Original Investigation / Orijinal Araştırma

DOI: 10.4274/tod.galenos.2025.93798
Turk J Osteoporos 2025;31(1):34-42

Understanding Kinesiophobia in Chronic Mechanical Low Back Pain: An Analysis of Contributing Factors

Kronik Mekanik Bel Ağrısında Kinezyofobiyi Anlamak: Katkıda Bulunan Faktörlerin Analizi

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Abstract

Objective: This study aims to evaluate how kinesiophobia is related to demographics, pain intensity, functional status, and quality of life in patients with chronic mechanical low back pain.

Materials and Methods: We assessed 226 participants suffering from chronic mechanical low back pain for pain intensity (using the visual analog scale), neuropathic pain (with the douleur neuropathic 4 questionnaire, DN4), functional disability [(using the Oswestry disability index (ODI)], kinesiophobia [(using the Tampa kinesiophobia scale (TKS)], and quality of life [using the short form-36 (SF-36) quality of life index]. Patients were grouped and compared based on having a high (TKS ≥37) or a low (TKS <37) kinesiophobia.

Results: Most participants (69.4%) reported high levels of kinesiophobia. Mean scores: TKS=40.7±6.9; ODI=32.0±18.5; DN4=1.8±2.0. Kinesiophobia was significantly associated with female sex, activity-related pain, low education level, being a housewife, disability, and low quality of life. The multivariate model revealed that the individual SF-36 domain scores for limitations due to physical health, emotional well-being, and social function were significantly and independently correlated with distinguishing patients with high and low levels of kinesiophobia

Conclusion: Sex, activity-related pain, occupation, education level, disability, and quality of life are significant factors influencing kinesiophobia in chronic mechanical low back pain patients.

Keywords: Chronic low back pain, disability, kinesiophobia, quality of life

Öz

Amaç: Bu çalışmanın amacı, kronik mekanik bel ağrısı olan hastalarda kinezyofobinin demografik özellikler, ağrı şiddeti, fonksiyonel durum ve yaşam kalitesi ile nasıl ilişkili olduğunu değerlendirmektir.

Gereç ve Yöntem: Kronik mekanik bel ağrısı olan 226 katılımcının ağrı şiddeti görsel analog skala; nöropatik ağrı varlığı douleur nöropatik 4 (DN4) anketi, fonksiyonel engelliliği Oswestry engellilik indeksi (OEE); kinezyofobileri Tampa kinezyofobi ölçeği (TKÖ) ve yaşam kaliteleri kısa form-36 (SF-36) yaşam kalitesi indeksi kullanılarak değerlendirildi. Hastalar kinezyofobi skorlarına göre yüksek (TKÖ ≥37) ve düşük (TKÖ <37) olarak göre gruplandırıldı ve karşılaştırıldı.

Bulgular: Katılımcıların çoğu (%69,4) yüksek düzeyde kinezyofobi bildirmiştir. Ortalama kinezyofobi, fonksiyonel engellilik ve nöropatik ağrı puanları sırasıyla TKÖ=40,7±6,9; OEE=32,0 ±18,5; DN4=1,8±2 olarak saptandı. Kinezyofobi kadın cinsiyet, aktiviteye bağlı ağrı, düşük eğitim düzeyi, ev hanımı olma, engellilik ve düşük yaşam kalitesi ile anlamlı şekilde ilişkiliydi. Çok değişkenli model ile yapılan ileri analiz, fiziksel sağlık nedeniyle sınırlamalar, duygusal iyilik hali ve sosyal işlev alanlarındaki bireysel SF-36 skorlarının, yüksek ve düşük kinesiophobia seviyelerine sahip hastaları ayırt etme konusunda anlamlı ve bağımsız olarak korele olduğunu ortaya koydu.

Sonuç: Sonuç olarak, cinsiyet, aktivite ile ilişkili ağrı, meslek, eğitim düzeyi, engellilik ve yaşam kalitesi kronik mekanik bel ağrısı hastalarında kinezyofobiyi etkileyen önemli faktörlerdir.

