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Kinesiophobia and Related Factors in Postmenopausal Women with Osteoporosis and Osteopenia

Postmenopozal Osteoporoz veya Osteopenili Kadınlarda Kinezyofobi ve İlişkili Faktörler

Salim Mısırcı, Yeşim Akyol, Yasemin Ulus, Ahmet Kıvanç Cengiz, Ayhan Bilgici

Ondokuz Mayıs University Faculty of Medicine, Department of Physical Medicine and Rehabilitation, Samsun, Turkey

Abstract

Objective: To investigate level of kinesiophobia and related factors in postmenopausal women with osteoporosis (OP) and osteopenia (OPN).
Materials and Methods: A total of 60 female patients with postmenopausal OP, 60 female patients with postmenopausal OPN and 60 age- and gender-matched controls were enrolled in this study. Demographic data (age, weight, height, body mass index, educational level, employment status, disease duration and menopause duration) of the participants were recorded. In all participants, the level of kinesiophobia, fear of falling, psychological status, health-related quality of life and osteoporosis self-efficacy were evaluated using the Tampa scale of kinesiophobia (TSK), falls efficacy scale-international (FES-I), hospital anxiety and depression scale (HADS), quality of life questionnaire of the European Foundation for Osteoporosis-41 (QUALEFFO-41) and osteoporosis self-efficacy scale (OSES), respectively.
Results: Postmenopausal patients with OP and OPN had higher levels of kinesiophobia than controls ($p<0.05$). However, there was no difference between the levels of kinesophobia in patients with OP and OPN ($p>0.05$). In addition, a positive correlation was found between TSK score and FES-I, HADS, QUALEFFO-41 scores and duration of menopause, and a negative correlation between OSES scores in patients with OP and OPN ($p<0.05$). Patients were divided into two groups according to their kinesiophobia levels: High and low kinesiophobia groups. All clinical parameters were negatively affected in patients in the high kinesophobia group ($p<0.05$).
Conclusion: Both OP and OPN may cause kinesiophobia in postmenopausal women. Increased fear of falling, impaired psychological status, poor quality of life, decreased perception of self-efficacy and prolonged duration of menopause in postmenopausal women with OP and OPN seem to be associated with a higher level of kinesiophobia. As physical activity is essential for bone health, postmenopausal women with OP and OPN should be counselled about the importance of overcoming kinesiophobia.
Keywords: Kinesiophobia, osteoporosis, osteopenia, fear of falling, quality

Öz

Amaç: Osteoporoz (OP) ve osteopenisi (OPN) olan postmenopozal kadınlarda kinezyofobi düzeyini ve ilişkili faktörleri araştırmaktır.
Gereç ve Yöntem: Çalışmaya postmenopozal OP'li 60 kadın hasta, postmenopozal OPN'li 60 kadın hasta, yaş ve cinsiyet uyumlu 60 kontrol dahil edildi. Katılımcıların demografik verileri (yaş, kilo, boy, vücut kitle indeksi, eğitim düzeyi, çalışma durumu, hastalık süresi ve menopoz süresi) kaydedildi. Tüm katılımcılarda kinezyofobi, düşme korkusu, psikolojik durum, sağlıkla ilgili yaşam kalitesi ve OP öz-yeterlik düzeyleri, sırasıyla Tampa kinezyofobi ölçeği (TKÖ), düşme etkinlik ölçeği-uluslararası (UDES), hastane anksiyete ve depresyon ölçeği (HADÖ), Avrupa Osteoporoz Vakfı'nın yaşam kalitesi anketi-41 (QUALEFFO-41) ve osteoporoz öz-yeterlik ölçeği (OEYÖ) kullanılarak değerlendirildi.
Bulgular: OP'li ve OPN'li postmenopozal hastalarda kontrole kıyasla daha yüksek kinezyofobi düzeyleri vardı ($p<0,05$). Ancak OP ve OPN'li hastalarda kinezyofobi düzeyleri arasında fark yoktu ($p>0,05$). OP ve OPN'li hastalarda TKÖ skoru ile UDES, HADÖ, QUALEFFO-41 skorları, menopoz süresi arasında pozitif, OEYÖ skorları arasında negatif korelasyon vardı ($p<0,05$). Hastalar kinezyofobi düzeylerine göre yüksek ve düşük kinezyofobi olarak iki gruba ayrıldı; yüksek kinezyofobisi olan hastalarda tüm klinik parametreler olumsuz etkilenmişti ($p<0,05$).
Sonuç: Hem OP hem de OPN, postmenopozal kadınlarda kinezyofobiye neden olabilir. OP ve OPN'li postmenopozal kadınlarda artmış düşme korkusu, bozulmuş psikolojik durum, düşük yaşam kalitesi ve azalmış öz-yeterlik algısı, uzamış menopoz süresi daha yüksek düzeyde kinezyofobi ile ilişkili görünmektedir. Fiziksel aktivite kemik sağlığı için gerekli olduğundan, OP ve OPN'li postmenopozal kadınlara kinezyofobinin üstesinden gelmenin önemi konusunda danışmanlık verilmelidir.
Anahtar kelimeler: Kinezyofobi, osteoporoz, osteopeni, düşme korkusu, yaşam kalitesi

