Pain and quality of life in postmenopausal osteoporotic women without vertebral fractures

Vertebral kırığı olmayan postmenopozal osteoporozlu kadınlarda ağrı ve yaşam kalitesi

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Abstract
Our study aimed to evaluate severity of pain and quality of life in terms of physical, social and emotional functions among the osteoporotic women without vertebral fractures. A total of 40 postmenopausal osteoporotic women without vertebral fractures and 40 age-matched controls were included in the study. Dual-energy x-ray absorptiometry (DEXA) values at lumbar spine (L2-4) and femoral neck, performed in our hospital in the last 6 months (retrospective data) were recorded. Quality of life was assessed with Nottingham Health Profile (NHP) and Assessment of Health-Related Quality of Life in Osteoporosis (ECOS-16). Severity of pain was measured with Visual Analog Scale (VAS). ECOS-16, VAS scores and pain, physical mobility, energy and sleep subscores of NHP were found as higher in the patient group than in the controls ($p<0.05$). Bone mineral density (BMD) lumbar spine and femoral neck values were found to be negatively correlated with VAS, ECOS-16, and energy, pain, physical mobility, and sleep subgroups of NHP ($p<0.05$). Pain and deterioration in quality of life in the osteoporotic women should be taken into consideration regardless of presence of vertebral fractures. A better understanding of pain mechanisms in postmenopausal osteoporosis will help us find more effective treatment strategies.
Keywords: Osteoporosis, pain, quality of life

Özet
Çalışmamız vertebral kırığı olmayan osteoporozlu kadınlarda ağrı şiddeti ve fiziksel, sosyal ve emosyonel fonksiyonlar açısından yaşam kalitesini değerlendirmeyi amaçladı. Çalışmada vertebral kırığı olmayan toplam 40 postmenopozal osteoporozlu kadın ve yaş uyumlu 40 kontrol yer aldı. Son 6 ay içinde hastanemizde yapılmış olan lomber omurga (L2-4) ve femur boyun dual enerji x-ışını absorbsiyometri (DEXA) değerleri kaydedildi. Yaşam kalitesi, Nottingham Sağlık Profili [Nottingham Health Profile (NHP)] ve Osteoporozda Yaşam Kalitesi Değerlendirme Ölçeği [Assessment of Health-Related Quality of Life in Osteoporosis (ECOS-16)] ile değerlendirildi. Ağrı şiddeti, Görsel Analog Skala [Visual Analog Scale (VAS)] ile ölçüldü. ECOS-16, VAS skoru ve NHP'nin ağrı, fiziksel mobilite, enerji ve uyku alt skorları hasta grubunda kontrollere göre yüksek olarak saptandı ($p<0,05$). Lomber omurga ve femur boyun kemik mineral yoğunluğu [bone mineral density (BMD)] değerleri, VAS, ECOS-16 ve NHP'nin enerji, ağrı, fiziksel mobilite ve uyku alt grupları ile negatif yönde korele bulundu ($p<0, 05$). Osteoporozlu kadınlarda ağrı ve yaşam kalitesinde bozulma, vertebral kırıkların varlığına bakılmaksızın göz önünde bulundurulmalıdır. Postmenopozal osteoporozlu kadınlarda ağrı mekanizmalarının anlaşılması daha etkili tedavi stratejileri bulmamızda bize yardımcı olacaktır.
Anahtar kelimeler: Osteoporoz, ağrı, yaşam kalitesi

Introduction

Osteoporosis is systemic skeletal disorder which is characterized by an increase in bone fragility resulting from low bone mass and deterioration of bone microarchitecture (1). It has two types. Primary type 1 osteoporosis or 'postmenopausal osteoporosis' occurs in women after menopause. Primary type 2 osteoporosis or in other words 'senile osteoporosis' is seen in both females and males after age 75 (2).