Anahtar kelimeler: Kronik bel ağrısı, engellilik, kinezyofobi, yaşam kalitesi

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Received/Geliş Tarihi: 20.01.2025 **Accepted/Kabul Tarihi:** 27.02.2025 **Publication Date/Yayınlanma Tarihi:** 20.03.2025

Cite this article as/Atıf: Karamanlıoğlu DŞ, Doğan YE, Akan Begoğlu F, Öztürk G, Yılmaz Kaysın M, Akpınar P, et al. Understanding kinesiophobia in chronic mechanical low back pain: an analysis of contributing factors. Turk J Osteoporos. 2025;31(1):34-42

Introduction

Low back pain is one of the most important causes of disability worldwide, with its prevalence steadily increasing (1). Most low back pain develops due to mechanical reasons such as repetitive trauma and overuse, usually workplace injuries. Although many people experience acute low back pain at least once, this pain often becomes chronic. Symptoms of chronic low back pain are poorly correlated with pathology, and the persistence of symptoms cannot be explained by biological factors alone; Psychological and social factors also play an essential role (2).

Kinesiophobia and other psychological factors play crucial roles in the prognosis of chronic low back pain (3,4). Kinesiophobia is the tendency to reduce physical activity or avoid movement altogether due to fear or anxiety about pain and worsening of their current medical condition (3). Kinesiophobia is often reported as a crucial risk factor in the chronicity of low back pain and associated disability (4). Preoperative kinesiophobia is related to postoperative sedentary behavior and decreased physical activity in spine surgery patients (5). Kinesiophobia can significantly affect the pathway to recovery of physical function (6).

Kinesiophobia in knee osteoarthritis is associated with pain and function (7). The term "low back-related leg pain" refers to both nerve root compression and referred leg pain without nerve involvement (3). Neuropathic pain in chronic low back pain ranges from 16% to 55% (2). Another common situation is sacroiliac joint dysfunction, which can be the main source of low back pain and is known to accompany other conditions (2,8). This complex nature of low back pain makes it increasingly complicated to treat.

Addressing kinesiophobia as one of the psychosocial factors in the low back pain treatment approach may increase the chances of success. Although clinical evidence is growing in this direction (5,9-11), the factors affecting fear of movement, especially in patients with chronic mechanical low back pain, are poorly defined. In this research, we aimed to contribute to the existing literature by exploring the link among kinesiophobia with demographic characteristics, pain severity, functional disability, and quality of life, as well as the relationship of kinesiophobia with sacroiliac dysfunction, leg pain, and neuropathic pain in patients with chronic mechanical low back pain.

Materials and Methods

This cross-sectional observational study was conducted following approval from the Health Sciences University Türkiye, Fatih Sultan Mehmet Training and Research Hospital Clinical Research Ethics Committee (approval number: FSM EAH-KAEK 2023/47 date: 09/03/2023). This study was conducted per the principles of the Declaration of Helsinki. After a detailed investigation of the inclusion and exclusion criteria, all participants provided written voluntary informed consent for participation. Clinical trial records from this study were prospectively transmitted to a public database. Registration Number: NCT06190041.

The sample size was determined using G*Power software. As per the results of previous reference and preliminary studies, we determined an effect size of 0.5 (medium level effect; Cohen, 1988) for the between-group comparisons for low back-related leg pain score measured using a visual analog scale (VAS). Using this effect size value and a statistical significance coefficient of 0.05, the minimum sample size was calculated as 51 subjects to obtain 80% power. As per the study objectives, we intended to compare the characteristics of subjects with high and low levels of kinesiophobia; Accordingly, both groups were targeted to have 51 subjects each (n=102).