Address for Correspondence/Yazışma Adresi: Yeşim Akyol Assoc. Prof., Ondokuz Mayıs University Faculty of Medicine, Department of Physical Medicine and Rehabilitation, Samsun, Turkey
Phone: +90 362 312 19 19-3827-2338 **E-mail:** yesimakyol@yahoo.com **ORCID ID:** orcid.org/0000-0002-5768-8024
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Introduction

Kinesiophobia is an irrational fear of movement due to the belief of susceptibility to injury and associated with lower levels of physical activity (1). Recently, researches showed that many chronic musculoskeletal diseases lead to fear of movement due to the belief of increasing pain during activity (2-4). In addition, kinesiophobia was shown to be associated with lower levels of physical activity in subjects with chronic pain (5). As a result, the risk of sedentary life style increases. Sedentary lifestyle and immobilization are important risk factors for bone loss (6).

Osteoporosis (OP) is a systemic skeletal disease characterized by low bone mineral density (BMD) and microarchitectural deterioration of bone tissue resulting in increased risk of fragility fractures (7). Osteopenia (OPN) is a term to define BMD that is not normal but also not as low as OP (8). OP and OPN have a higher incidence in women, especially after menopause, and are increasingly prevalent due to aging populations and increased life expectancy (9). Physically active life style and exercise are essential preventive and therapeutic approaches for OP and OPN (10).

OP is known as a silent disease without pain unless fragility fractures occur (10). However, being diagnosed as OP without an adequate education about the disease may lead to kinesiophobia in patients due to an irrational belief about increasing possibility of falls and related fractures during physical activity (11). In a previous study, researchers reported that subjects with OP have higher levels of kinesiophobia compared to age and gender-matched healthy subjects. They have suggested that a person with OP may have kinesiophobia that might be associated with fear of fracture (11). Although low BMD is not the only factor for fragility, it contributes significantly to the fracture risk (12). Since OP may be perceived by subjects as a more serious and fragile disease than OPN, a higher level of kinesiophobia may be expected in patients with OP than patients with OPN. To date, no study has assessed the association between kinesiophobia and OPN, and no study has compared level of kinesiophobia in subjects with OP and OPN.

The aim of the present study was to investigate the level of kinesiophobia in women with OP and OPN comparing with controls. It was also aimed to evaluate the relation of the level of kinesophobia with demographic features, fear of falling, self-efficacy in OP, quality of life (QoL), and psychological status in these patients.

Materials and Methods

The present study was conducted at the Department of Physical Medicine and Rehabilitation of the Medical Faculty of Ondokuz Mayıs University between May 2018 and June 2019. This cross-sectional observational study includes 60 female patients with postmenopausal OP and 60 female patients with postmenopausal OPN. Age and gender matched 60 subjects with normal BMD were enrolled as control subjects. Diagnosis of OP, OPN and normal BMD was made according to the World Health Organization classification system [lumbar spine or femoral neck T-scores <-2.5 standard deviation (SD) for OP, T-scores -1 to -2.5 SD for OPN, T-scores >-1 SD for normal BMD measured by dual energy X-ray absorptiometry] (13). Patients were included in the study if they were aware of their diagnosis and disease duration was ≥12 months. Participants with history of falls or fractures, any diagnosed musculoskeletal or neurological disease that may affect mobility or any acute or chronic painful condition that may cause kinesiophobia, and participants with a major psychiatric disorder were excluded from the study.

The study protocol was approved by the Medical Research Ethics Committee at Ondokuz Mayıs University (decision no: 2018/154, date: 12.04.2017). All participants provided signed informed consent. The study was conducted in accordance with the principles of the Declaration of Helsinki.

