = 76) mean (SD)	Healthy control (n = 87) mean (SD)	*p*
Age (year)	48.65 ± 11.40	45.58 ± 10.77	48.82 ± 8.30	0.079
Disease duration (year)	7.21 ± 6.26	6.39 ± 6.07	N/A	0.364
BMI	28.24 ± 4.02	26.87 ± 4.83	27.40 ± 4.17	0.078
TAMPA scores	41.42 ± 6.95	37.84 ± 8.85	26.75 ± 7.87	**< 0.001**
				***p1* = 0.005**
				***p2* < 0.001**
				***p3* < 0.001**
FES-I	36.02 ± 12.33	33.07 ± 13.73	N/A	0.116
FSS	4.61 ± 1.57	4.93 ± 1.86	N/A	0.229
HAQ	0.72 ± 0.75	0.56 ± 0.57	N/A	0.097
DAS28	2.45 ± 1.16	N/A	N/A	
SLEDAI-2K	N/A	9.11 ± 7.05	N/A	

RA: Rheumatoid Arthritis, SLE: Systemic Lupus Erythematosus, SD: Standart Deviation, BMI: Body Mass Index, FES-I: The Falls Efficacy Scale International, FSS: Fatigue Severity Scale, HAQ: Health Assessment Questionnaire, DAS28: Disease Activity Score 28, SLEDAI-2K: Systemic Lupus Erythematosus Disease Activity Index 2000, $p1$: p-value for the comparison of RA and SLE, $p2$: p-value for the comparison of RA and healthy control, $p3$: p-value for the comparison of SLE and healthy control, N/A: Not available. $p < 0.05$ presented in bold.

Table II. Correlation between TKS scores and clinical parameters.

	RA TKS		SLE TKS	
	r	p	r	p
Age	0.234	**0.00**	0.021	0.860
Disease duration	0.106	0.239	-0.025	0.830
BMI	-0.03	0.635	0.015	0.900
HAQ	0.323	**< 0.001**	0.356	**0.002**
FES-I	0.348	**< 0.001**	0.612	**< 0.001**
FSS	0.373	**< 0.001**	0.412	**< 0.001**
DAS28	0.313	**< 0.001**	N/A	N/A
SLEDAI-2K	N/A	N/A	0.016	0.892

RA: Rheumatoid Arthritis, SLE: Systemic Lupus Erythematosus, BMI: Body Mass Index, HAQ: Health Assessment Questionnaire, FES-I: The Falls Efficacy Scale International, FSS: Fatigue Severity Scale, DAS28: Disease Activity Score 28, SLEDAI-2K: Systemic Lupus Erythematosus Disease Activity Index 2000, N/A: Not available. $p < 0.05$ presented in bold.

not show a significant difference between those with low and high kinesiophobia (p=0.624). DAS 28 scores were higher in RA patients with high kinesiophobia compared to those with low (2.57±1.23 *vs.* 1.97±0.61; p=0.008, respectively) (Table III).

No difference was detected in gender, upper and lower joint involvement, medical treatment, steroid use, serological status, presence of extra-articular organ involvement, and BMI in RA patients with low and high kinesiophobia (p>0.05 for all) (Table IV).

In SLE patients with joint involvement, mean kinesiophobia scores were found to be higher compared to those without joint involvement (38.86±9.12 *vs.* 34.78±7.38; p=0.016, respectively). No difference was detected in gender, disease activity severity, treatment, BMI, presence of extra-articular organ involvement, presence of nephritis, and steroid use in SLE patients with low and high kinesiophobia (p>0.05 for all) (Table V).

Discussion

The aim of this study was to compare the prevalence of kinesiophobia between RA and SLE patients and healthy individuals, as well as its association with disease activity, organ involvement, functioning, fear of falling, and fatigue. Our study is the first to compare the kinesiopho-

Table III. Differences in demographic and clinical data between RA and SLE patients with high and low kinesophobia.