The study encompassed individuals aged 18 to 75 years who attended our physical medicine and rehabilitation (PMR) clinic and had chronic mechanical low back pain (pain duration of 3 months or more). To confirm their suitability, these participants were further assessed in detail by the PMR specialist based on anamnesis, physical examination, and imaging methods. All participants underwent two-directional X-ray and magnetic resonance imaging of the lumbar spine for diagnostic and differential diagnosis purposes. The individuals with inflammatory low back pain, those who had undergone lumbar spine, hip, or knee surgery, those with abnormal findings on hip and knee joint examinations, oncological conditions, suspected referred pain from internal organs, infections, pregnancy, recent trauma impacting the lumbar spine, and/or lumbar fractures were excluded.

Patient data regarding demographics and the presence of chronic diseases were recorded. The intensity of back pain at rest, activity, and night, as well as neuropathic pain, disability, kinesiophobia, and quality of life, were assessed by a blinded rater (a PMR physician). Sacroiliac dysfunction was evaluated by history and physical examination (8).

VAS is a unidimensional measure used to assess pain intensity and is frequently used in adult populations, including rheumatological patients (12). It comprises a 10-cm line (horizontal or vertical) on which the patient marks their pain; One end of the line indicates "no pain," and the other end is "most severe possible pain." The patient is asked to mark a point on the line that most accurately depicts the intensity of their back pain in the last week (12).

The DN4 is a scale developed to define neuropathic pain. A score of ≥4 suggests that the pain may be of neuropathic origin (13). DN4 was confirmed to be a reliable and accurate tool for assessing neuropathic pain in the Turkish population (14).

The ODI also comprises 10 questions evaluating disability. Disability can be classified into five categories (15): minimal (0%-20%), moderate (21%-40%), severe disability (41-60%), disabled (61%-80%), and bedridden (81%-100%). The validity and reliability of the ODI in the Turkish population have been established in a previous study (16).

The Turkish version of the TKS assessed fear of movement (17). The TKS consists of 17 questions that examine injury/reinjury and fear-avoidance parameters in work-related activities. The total score ranges between 17 and 68. Vlaeyen et al. (18) established that a TKS score of ≥37 indicates high kinesiophobia. This score (TKS ≥37) was used in the present study to classify patients into high and low kinesiophobia groups.

The short form-36 (SF-36), created in 1992 (19), is one of the most frequently used quality-of-life questionnaires. It comprises 36 questions about eight categories. The total score varies between 0 and 100, with higher scores indicating good health. The SF-36 has been proven valid and reliable in the Turkish population (20).

Statistical Analysis

All statistical analyses were conducted using SPSS (version 28.0). Descriptive statistics, including mean±standard deviation, median (range), and frequency (percentage), were used to summarize the data. The normality of the data distribution was evaluated with the Shapiro-Wilk test. The Mann-Whitney U test was used for independent quantitative data, while qualitative independent data were analyzed with the Chi-square test or Fisher's exact test, as appropriate. To identify potential predictors of kinesiophobia, both univariate and multivariate logistic regression analyses were performed. All tests with a p-value under 0.05 were deemed statistically significant.

Results

240 suitable participants were invited to participate, of which 230 agreed. Four patients (three of them had symptomatic knee osteoarthritis; One had symptomatic hip osteoarthritis) were excluded, and 226 patients were included in the study (Figure 1).

Table 1 summarizes the demographic data of the study participants. Most participants (68.1%) were females, among which 43.8% were housewives. The mean duration of pain was 48.2±71.8 months, and most participants reported high kinesiophobia (69.4%). The mean TKS, ODI, and DN4 scores of the entire cohort were 40.7±6.9, 32.0±18.5, and 1.8±2.0, respectively. A summary of the participants' clinical features is shown in Table 2. More than half (58.4%) of participants had