Demographic data of subjects [age, weight, height, body mass index (BMI), educational level and employment status] were recorded. Disease duration and menopause duration of the patients were also reported. The same researcher (S.M.) interviewed with participants face-to-face.

Clinical Assessments

Kinesiophobia

The Tampa scale of kinesiophobia (TSK) was used for the subjective assessment of fear of movement/kinesiophobia. It was developed in 1991 by Miller et al. (14). The TSK includes 17 items associated with fear of movement and reinjury. Each item is scored on a 4-point Likert-type scale, ranging from "strongly disagree" to "strongly agree". Total score ranges between 17 and 68. Higher scores associate with higher levels of kinesiophobia (14). The validity and reliability of the Turkish version of the TSK have been previously performed by Yılmaz et al. (15). Vlaeyen et al. (16) developed a cut-off score and reported patients that scored greater than 37 were high-responders. We used this cut-off score to identify the patients with kinesiophobia.

Fear of Falling

Falls efficacy scale-international (FES-I) was used to evaluate the fear of falling (FOF). The FES-I is a self-report questionnaire, providing information on the level of concern about falls during activities of daily living. The questionnaire contains 16 items scored on a four-point scale (1= not at all concerned to 4= very concerned) providing a total score ranging from 16 (absence of concern) to 64 (extreme concern). The reliability and validity of the Turkish form of FES-I was performed by Ulus et al. (17).

Self-efficacy in Osteoporosis

Osteoporosis self-efficacy scale (OSES) was used to evaluate the self-efficacy in OP. OSES aims to identify the perceived confidence level in relation to calcium intake and weight bearing exercises in order to prevent OP. Turkish adaptation, validity, and reliability of the OSES developed by Kim et al. (18) was performed by Kılıç and Erci (19). The OSES is a twelve item rating scale. The

items are rated by the participants on their confidence about engaging in OP preventive behaviors. The OSES tool consists of two subscales: The OSES-Exercise (6 items) and OSES-Calcium (6 items). Participants then respond on a 100-point Likert-type scale of 0 to 100 (0= not confident at all, 100= very confident). The score of each subscale ranges between 0 and 600 and total score of the scale ranges between 0 and 1200. An increase in the score indicates an increase in the perception of self-efficacy (19).

Psychological Status

The hospital anxiety and depression scale (HADS) was used to evaluate the psychological status. HADS is a frequently used self-rating scale developed to assess psychological distress in non-psychiatric patients. It consists of two subscales, one measuring anxiety (HADS-A) with seven items, and another measuring depression (HADS-D) with seven items, which are calculated separately (20). Each item was answered by the patient on a 4-point (0-3) scale, so the possible scores ranged from 0 to 21 for each of the two subscales. Lower scores of both anxiety and depression subscales indicate better mood status. Aydemir et al. (21) found that Turkish version of HADS is valid and reliable. They proposed a cutoff point of 10 for anxiety and 7 for depression scales. The scores above these cutoff levels, are considered as risk for anxiety and depression (21).

Health Related Quality of Life

The quality of life questionnaire of the European Foundation for Osteoporosis-41 (QUALEFFO-41) was used to assess health related QoL of subjects. This questionnaire covers five dimensions of health: pain, physical functioning, social activities, general health assessment and mental functioning. The total QUALEFFO-41 score is calculated as a sum of all answers to items. Higher scores indicate worse health related QoL. Turkish version of QUALEFFO-41 was reported to be valid and reliable (22).

Statistical Analysis

Statistical analyses were performed with SPSS 22.0 for Windows. Descriptive data were presented as mean ± SD and categorical variables were presented as percentage. The Kolmogorov-Smirnov test was used to analyse normal distribution assumption of the quantitative outcomes. One-Way ANOVA analysis of variance was used to compare the three groups. When a statistically significant difference was noted, Tukey's multiple comparison test was performed in order to demonstrate the difference between the groups. All patients were divided into two groups according to their TSK scores and these groups are compared. To compare two groups Student's t-test was used because all variables were normally distributed. Correlation between kinesiophobia and other parameters' scores in OP and OPN groups was performed by Pearson correlation analysis. The categorical variables (education, occupation, etc.) of the groups were evaluated by chi-square test. P-values less than 0.05 were considered statistically significant.