	RA			SLE		
	Low Kinesiophobia TKS<37	High Kinesiophobia TKS≥37	p	Low Kinesiophobia TKS<37	High Kinesiophobia High TKS≥37	p
Age	45.57 ± 10.93	49.55 ± 11.41	0.104	46.54 ± 10.56	45.02 ± 10.96	0.550
Disease duration	6.61 ± 6.28	7.39 ± 6.11	0.637	6.18 ± 5.92	6.52 ± 6.22	0.815
BMI	28.13 ± 4.16	28.27 ± 4.00	0.876	26.60 ± 5.25	27.02 ± 4.62	0.511
HAQ	0.43 ± 0.63	0.81 ± 0.77	**0.011**	0.35 ± 0.46	0.69 ± 0.60	**0.002**
FES-I	30.18 ± 11.39	37.73 ± 12.12	**0.004**	26.21 ± 11.30	37.06 ± 13.53	**0.001**
FSS	3.52 ± 1.40	4.95 ± 1.27	**< 0.001**	4.08 ± 1.90	5.42 ± 1.67	**0.008**
DAS28	1.99 ± 0.63	2.58 ± 1.24	**0.017**	N/A	N/A	N/A
SLEDAI-2K	N/A	N/A	N/A	9.64 ± 7.89	8.81 ± 6.57	0.624

RA: Rheumatoid Arthritis, SLE: Systemic Lupus Erythematosus, TKS: Tampa Kinesiophobia Scale, BMI: Body Mass Index, HAQ: Health Assessment Questionnaire, FES-I: The Falls Efficacy Scale International, FSS: Fatigue Severity Scale, DAS28: Disease Activity Score 28, SLEDAI-2K: Systemic Lupus Erythematosus Disease Activity Index 2000, N/A: Not available. $p < 0.05$ presented in bold.

Table IV. Comparison of clinical parameters of RA patients with low and high kinesiophobia.

	Low Kinesiophobia TKS<37	High Kinesiophobia TKS≥37	p
Gender			0.296[a]
Female	18 (64.3%)	51 (53.1%)	
Male	10 (35.7%)	45 (46.9%)	
DAS28			**0.004**[b]
< 3.2	28 (100%)	74 (771%)	
≥ 3.2	0 (0%)	22 (22.9%)	
Joint involvement			0.833[a]
Predominant upper extremity	16 (42.9%)	57 (40.6%)	
Predominant lower extremity	12 (57.1%)	39 (59.4%)	
Treatment			0.238[b]
csDMARD	26 (92.9%)	79 (82.3%)	
bDMARD	2 (7.1%)	17 (17.7%)	
Steroid Use			0.247[a]
Yes	20 (71.4%)	57 (59.4%)	
No	8 (28.6%)	39 (40.6%)	
Serology			0.863[a]
Seronegative	10 (35.7%)	36 (37.5%)	
Seropositive	18 (64.3%)	60 (62.5%)	
Extra-articular involvement			0.620[a]
Yes	6 (21.4%)	25 (26.0%)	
No	22 (78.6%)	71 (74%)	
BMI			0.910[a]
< 25	7 (25.0%)	21 (24.0%)	
≥ 25	21 (75.0%)	73 (76.0%)	

TKS: Tampa Kinesiophobia Scale, DAS28: Disease Activity Score 28, csDMARD: Conventional synthetic disease-modifying anti-rheumatismal drug, DMARD: Biological disease-modifying anti-rheumatismal drug, BMI: Body Mass Index. [a]Chi-square test, [b]Fischer's exact test.

Table V. Comparison of clinical parameters of SLE patients with low and high kinesiophobia.

	Low Kinesiophobia TKS<37	High Kinesiophobia TKS≥37	p
Gender			0.446[a]
Female	21 (75%)	32 (66.7%)	
Male	7 (25%)	16 (33.3%)	
SLEDAI-2K			0.704[b]
< 20	25 (89.3%)	44 (91.7%)	
≥ 20	3 (10.7%)	4 (8.3%)	
Treatment			0.106[a]
Only HCQ-/+Steroid	14 (50%)	16 (30.8%)	
Immunsupresives	14 (50%)	36 (69.2%)	
Joint involvement			**0.006**[a]
Yes	12 (42.9%)	7 (14.6%)	
No	16 (57.1%)	41 (85.4%)	
Steroid Use			0.194[a]
Yes	18 (64.3%)	26 (54.2%)	
No	10 (35.7%)	22 (45.8%)	
Extra-articular involvement			0.429[a]
Yes	8 (28.6%)	18 (37.5%)	
No	20 (71.4%)	30 (62.5%)	
Nephritis			0.733[a]
Yes	8 (28.6%)	36 (75%)	
No	20 (71.4%)	12 (25%)	
BMI			0.481[a]
< 25	14 (50%)	20 (41.7%)	
≥ 25	14 (50%)	28 (58.3%)	

TKS: Tampa Kinesiophobia Scale, SLEDAI-2K: Systemic Lupus Erythematosus Disease Activity Index, HCQ: Hydroxychloroquine, BMI: Body Mass Index, [a]Chi square test, [b]Fischer's exact test. $p < 0.05$ presented in bold.

bia levels of patients with RA and SLE. High levels of kinesiophobia were observed in 77.4% of RA patients and 63.2% of SLE patients. RA patients are 2 times more likely than SLE patients to experience kinesiophobia.