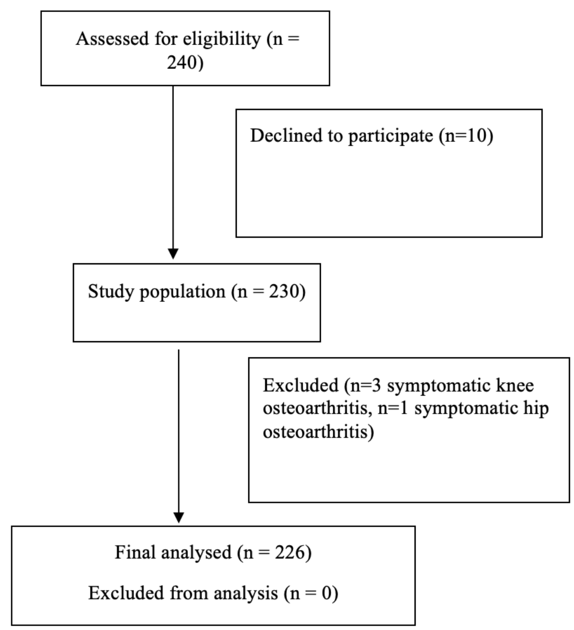

Figure 1. Flow diagram of participation

Table 1. Demographic parameters of participants

		Min-max	Median	Mean±SD/n%	
Age		18.0-75.0	52.0	51.5±13.7	
Sex	Female			154	68.1%
	Male			72	31.9%
BMI		17.2 - 43.0	28.1	28.5±4.8	
HT				73	32.3%
DM				43	19.0%
CAD				27	11.9%
Education	Illiterate			21	9.3%
	Primary school			97	42.9%
	Secondary school			18	8.0%
	High school			44	19.5%
	University			46	20.4%

low back pain-related leg pain. The high and low kinesiophobia groups were statistically comparable in terms of participants' age, body mass index (BMI), the incidence of comorbidities (as well as the individual rates of hypertension, diabetes mellitus, coronary artery disease), occupation (civil servants, workers, retirees, or students), and alcohol use and smoking status (p>0.05; Table 3). In contrast, the high kinesiophobia group exhibited a markedly greater proportion of female patients,

Table 1. Continued

		Min-max	Median	Mean±SD/n%	
Occupation	Housewife			99	43.8%
	Civil servant			22	9.7%
	Worker			59	26.1%
	Retired			42	18.6%
	Student			4	1.8%
Smoking	Never smoking			130	57.5%
	Previous smoking			35	15.5%
	Smoking			61	27.0%
Alcohol use	None			199	88.1%
	Less than once a month			27	11.9%
VAS score					
Rest		0.0-10.0	5.0	4.3±2.7	
Activity		0.0-10.0	8.0	7.4±2.2	
Night		0.0-10.0	4.0	3.9±3.6	

BMI: Body mass index, HT: Hypertension, DM: Diabetes mellitus, CAD: Coronary artery disease, VAS: Visual analog scale, SD: Standard deviation, Min-max: Minimum-maximum

Table 2. Clinical features of participants

		Min-max	Median	Mean±SD/n%	
Low back-related leg pain	**Yes**			**132**	**58.4%**
	No			**94**	**41.6%**
Pain duration		1.0-360.0	12.0	48.2±71.8	
DN4 score		0.0-8.0	1.0	1.8±2.0	
TKS score		20.0-61.0	41.0	40.7±6.9	
ODI score		2.0-90.0	28.8	32.0±18.5	
ODI classification	Minimal disability			72	31.9%
	Moderate disability			86	38.1%
	Severe disability			51	22.6%
	Disabled			13	5.8%
	Bedridden			4	1.8%
SF-36 scale					
Physical functioning		0.0-100.0	60.0	56.2±24.1	
Role limitations due to physical health		0.0-100.0	25.0	34.3±38.0	
Role limitations due to emotional problems		0.0-100.0	33.3	37.2±40.0	
Energy		0.0-90.0	45.0	41.3±20.2	
Emotional well-being		10.0-100.0	52.0	52.9±19.0	
Social function		0.0-100.0	62.5	56.4±25.2	
Pain		0.0-90.0	35.0	38.0±20.6	
General health		0.0-90.0	45.0	44.9±19.6	

DN4: Douleur neuropathic 4 questions, TKS: Tampa kinesiophobia scale, ODI: Oswestry disability index, SF-36: Short form-36, Min-max: Minimum-maximum

lower education levels, and a higher incidence of housewives (p=0.013, p=0.012, p=0.007, respectively).