The sample size was calculated by a statistician with PASS 2011 software. A priori power analysis using data from a previous study (15) assessing kinesiophobia score were applied. In order to have statistical power of 0.82 and $p<0.05$, it was calculated that 60 subjects in each group were required to detect the differences in mean TSK scores between the groups.

Results

Comparison of groups' socio-demographic data are shown in Table 1. The mean age, weight, height, BMI and gender were similar between the three groups. There was no difference between groups regarding education and employment status. The mean duration of disease was 4.85±4.64 years for the OP group and 3.68±4.24 years for the OPN group, and there was no significant difference between the groups regarding this parameter ($p>0.05$).

Comparison of groups' clinical data are shown in Table 2. Patients with OP and OPN had higher level of kinesiophobia than healthy controls ($p<0.05$). But, there was no significant difference in kinesiophobia scores between the patients with OP and OPN. The mean QUALEFFO-41 total, FES-I, HADS-A/D scores were significantly different in the patients with OP and OPN from the healthy control ($p<0.05$). But there was no significant difference between the patients with OP and OPN for QUALEFFO-41 total, FES-I, HADS-A/D scores ($p>0.05$). The mean OSES scores were similar between the three groups ($p>0.05$) (Table 2).

Correlations between the kinesiophobia and demographics, and clinic parameters in the patients with OP and OPN are shown in Table 3. In the OP group, there was a strong correlation between kinesiophobia scores and QUALEFFO-41 total scores. Kinesiophobia scores were moderately correlated with FES-I scores and weakly correlated with duration of menopause, HADS-A/D, and OSES total scores ($p<0.05$). In the OPN group; kinesiophobia scores were strongly correlated with QUALEFFO-41 total scores and moderately correlated with HADS-A/D scores. There were weak correlations between kinesiophobia scores and age, BMI, duration of menopause, FES-I, OSES total scores ($p<0.05$) (Table 3).

Comparison of clinical data according to level of kinesiophobia in the patients with OPN and OP are shown in Table 4. Comparison of high kinesiophobia and low kinesiophobia groups for their mean QUALEFFO-41 total, FES-I, HADS, OSES total scores revealed statistically significant differences ($p<0.05$). But, there was no significant difference between these groups regarding age, BMI, duration of menopause and duration of disease ($p>0.05$) (Table 4).

Discussion

In the current study, kinesiophobia of women with OP, OPN and age-matched healthy controls with normal BMD were compared. The relationship between level of kinesiophobia and demographic features, FOF, self-efficacy in OP, QoL and

psychological status in these patients were evaluated. The results showed that patients with OP and OPN have higher levels of kinesiophobia compared to healthy controls. But, there was no difference between the level of kinesophobia in patients with OP and OPN. Increased FOF, impaired psychological status, poor QOL, and decreased perception of self-efficacy, prolonged duration of menopause seem to be associated with higher level of kinesiophobia in women with OP and OPN.

In the literature, there is only one study evaluating kinesiophobia in the patients with OP (12). Gunendi et al. (11) found that kinesophobia levels of OP patients were higher than healthy individuals with similar age and sex. OP is not associated with

Table 1. Comparison of groups' socio-demographic data

Characteristics	OPN (n=60) Mean ± SD	OP (n=60) Mean ± SD	Healthy control (n=60) Mean ± SD	p
Age (years)	56.98±5.31	56.60±6.37	56.20±4.67	0.73
Height (cm)	157.92±5.65	158.80±6.10	159.15±6.72	0.53
Weight (kg)	73.18±11.40	73.77±8.88	73.68±8.36	0.93
BMI (kg/m^2)	29.41±4.79	29.35±4.23	29.17±3.51	0.95
Duration of menopause (years)[b, c]	10.83±7.16	12.20±6.83	5.88±5.74	<0.01
Duration of disease (years)	3.68±4.24	4.85±4.64	-	0.15
	n (%)	**n (%)**	**n (%)**	
Education				
Primary education	47 (78.4)	39 (65)	45 (75)	0.39
Secondary education	8 (13.3)	14 (23)	11 (18.4)	
College	5 (8.3)	7 (12)	4 (6.6)	
Occupation				
Housewife	38 (63.4)	44 (73.3)	44 (73.3)	0.68
Retired	18 (30)	13 (21.7)	13 (21.7)	
Worker	2 (3.3)	2 (3.3)	2 (3.3)	
Officer	2 (3.3)	1 (1.7)	1 (1.7)	
Level of kinesophobia[b, c]				
TSK score ≤37	11 (%18)	11 (%18)	53 (%88)	<0.01
TSK score ≥38	49 (%82)	49 (%82)	7 (%12)	