Despite the fact that SLE can have a severe course and involve significant organ involvement, leading to a serious disease burden in some patients, the detection of higher rates of kinesiophobia in RA patients compared to those with SLE might be attributed to the more destructive nature of RA's joint involvement and its potential to result in deformities. In the sub-analysis performed by including SLE patients with musculoskeletal involvement (musculoskeletal involvement with or without organ involvement), kinesiophobia was found to be 2.2 times higher in RA patients than in RA patients, also supporting that the severity and course of joint involvement is an important factor for kinesiophobia. In a study[23] where joint findings in untreated RA and SLE patients were compared with ultrasound, joint synovitis scores (grey scale and power Doppler) were found to be higher in RA patients, supporting our results. Despite higher kinesiophobia levels in RA patients, no difference in Health Assessment Questionnaire (HAQ) scores, fear of falling, and intensity of fatigue in both RA and SLE implies that joint findings may be the most significant factor in the development of kinesiophobia in both groups.

There are studies in the literature that assess kinesiophobia in RA patients[11,12,24-26]. The study by Baysalhan et al[11] is the first to examine the prevalence of kinesiophobia. According to their study, RA patients had a higher prevalence of kinesiophobia than the general population (70% *vs.* 12%), which is consistent with our findings.

Yentur et al[5] identified high kinesiophobia in 66.6% of patients with SLE, which is also consistent with our study. In this study, they identified a correlation between kinesiophobia and depression. Also, correlations were found between kinesiophobia and quality of life items such as social isolation, sleep, and emotional reactions. Depression has been reported to range from mild to severe in 53% of SLE patients. However, no correlation was found between kinesiophobia levels and other parameters like disease activity, pain, fatigue, and fear of falling in their study.

In studies conducted with RA patients, no relationship has been found between TKS scores and the duration of the disease[11,25], and in our study, no relationship has been found between the duration of the disease and the levels of kinesiophobia in both RA and SLE patients. This can be attributed to the fact that the extended duration of the condition increases the patient's ability to handle their condition and pain. Another perspective is that acute pain or disease processes can cause avoidance of movement behavior in patients, just as in chronic patients, and kinesiophobia should not only be considered as a condition brought by chronic diseases.

In one study, it was reported that individuals with increased kinesiophobia had more fear of falling and higher levels of depression[27]. The study by Baysalhan et al[11] demonstrates the relationship between kinesiophobia and fear of falling in RA patients, which was consistent with our results. In our study, a relationship has also been identified between fear of falling and kinesiophobia in SLE patients and has been found at similar levels in both RA and SLE. This result indicates that fear of falling is an effective factor in kinesiophobia. Since falling causes pain, it is expected that patients with joint impairments or painful joints experience a greater fear of falling.

In a recent study[12], fatigue scores were identified as one of the independent variables affecting kinesiophobia in RA patients. Similarly, a study conducted by Mancuso et al[27] reported that 78% of SLE patients avoided movement; approximately half attributed this avoidance to joint symptoms, and one-third cited fatigue as the cause of kinesiophobia. We found a correlation between fatigue in patients with both RA and SLE. In patients with SLE, a stronger correlation has been identified between fatigue compared to patients with RA. This has suggested that even though joint involvement in SLE patients leads to fewer deformities compared to RA and despite not being present in some patients, fatigue is a significant component in movement avoidance.