Regarding clinical features, both the high and low kinesiophobia groups had statistically comparable VAS scores for resting pain, night pain, low back-related leg pain, and pain duration (p>0.05); However, activity-related pain was higher in the high kinesiophobia group (p=0.002). The high kinesiophobia group had more patients diagnosed with sacroiliac dysfunction as compared to the low kinesiophobia group (p<0.05). The DN4 score for neuropathic pain was also statistically similar in both groups (p>0.05). In terms of functional status, the high kinesiophobia group had a notably higher ODI score (p=0.001) than the low kinesiophobia group (Table 4). Lastly, the high kinesiophobia group had notably higher scores on all eight domains of the SF-36 when juxtaposed with the low kinesiophobia group (p<0.001; Table 5).

Sex, VAS score for activity-related pain, educational status, disability score, and the SF-36 score (all domains) were significant indicators that can be used to distinguish patients with high and low kinesiophobia levels (p=0.014, p=0.005, p=0.013, p=0.008, p<0.001 respectively). The multivariate model revealed that the individual SF-36 domain scores for limitations due to physical health, emotional well-being, and social function were significantly and independently correlated (p=0.006, p=0.001, p=0.018 respectively) with classifying patients based on high and low levels of kinesiophobia (Table 6).

Discussion

In this study, the majority of participants (69.4%) reported high levels of kinesiophobia, consistent with existing literature (11,12). The findings of our research indicated that kinesiophobia

Table 3. Distribution of kinesiophobia according to demographic characteristics of the participants

		Low-level kinesiophobia n=69			High-level kinesiophobia n=157			p-value
		Mean±SD/n%		Median	Mean±SD/n%		Median	
Age		50.0±15.6		53.0	52.2±12.8		52.0	0.382^{m}
Sex	Female	39	56.5%		115	73.2%		0.013^{x2}
	Male	30	43.5%		42	26.8%		
BMI		27.8±4.8		27.3	28.8±4.8		28.4	0.171^{m}
HT		17	24.6%		56	35.7%		0.102^{x2}
DM		15	21.7%		28	17.8%		0.491^{x2}
CAD		8	11.6%		19	12.1%		0.914^{x2}
Education								
Illiterate		5	7.2%		16	10.2%		0.012^{x2}
Primary school		25	36.2%		72	45.9%		
Secondary school		3	4.3%		15	9.6%		
High school		12	17.4%		32	20.4%		
University		24	34.8%		22	14.0%		
Occupation								
Housewife		21	30.4%		78	49.7%		0.007^{x2}
Civil servant		10	14.5%		12	7.6%		0.110^{x2}
Worker		18	26.1%		41	26.1%		0.997^{x2}
Retire		17	24.6%		25	15.9%		0.121^{x2}
Student		3	4.3%		1	0.6%		0.086^{x2}
Smoking	Never smoking	42	60.9%		88	56.1%		0.691^{x2}
	Previously smoking	11	15.9%		24	15.3%		
	Smoking	16	23.2%		45	28.7%		
Alcohol use	None	62	89.9%		137	87.3%		0.580^{x2}
	Less than once a month	7	10.1%		20	12.7%		

^{m}Mann-Whitney U test, x^2Chi-square test

BMI: Body mass index, HT: Hypertension, DM: Diabetes mellitus, SD: Standard deviation, CAD: Coronary artery disease, Min-max: Minimum-maximum was associated with female gender, being a housewife, lower educational level, disability, poor quality of life, and the presence of sacroiliac dysfunction.

Previous studies have identified high kinesiophobia in elderly adults with chronic low back pain (9,21); Our research did not find a significant link between age and kinesiophobia, possibly due to the younger age of our sample compared to studies like Tiaho et al. (22). Regarding sex differences, the literature presents varying results. Tiaho et al. (22). found no association; John et al. (9) reported higher rates in males. In contrast, our study observed significantly higher levels of kinesiophobia in females, similar to the results of Manoj and Gaurav (23), possibly due to lower muscle mass and higher pain perception among women. However, further research with larger samples is needed to validate these findings. In line with previous research (9,22), our study revealed no notable correlation between BMI and kinesiophobia. Unlike Tiaho et al. (22), we did not observe a notable connection regarding pain duration and kinesiophobia, aligning with the findings of Altuğ et al. (10).