P-value is significant when <0.05. [a]Significant difference between OP and OPN group, [b]Significant difference between OPN and control group, [c]Significant difference between OP and control group. SD: Standard deviation, n: Number of patients, %: Percentage of patients, BMI: Body mass index, TSK: Tampa scale of kinesiophobia, OPN: Osteopenia, OP: Osteoporosis

Table 2. Comparison of groups' clinical data

Characteristics	OPN (n=60) Mean ± SD	OP (n=60) Mean ± SD	Healthy Control (n=60) Mean ± SD	p
TSK score (17-68)[b, c]	41.46±4.51	42.76±4.76	32.36±3.78	<0.01
FES-I score (16-64)[b, c]	19.60±1.78	20.01±1.39	18.91±1.12	<0.01
HADS-D score (0-21)[b, c]	5.23±3.29	5.61±3.23	3.70±2.42	<0.01
HADS-A score (0-21)[b, c]	5.86±3.13	6.41±3.40	4.93±2.29	0.02
QUALEFFO-41 total score (0-100)[b, c]	54.76±14.28	55.05±14.74	35.58±9.92	<0.01
OSES-exercise score (0-600)	412.16±123.05	375.83±110.36	390.00±142.91	0.28
OSES-calcium score (0-600)	463.50±130.71	432.66±135.01	424.50±147.14	0.26
OSES-total score (0-1200)	875.66±198.44	808.50±221.33	814.50±231.67	0.17

P-value is significant when <0.05. [a]Significant difference between OP and osteopenia group, [b]Significant difference between osteopenia and control group, [c]Significant difference between OP and control group. OPN: Osteopenia, OP: Osteoporosis, TSK: Tampa scale of kinesiophobia, FES-I: Falls efficacy scale-international, HADS-A: Hospital anxiety and depression scale-anxiety score, HADS-D: Hospital anxiety and depression scale-depression score, QUALEFFO-41: The quality of life questionnaire of the European Foundation for Osteoporosis-41, OSES: Osteoporosis self-efficacy scale, SD: Standard deviation

Table 3. Correlations between the kinesiophobia and demographics, and clinic parameters in the patients with OPN and OP

Characteristics		TSK score	
		OPN patiens (n=60)	OP patients (n=60)
Age	r p	0.345** 0.007	0.214 0.101
BMI	r p	0.352** 0.006	0.068 0.608
Duration of menopause	r p	0.305* 0.018	0.256* 0.048
Duration of disease	r p	-0.009 0.946	0.069 0.601
HADS-A	r p	0.426** 0.001	0.352** 0.006
HADS-D	r p	0.469** 0.001	0.428** 0.001
FES-I	r p	0.340** 0.008	0.495** 0.001
QUALEFFO-41 total	r p	0.830** 0.001	0.715** 0.001
OSES total	r p	-0.315* 0.014	-0.338** 0.008

OPN: Osteopenia, OP: Osteoporosis, TSK: Tampa scale of kinesiophobia, BMI: Body mass index, HADS-A: Hospital anxiety and depression scale-anxiety score, HADS-D: Hospital anxiety and depression scale-depression score, FES-I: Falls efficacy scale-international, QUALEFFO-41: The quality of life questionnaire of the European Foundation for Osteoporosis-41, OSES: Osteoporosis self-efficacy scale, r: Correlation coefficient, *p<0.05, **p<0.01

musculoskeletal pain unless osteoporotic bone fracture occurs. In the study of Gunendi et al. (11), subjects with musculoskeletal disorders that might cause pain were excluded. Thus, they reported that the relationship between OP and kinesiophobia cannot be explained by musculoskletal pain. In addition, they suggested that having a diagnosis of OP without an adequate education about the disease may lead to kinesiophobia and the reason of this behavior might be a belief about increasing possibility of movement related injuries like osteoporotic fracture. Similar to that study we found that there was an association between being diagnosed as OP and kinesiophobia. Furthermore, the level of kinesophobia was similar in postmenopausal OP and OPN patients, and was higher in both patient groups compared to healthy controls. The similarity in kinesiophobia levels of patients with OP and OPN may be due to the inability to distinguish both diseases due to insufficient information. On the other hand, the diagnosis of both diseases may be perceived to be of the same importance. We excluded participants with history of fragility fractures and musculoskeletal painful conditions that could cause kinesophobia. Therefore, we think that having a diagnosis of OP or OPN may cause kinesiophobia in postmenopausal women regardless of painful conditions. In clinical practice, patients with postmenopausal OP or OPN should be evaluated for kinesophobia and strategies should be developed to overcome their wrong beliefs. In this way, patients can be protected from sedentary life and have a positive contribution to bone health.