In our study, there was no significant difference between the levels of kinesiophobia in RA patients, with involvement predominantly in the upper and lower extremities. This suggests that not only weight-bearing joints but also upper extremity involvement are associated with movement avoidance. Due to the pattern of polyarticular involvement, it has been unable to determine which joint involvement is most frequently related to kinesiophobia. In general, however, it has been observed that the fear induced by pain in the joints results in comparable levels of kinesiophobia in patients with upper and lower extremity

involvement. Due to the fact that not all patients with SLE have joint involvement, a similar comparison could not be made. However, kinesiophobia was found to be more prevalent in those with joint involvement compared to those with other organ involvement but no joint involvement. The presence of involvement of extra-articular systems was not found as a risk factor for kinesiophobia. This situation also demonstrates that joint involvement is an important risk factor for kinesiophobia in SLE patients. There was no difference in kinesiophobia rates between RA patients with and without the involvement of non-articular organs. However, the fact that patients with severe orthopedic, neurological, and cardiopulmonary diseases were excluded from our study may have affected these results.

Baysalhan et al[11] examined the relationship between kinesiophobia and disease activity for the first time and found a positive correlation between the TKS scores and the DAS28 scores. High pain levels were associated with an increased incidence of fear-avoidance behavior or kinesiophobia in additional studies[15,16] involving RA patients. In another study[17] evaluating kinesiophobia in patients with RA in remission, no correlation was found between pain and kinesiophobia, which was attributed to the low pain scores of patients in remission.

In our study, a significant positive correlation was found between the disease activity score DAS28 and TKS scores in patients with RA, while no correlation was found with disease activity levels (SLEDAI-2K) in patients with SLE. This situation has been associated with the fact that the DAS28 score is a composite index based on joint inflammation findings, such as swelling and tenderness. Joint tenderness and swelling are related to more pain and discomfort, making kinesiophobia an expected behavior. On the other hand, SLEDAI-2K encompasses multiple organ involvement and includes numerous components weighted from symptomless disease findings (such as laboratory abnormalities and low complement levels) to severe disease findings, with joint symptoms only being represented with 4 points. The absence of a significant difference in levels of kinesiophobia between SLE patients with high disease activity and those with low disease activity suggests that the chronic nature of the disease, accompanying fatigue, or other psychosocial factors may also be influential.

TKS scores did not differ significantly between steroid users and non-users in patients with RA and SLE. There was also no statistically significant difference in kinesiophobia scores between csDMARD and bDMARD-treated RA patients, and HCQ users and immunosuppressive users in SLE patients. The findings indicate that patients who receive more intense treatments as a result of higher disease activity, intensity of symptoms, and disease burden do not have an increased sense of vulnerability and susceptibility to injury while receiving appropriate therapy.

Limitations

There are some limitations in our study. First, the long-term consequences of conditions such as kinesiophobia-related immobility could not be evaluated since the study was cross-sectional. Our results are also insufficient for generalization to the population due to the study was single-centered. The fact that our center is a tertiary care hospital may have resulted in a bias in patient selection due to the prevalence of more complicated and severe cases. Further, the exclusion of patients with severe orthopedic, neurological, cardiac, and pulmonary involvement may have affected our results. In addition, psychological factors, such as anxiety and depression, that may contribute to kinesiophobia have not been evaluated. Additional studies are required to evaluate the long-term effects of kinesiophobia in RA and SLE patients.

Conclusions

Patients with RA and SLE have a high rate of kinesiophobia. The observation of relatively higher kinesiophobia in RA patients compared to those with SLE may be attributable to RA's more erosive course, which results in more deformities and disability. The correlation of kinesiophobia with fatigue in both RA and SLE patients necessitates more meticulous evaluation in patients. Interventions focused on reducing fatigue and managing disease activity are essential for preventing the development of kinesiophobia. The prompt identification and treatment of patients with kinesiophobia is crucial for preventing the progression of this condition, diminishing its long-term effects, and preserving the patient's functional capacity. Patients should be informed about kinesiophobia and its long-term effects, and if necessary, physical therapy and psychological support should be provided.

Conflict of Interest
The authors declare that they have no conflict of interests.

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Informed Consent
Written informed consent was obtained from the study participants.

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Ethics Approval
This study was conducted in accordance with the principles of the Declaration of Helsinki. This study was approved by the Ethics Committee of Clinical Research of Mersin University (date: 07/07/2022, approval number: 2022/466).

Data Availability
Data information can be obtained from the author upon request.