Osteoporosis has a negative impact on the health related quality of life (HRQoL) owing to the fact that it is one of major causes of mortality and morbidity (3,4).World Health Organization defines health-related quality of life as individuals' perceptions of their conditions in life, with regard to their objectives, expectations, norms and concerns, within the context of their own cultural and value systems (5). Measurement of HRQoL holds the key to determine treatment strategies and efficacy of the treatment (6).

Various scales have been developed to evaluate osteoporosis-related HRQoL. One of them is Assessment of Health Related Quality of Life in Osteoporosis (ECOS-16)(7). It has been proven to have good psychometric properties, so that it can be used in routine clinical practice and studies as a useful osteoporosis-related HRQoL scale (8). Its

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adaptation to Turkish language and validation were proven by Yilmaz et al. (9).

The aim of our study is to assess severity of back pain and HRQoL in terms of pain, physical, social and emotional functioning among the postmenopausal osteoporotic women without vertebral fractures.

Patients and methods

This cross-sectional study was conducted at department of physical medicine and rehabilitation of a training and research hospital. All of the patients gave their informed consent prior to their inclusion in the study. The study protocol was approved by the Medical Research Ethics Committee of the hospital. The study conforms to the provisions of the World Medical Association's Declaration of Helsinki.

A total of 40 postmenopausal women with osteoporosis, aged between 40-65, participated in the study. Control group consisted of 40 age-matched postmenopausal women. Exclusion criteria were rheumatic diseases such as rheumatoid arthritis, ankylosing spondylitis; endocrine diseases such as diabetes mellitus, hypogonadism, thyroid and parathyroid disorders; use of oral corticosteroids, thyroxin, methotrexate, diuretics and a history of previous vertebral fracture. Patient data including age, parity, and body mass index (BMI) was noted. Dual-energy x-ray absorptiometry (DEXA) values [Hologic QDR 2000, Waltham, MA, USA] at lumbar spine (L2-4) and femoral neck, performed in our hospital in the last 6 months [retrospective data] were recorded. Lumbar BMD value more than 2.5 standard deviation (SD) below T score, corresponding to 0.759 g/cm2 was accepted as osteoporosis according to World Health Organization (WHO) (10). HRQoL was evaluated by using a generic [Nottingham Health Profile (NHP)] (11), and a disease-specific (ECOS-16) (9) HRQoL scale. Severity of pain was measured by using Visual Analog Scale-pain (VAS-pain) (12).

ECOS-16 is a 16-item scale, designed to evaluate osteoporosis-specific HRQoL. It has two components. Physical component assesses pain and physical functions. Mental component includes fear of illness and psychosocial functions. These two components are combined to provide a total score. Total score ranges from 1(best HRQoL) to 5 (worst HRQoL) (8).

Statistical Analyses

Descriptive statistics [mean, median, SD (Standard deviation), minimum, maximum and frequencies] were used for assessing the demographics and clinical parameters. Since variables were not normally distributed, differences among groups were assessed using Mann Whitney U test. The presence of correlation was evaluated by Spearman's correlation coefficient. A value of $p<0.05$ was considered statistically significant. All analyses were performed using IBM Statistical Package for the Social Sciences (SPSS) for Windows, Version 21.0 (Armonk, New York, USA).

Results

Demographic and clinical characteristics of the patients

A total of 40patients with postmenopausal osteoporosis and age-matched controls participated in this study. Mean age was 55.1±6.23 (41-65) in the patient group and 52.68±6.67 (41-65) in the control group. Number of pregnancies was 3.65±1.87 (0-8) in the patients, and 3.32±1.58 (1-6) in controls. BMI was 29.06±4.19 (18.75-38.22) in the patients, and 28.47±3.48 (21.4-35.65) in the controls. Age, parity and BMI did not significantly differ among the groups ($p=0.09$, 0.41, and 0.49 respectively).

Demographic and clinic data are given in Table 1.