There are few studies evaluating the relationship between kinesophobia and demographic characteristics in the literature (23-25). In these studies, it was reported that kinesiophobia may be associated with increasing age and obesity. In our

Table 4. Comparison of clinical data according to level of kinesiophobia in the patients with OPN and OP

Characteristics	Subjects with OPN and OP (n=120)		p
	Low kinesiophobia (TSK score ≤37, n=22) Mean ± SD	High kinesiophobia (TSK score ≥38, n=98) Mean ± SD	
Age (years)	55.50±5.55	57.088±5.89	0.25
BMI (kg/m²)	27.71±2.92	29.75±4.71	0.05
Duration of menopause (years)	9.18±5.54	12.04±7.21	0.08
Duration of disease (years)	4.86±5.22	4.13±4.29	0.49
FES-I score (16-64)	18.90±1.19	20.01±1.62	<0.01
HADS-D score (0-21)	3.27±2.45	5.90±3.22	<0.01
HADS-A score (0-21)	4.27±2.71	6.56±3.24	<0.01
QUALEFFO-41 total score (0-100)	36.00±10.28	59.15±11.58	<0.01
OSES-exercise score (0-600)	932.27±214.09	821.83±207.27	0.02
OSES-calcium score (0-600)	488.18±133.29	439.08±132.22	0.11
OSES-total score (0-1200)	932.27±214.09	821.83±207.27	0.02

P-value is significant when <0.05. SD: Standard deviation, TSK: Tampa scale of kinesiophobia, BMI: Body mass index, HADS-A: Hospital anxiety and depression scale-anxiety score, HADS-D: Hospital anxiety and depression scale-depression score, FES-I: Falls efficacy scale-ınternational, QUALEFFO-41: The quality of life questionnaire of the European Foundation for Osteoporosis-41, OSES: Osteoporosis self-efficacy scale

study, there was no statistically significant difference between postmenopausal OP, OPN and control groups in terms of height, weight, BMI, disease duration, education level and occupational status. Therefore, we can say that the results obtained in terms of kinesophobia are independent of these socio demographic characteristics. When we evaluated the relationship between kinesophobia and demographic characteristics, we obtained weak or contradictory data. We observed the relationship between level of kinesophobia and age and BMI only in the patients with OPN. While there was a weak positive correlation between level of kinesiophobia and duration of menopause in the patients with OP and OPN, there was no correlation between level of kinesiophobia and duration of disease. These results may be due to the age range of the participants being 40-65 years. In order to better understand the relationship between the level of kinesophobia and demographic characteristics in these populations, our results should be supported with new studies.

The relationship between OP and fall risk is well known (26). However, there are few studies in the literature evaluating the FOF in patients with OP. In these studies, researchers reported that OP is associated with FOF and restrictions in daily life due to FOF (27,28). In line with previous studies, we found that the FOF was higher in both patient groups than in controls. But the level of FOF was similar in the patients with OP and OPN. In the literature, there are no studies evaluating the relationship between FOF and kinesophobia in any patient population. In the current study, there was a weak-moderate positive correlation between FOF and kinesophobia in the patients with OP and OPN. When the patients were grouped as high and low kinesiophobia, we found that patients with high kinesophobia had more FOF than patients with low kinesophobia. It can be concluded that FOF may increase kinesiophobia or the FOF may be triggered by kinesophobia.

It has been reported that the prevalence of psychological problems such as anxiety and depression in OP patients is higher than the normal population (29,30). Furthermore, increased depression or anxiety levels are correlated with decreased BMD (31,32). Consistent with the literature; anxiety and depression scores in our study were significantly higher in OP and OPN patients compared to controls. But, anxiety and depression scores were similar in the patients with OP and OP. Previously, the relationship between kinesophobia and psychological state was evaluated in other disease populations, and a positive correlation was reported between the level of anxiety and depression and the level of kinesophobia (2,3,33). In our study, we found a weak to moderate positive correlation between kinesophobia scores and anxiety and depression scores of patients with OP and OPN. The weak to moderate level of correlation may be due to the fact that we excluded individuals with major psychiatric disorders who take medication and that the anxiety and depression scores of the study population were low. In addition, when high and low kinesophobia patients were compared in terms of anxiety and depression scores, it was found that high kinesophobia patients had higher anxiety and depression scores. These results suggest that psychological status is associated with kinesiophobia in postmenopausal OP and OPN patients. However, it may be difficult to determine whether this is the cause or consequence of kinesiophobia.