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References

1) Jang S, Kwon EJ, Lee JJ. Rheumatoid Arthritis: Pathogenic Roles of Diverse Immune Cells. Int J Mol Sci 2022; 23: 905.
2) Karlson EW, Deane K. Environmental and gene-environment interactions and risk of rheumatoid arthritis. Rheum Dis Clin North Am 2012; 38: 405-426.
3) Tani C, Elefante E, Arnaud L, Barreira SC, Bulina I, Cavagna L, Costedoat-Chalumeau N, Doria A, Fonseca JE, Franceschini F, Fredi M, Iaccarino L, Limper M, Majnik J, Nagy G, Pamfil C, Rednic S, Reynolds JA, Tektonidou MG, Troldborg A, Zanframundo G, Mosca M. Rare clinical manifestations in systemic lupus erythematosus: a review on frequency and clinical presentation. Clin Exp Rheumatol 2022; 134: 93-102.
4) Björk M, Dahlström Ö, Wetterö J, Sjöwall C. Quality of life and acquired organ damage are intimately related to activity limitations in patients with systemic lupus erythematosus. BMC Musculoskelet Disord 2015; 16: 188.
5) Yentur SB, Karatay S, Oskay D, Tufan A, Küçük H, Haznedaroğlu Ş. Kinesiophobia and related factors in systemic lupus erythematosus patients. Turk J Med Sci 2019; 49: 1324-1331.
6) Larsson C, Ekvall Hansson E, Sundquist K, Jakobsson U. Kinesiophobia and its relation to pain characteristics and cognitive affective variables in older adults with chronic pain. BMC Geriatr 2016; 16: 128.
7) Alsaleem MK, Alkhars AM, Alalwan HA, Almutairi A, Alonayzan A, AlYaeesh IA. Kinesiophobia Post Total Hip Arthroplasty: A Retrospective Study. Cureus 2021; 13: e15991.
8) Santos EJF, Duarte C, da Silva JAP, Ferreira RJO. The impact of fatigue in rheumatoid arthritis and the challenges of its assessment. Rheumatology (Oxford) 2019; 58: 3-9.
9) Stanmore EK, Oldham J, Skelton DA, O'Neill T, Pilling M, Todd C. Fear-of-falling and associated risk factors in persons with rheumatoid arthritis: a 1 year prospective study. BMC Musculoskelet Disord 2021; 22: 260.
10) Dey M, Parodis I, Nikiphorou E. Fatigue in Systemic Lupus Erythematosus and Rheumatoid Arthritis: A Comparison of Mechanisms, Measures and Management. J Clin Med 2021; 10: 3566.
11) Baysalhan Öztürk İ, Garip Y, Sivas F, Parlak Özden M, Bodur H. Kinesiophobia in rheumatoid arthritis patients: Relationship with quadriceps muscle strength, fear of falling, functional status, disease activity, and quality of life. Arch Rheumatol 2021; 36: 427-434.
12) Baday-Keskin D, Ekinci B. The relationship between kinesiophobia and health-related quality of life in patients with rheumatoid arthritis: A controlled cross-sectional study. Joint Bone Spine 2022; 89: 105275.
13) Aletaha D, Neogi T, Silman AJ, Funovits J, Felson DT, Bingham CO 3rd, Birnbaum NS, Burmester GR, Bykerk VP, Cohen MD, Combe B, Costenbader KH, Dougados M, Emery P, Ferraccioli G, Hazes JM, Hobbs K, Huizinga TW, Kavanaugh A, Kay J, Kvien TK, Laing T, Mease P, Ménard HA, Moreland LW, Naden RL, Pincus T, Smolen JS, Stanislawska-Biernat E, Symmons D, Tak PP, Upchurch KS, Vencovský J, Wolfe F, Hawker G. 2010 Rheumatoid arthritis classification criteria: an American College of Rheumatology/European League Against Rheumatism collaborative initiative. Arthritis Rheum 2010; 62: 2569-2581.
14) Aringer M, Costenbader K, Daikh D, Brinks R, Mosca M, Ramsey-Goldman R, Smolen JS, Wofsy D, Boumpas DT, Kamen DL, Jayne D, Cervera R, Costedoat-Chalumeau N, Diamond B, Gladman DD, Hahn B, Hiepe F, Jacobsen S, Khanna D, Lerstrøm K, Massarotti E, McCune J, Ruiz-Irastorza G, Sanchez-Guerrero J, Schneider M, Urowitz M, Bertsias G, Hoyer BF, Leuchten N, Tani C, Tedeschi SK, Touma Z, Schmajuk G, Anic B, Assan F, Chan TM, Clarke AE, Crow MK, Czirják L, Doria A, Graninger W, Halda-Kiss B, Hasni S, Izmirly PM, Jung M, Kumánovics G, Marietta X, Padjen I, Pego-Reigosa JM, Romero-Diaz J, Rúa-Figueroa Fernández Í, Seror R, Stummvoll GH, Tanaka Y, Tektonidou MG, Vasconcelos C, Vital EM, Wallace DJ, Yavuz S, Meroni PL, Frit-