Table 4. Distribution of kinesiophobia according to clinical characteristics of the participants

	Low-level kinesiophobia			High-level kinesiophobia			p-value
	Min-max/n-%		Median	Min-max/n-%		Median	
VAS score							
Rest	0-10		5.0	0-10		5.0	0.167[m]
Activity	2-10		6.0	0-10		8.0	**0.002[m]**
Night	0-10		3.0	0-10		4.0	0.127[m]
Low back-related leg pain							
Yes	41	59.4%		91	58.0%		0.838[x2]
No	28	40.6%		66	42.0%		
Sacroiliac disfunction	4	5.8%		24	15.3%		0.046[x2]
Pain duration	3-360		12.0	3-360		12.0	0.547[m]
DN4 score	0-8		2.0	0-8		1.0	0.153[m]
ODI score	2-86		22.0	2-90		31.0	0.001[m]
ODI Classification							
Minimal Disability	33	47.8%		39	24.8%		**0.001[x2]**
Moderate disability	21	30.4%		65	41.4%		
Severe disability	10	14.5%		41	26.1%		
Disabled	4	5.8%		9	5.7%		
Bedridden	1	1.4%		3	1.9%		

mMann-Whitney U test, [x2]Chi-square test, DN4: Douleur neuropathic 4 Questions, ODI: Oswestry disability index, VAS:Visual analog scale, Min-max: Minimum-maximum

Tablo 5. Distribution of kinesiophobia according to participants' quality of life

	Low-level kinesiophobia		High-level kinesiophobia		p-value
	Min-max	Median	Min-max	Median	
SF-36 scale					
Physical functioning	0-100	70.0	0-100	55.0	**0.000[m]**
Role limitations due to physical health	0-100	50.0	0-100	0.0	**0.000[m]**
Role limitations due to emotional problems	0-100	66.7	0-100	25.0	**0.000[m]**
Energy	0-85	50.0	0-90	35.0	**0.000[m]**
Emotional well-being	16-100	60.0	10-96	48.0	**0.000[m]**
Social function	12.5-100	75.0	0-100	50.0	**0.000[m]**
Pain	0-90	45.0	0-87.5	35.0	**0.000[m]**
General health	15-90	55.0	0-90	40.0	**0.000[m]**

[m] Mann-Whitney U test, SF-36: Short form-36, Min-max: Minimum-maximum

Table 6. Predictors of kinesiophobia according to regression analysis

	Univariate modal			**Multivariable modal**		
	OR	**95% CI**	**p-value**			
Sex	0.475	0.262-0.859	**0.014**			
Pain activity	1,210	1.060-1,381	**0.005**			
Education	0.481	0.270-0.855	**0.013**			
Oswestry	1,024	1,006-1,041	**0.008**			
Sacroiliac disfuncton	1,431	0.992-2.065	0.055			
SF-36 scale						
Physical functioning	0.976	0.963-0.989	**0.000**	OR	95% CI	p-value
Role limitations due to physical health	0.983	0.975-0.990	**0.000**	0.988	0.980-0.997	**0.006**
Role limitations due to emotional problems	0.985	0.978-0.992	**0.000**			
Energy	0.973	0.959-0.988	**0.000**			
Emotional well-being	0.959	0.943-0.976	**0.000**	0.970	0.953-0.988	**0.001**
Social function	0.968	0.955-0.981	**0.000**	0.982	0.968-0.997	**0.018**
Pain	0.972	0.957-0.986	**0.000**			
General Health	0.965	0.949-0.981	**0.000**			
Lojistik regresyon (forward LR)						

SF-36: Short form-36, LR: Likelihood ratio, OR: Odds ratio, CI: Confidence interval

Our study also revealed a marked inverse link with education level and kinesiophobia; While John et al. (9) found no such relationship, Knapik et al. (24) reported a positive correlation. The negative correlation in our study may be due to the high proportion of primary school graduates among our participants, emphasizing the role of education in reducing movement fear. Public health initiatives and educational interventions promoting physical activity benefits could help reduce kinesiophobia in populations with limited exercise habits (25).