In the literature, there are studies showing that the QoL of OP patients with or without fractures has deteriorated compared to healthy controls (34,35). In a study evaluating the QoL in women with postmenopausal OP without fractures; advanced age, high BMI, low education level, early menopause and low BMD values were stated to adversely affect QoL (36). Our study population consisted of postmenopausal women without fractures. Although the groups were similar in terms of socio-demographic characteristics, QoL was decreased in the patients with OP or OPN compared to controls. In studies conducted in patients with chronic musculoskeletal pain, kinesiophobia has a negative effect on QoL, and a significant relationship between high kinesophobia and low QoL has been reported (2,3,37,38). Similarly, Gunendi et al. (11) reported a significant negative correlation between kinesophobia and QoL in the patients with OP. Consistent with the literature, we found a strong correlation between increased kinesophobia and decreased QoL in both OP and OPN patients. In addition, when we compared the patients with high and low kinesophobia in terms of QoL, we found that patients with high kinesophobia had poor QoL. Overcoming kinesiophobia in the OP and OPN patients may contribute to improved QoL.

Self-efficacy refers to the individual's belief in their ability to successfully complete a specific task (39). OSES utilizes perceived susceptibility and seriousness, perceived barriers and benefits, health motivation, and self-confidence in one's ability to take actions needed to prevent osteoporosis to predict possible occurrence of health behaviors. Janiszewska et al. (40) reported that self-efficacy levels in women over 45 years of age receiving OP treatment were not satisfactory and moreover were decreased with age. Studies have shown that OP knowledge and self-efficacy levels increase with education (41,42). According to our results, there was no difference between the groups (OP, OPN, control) in terms of OSES-total, exercise and calcium intake subgroup scores. On the other hand, in the high kinesiophobia patient group, the OSES-total and subscale scores were lower than the lower kinesiophobia group. There was also a weak negative correlation between total scores of OSES and kinesiophobia scores. Low OP self-efficacy may increase kinesiophobia in the patients with OP and OPN. Strategies to increase OP self-efficacy levels can provide support in overcoming kinesophobia in the patients with OP and OPN.

Study Limitations

The limitations of the present study should be considered. Firstly, a cross-sectional design was used in this study so we cannot establish causal relationship kinesiophobia and OP, and OPN. Secondly, the TSK lacks validity for use in subjects with OP, since it is a measure specifically developed for subjects with

pain complaint. As there is no kinesiophobia scale specifically developed for OP, we used TSK that was previously applied in patients with OP (11,43). Thirdly, our study group has limited number of patients and is composed of only females. Future studies should include a larger population and both sexes. A strong point of our study is that it is the first study in which the relationships between kinesophobia level and demographic, FOF, self-efficacy in OP, QoL and psychological status were assessed together in patients with OP and OPN.

Conclusion

The patients with postmenopausal OP and OPN may have kinesiophobia that might be associated with fear of fracture. Presence of kinesiophobia should be considered in the evaluation of these patients. The kinesiophobia levels of patients with OP and OPN were similar in this study. Therefore, it should be kept in mind that patients with OPN may develop kinesiophobia as well as patients with OP. High level of kinesiophobia may be associated increased FOF, impaired psychological status, poor QoL and decreased self-efficacy in the patients with postmenopausal OP or OPN. This should also be taken into consideration when developing strategies and prevention programs for OP or OPN.

Ethics

Ethics Committee Approval: The study protocol was approved by the Medical Research Ethics Committee at Ondokuz Mayıs University (decision no: 2018/154, date: 12.04.2017).

Informed Consent: All participants provided signed informed consent.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: S.M., Y.A., Concept: S.M., Y.A., A.B., Data Collection or Processing: S.M., Analysis or Interpretation: Y.A., Y.U., Literature Search: S.M., Y.A., Writing: S.M., Y.A., A.K.C., Y.U.

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