zler MJ, Naden R, Dörner T, Johnson SR. 2019 European League Against Rheumatism/American College of Rheumatology Classification Criteria for Systemic Lupus Erythematosus. Arthritis Rheumatol 2019; 78: 1151-1159.

15) Vlaeyen JW, Kole-Snijders AM, Rotteveel AM, Ruesink R, Heuts PH. The role of fear of movement/(re)injury in pain disability. J Occup Rehabil 1995; 5: 235-252.

16) Tunca Yılmaz Ö, Yakut Y, Uygur F, Uluğ N. Tampa Kinezyofobi Ölçeği'nin Türkçe versiyonu ve test-tekrar test güvenirliği. Fizyoter Rehabil 2011; 22: 44-49.

17) Prevoo ML, van't Hof MA, Kuper HH, van Leeuwen MA, van de Putte LB, van Riel PL. Modified disease activity scores that include twenty-eight-joint counts. Development and validation in a prospective longitudinal study of patients with rheumatoid arthritis. Arthritis Rheum 1995; 38: 44-48.

18) Gladman DD, Ibañez D, Urowitz MB. Systemic lupus erythematosus disease activity index 2000. J Rheumatol 2002; 29: 288-291.

19) Küçükdeveci AA, Sahin H, Ataman S, Griffiths B, Tennant A. Issues in cross-cultural validity: example from the adaptation, reliability, and validity testing of a Turkish version of the Stanford Health Assessment Questionnaire. Arthritis Rheum 2004; 51: 14-19.

20) Yardley L, Beyer N, Hauer K, Kempen G, Piot-Ziegler C, Todd C. Development and initial validation of the Falls Efficacy Scale-International (FES-I). Age Ageing 2005; 34: 614-619.

21) Ulus Y, Durmus D, Akyol Y, Terzi Y, Bilgici A, Kuru O. Reliability and validity of the Turkish version of the Falls Efficacy Scale International (FES-I) in community-dwelling older persons. Arch Gerontol Geriatr 2012; 54: 429-433.

22) Krupp LB, LaRocca NG, Muir-Nash J, Steinberg AD. The fatigue severity scale. Application to patients with multiple sclerosis and systemic lupus erythematosus. Arch Neurol 1989; 46: 1121-1123.

23) Ogura T, Hirata A, Hayashi N, Takenaka S, Ito H, Mizushina K, Fujisawa Y, Imamura M, Yamashita N, Nakahashi S, Kujime R, Kameda H. Comparison of ultrasonographic joint and tendon findings in hands between early, treatment-naïve patients with systemic lupus erythematosus and rheumatoid arthritis. Lupus 2017; 26: 707-714.

24) Lööf H, Demmelmaier I, Henriksson EW, Lindblad S, Nordgren B, Opava CH, Johansson UB. Fear-avoidance beliefs about physical activity in adults with rheumatoid arthritis. Scand J Rheumatol 2015; 44: 93-99.

25) Kınıklı Gİ, Güney Deniz H, Karahan S, Ateş A, Turgay M, Kınıklı G. Predictors of Fear of Movement in Patients with Rheumatoid Arthritis Turk J Physiother Rehabil 2018; 29: 11-17.

26) Özlü A, Akdeniz Leblebicier M. Does remission in rheumatoid arthritis bring kinesiophobia, quality of life, fatigue, and physical activity closer to normal? Arch Rheumatol 2022; 37: 603-612.

27) Yükselmiş Ö. The relationship of kinesiophobia with depression and anxiety in nursing homes. Eur Rev Med Pharmacol Sci 2023; 27: 2305-2313.

28) Mancuso CA, Perna M, Sargent AB, Salmon JE. Perceptions and measurements of physical activity in patients with systemic lupus erythematosus. Lupus 2011; 20: 231-242.