The relationship between kinesiophobia and pain intensity remains debated. Some studies show a connection (9,22) while our research found only activity-related pain intensity to be significantly correlated with kinesiophobia, suggesting that patients with high kinesiophobia avoid activity to prevent pain. Núñez-Cortés et al. (3) did not observe a notable link involving kinesiophobia and the leeds assessment of neuropathic symptoms and sign neuropathic pain scale but stated that high kinesiophobia was associated with impaired motor control in patients with low back leg pain. Similarly, in the present study, we did not find an association between neuropathic pain, low back leg pain, and kinesiophobia; Instead, we concluded that activity-related pain may better predict kinesiophobia. On the other hand, Baranidharan et al. (26) suggest that the available scales may not reliably identify the neuropathic component in low back pain and that a system to identify neuropathic pain in chronic low back pain is needed.

Chronic low back pain's clinical symptoms are often poor correlate with pathology and symptoms (2). Psychological factors such as kinesiophobia play crucial roles in prognosis (10). Our study confirmed significant links among kinesiophobia, disability, and quality of life, aligning with previous research findings (4,10,11,22).

Researches indicate that fear avoidance can delay recovery and lead to chronicity, and that interventions to address kinesiophobia in the acute phase can improve treatment outcomes and prevent chronicity (27). People with chronic low back pain have lower quality of life and physical activity levels than healthy individuals, and kinesiophobia negatively affects quality of life (2,10,22). Our study found strong negative correlations between kinesiophobia and all SF-36 domains, with physical health limitations, emotional well-being, and social function as independent predictors. Emotional well-being is impacted by anxiety and depression, which worsen kinesiophobia (4). Social function limitations contribute to social withdrawal, reinforcing avoidance behaviors and exacerbating kinesiophobia. Reduced social engagement further hinders physical activity, which is crucial for chronic pain management. The bio-psycho-social model highlights that disability in chronic musculoskeletal pain arises from both pain intensity and biomedical-psychological factors (2). Therefore, rehabilitation should incorporate cognitive-behavioral therapy to address kinesiophobia (21) and consider the patient's emotional well-being and social function as well as physical condition.

Study Limitations

Our study's limitations include its cross-sectional design, which prevents causality determination, and its single-center scope, limiting generalizability. Although emotional status was evaluated in SF-36, the depression scale could also be used.

Conclusion

Our results revealed that sex, occupation, education level, activity-related pain, disability, and quality of life significantly influence kinesiophobia in chronic mechanical low back pain patients. Further studies are required to confirm these findings. Rehabilitation should address psychosocial factors and possible kinesiophobia, while patient education should emphasize the importance of physical activity and the harmful effects of kinesiophobia.

Ethics

Ethics Committee Approval: It was carried out after the approval received from the Clinical Research Ethics Committee of the Fatih Sultan Mehmet Training and Research Hospital, University of Health Sciences (approval number: FSM EAH-KAEK 2023/47 date: 09/03/2023).

Informed Consent: After a detailed investigation of the inclusion and exclusion criteria, all participants provided written voluntary informed consent for participation.

Footnotes

Authorship Contributions

Surgical and Medical Practices: D.Ş.K., S.Y.E.D, F.A.B., Concept: D.Ş.K., G.Ö. Design: D.Ş.K., F.Ü.Ö., İ.A. Data Collection or Processing: G.Ö., M.Y.K., Analysis or Interpretation: Y.E.D, F.A.B., M.Y.K, P.A. Literature Search: D.Ş.K, Y.E.D., G.Ö., M.Y.K., P.A. Writing: D.Ş.K., P.A., F.Ü.Ö., İ.A.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declare that this study received no financial support.

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