Table 1. Clinical data of the patients with postmenopausal osteoporosis

Parameters	Mean±SD (range)
Age	55.1±6.23(41-65)
Parity	3.65±1.87(0-8)
BMI	29.06±4.19 (18.75-38.22)
BMD-lumbar spine	0.63±0.09(0.5-0.76)
T score-lumbar spine	-3.27±0.53 [(-4.3)-(-2.5)]
BMD-femoral neck	0.71±0.09(0.52-0.97)
T score-femoral neck	-2.07±1.00 [(-3.5)-(0.64)]

BMI: Body mass index, BMD: Bone mineral density

Comparison of health-related quality of life and severity of pain among the groups

ECOS-16 and VAS-pain scores were found to be significantly higher in the patient group than in the controls ($p<0.001$). Patients with postmenopausal osteoporosis scored significantly higher in pain, physical mobility, energy and sleep subgroups of NHP when compared with controls ($p<0.05$). Significant statistical differences were not recorded in social isolation and emotional reactions subgroups of NHP among the patient groups with and without postmenopausal osteoporosis ($p>0.05$) (Table 2).

The relation of BMD values with quality of life

In 40 patients with postmenopausal osteoporosis, the relation of BMD lumbar spine and femoral neck values with VAS-pain, ECOS-16 and NHP scores was evaluated by using Spearman nonparametric correlation test. BMD-lumbar spine was found to be negatively correlated with VAS-pain, ECOS-16, and energy, pain, physical mobility, and sleep subgroups of NHP (r: -0.74, -0.71, -0.47, -0.36, -0.29, and -0.24, respectively) ($p<0.05$). BMD-femoral neck was negatively correlated with VAS-pain, ECOS-16, and

Table 2. Comparison of severity of pain and health-related quality of life among the groups

	Patient group (n=40) mean±standard deviation (median)	Control group (n=40) mean±standard deviation (median)	*p* value
VAS-pain	7.65±0.98 (8)	3.45±1.82 (4)	<0.001**
ECOS-16	3.83±0.81 (4)	1.93±0.92 (2)	<0.001**
NHP-pain	47.49±30.07(42.85)	23.8±24.59(14.28)	<0.001**
NHP-physical mobility	42.5±28.28(37.5)	23.13±25.87(12.5)	0.001**
NHP- energy	57.5±36.77(50)	15±25.82(0)	<0.001**
NHP- sleep	45.5±28.28(40)	30.5±24.38(20)	0.019*
NHP-social isolation	45.00±30.29(40)	37.00±28.48(30)	0.24
NHP-emotional reactions	35.94±33.03(25)	27.81±30.68(12.5)	0.24

*VAS: Visual Analog Scale, ECOS-16: Assessment of health related quality of life in osteoporosis, NHP:Nottingham Health Profile, *:p<0.05(significant), **:p<0.01 (highly significant)*

Table 3. The relation of BMD values with quality of life scores and VAS-pain

		BMD-lumbar spine	BMD-femoral neck
ECOS-16	r	-0.71	-0.66
	p	<0.001**	<0.001**
VAS-pain	r	-0.74	-0.71
	p	<0.001**	<0.001**
NHP-pain	r	-0.36	-0.37
	p	0.001**	0.001**
NHP-physical mobility	r	-0.29	-0.39
	p	0.009**	<0.001**
NHP- energy	r	-0.47	-0.38
	p	<0.001**	0.001**
NHP- sleep	r	-0.24	-0.26
	p	0.032*	0.019*
NHP-social isolation	r	-0.027	-0.07
	p	0.81	0.54
NHP-emotional reactions	r	-0.037	-0.12
	p	0.75	0.28

*BMD: Bone mineral density, ECOS-16: Assessment of health related quality of life in osteoporosis, VAS: Visual Analog Scale, NHP: Nottingham Health Profile, *:p<0.05(significant), **:p<0.01 (highly significant)*

physical mobility, energy, pain and sleep subgroups of NHP (r: -0.71, -0.66, -0.39, -0.38, -0.37, and -0.26, respectively) (p<0.05). When the correlation coefficients were analyzed, VAS-pain showed the highest negative correlation with both BMD-lumbar spine and femoral neck values. Both BMD-lumbar spine and BMD-femoral neck showed no statistically significant correlation with social isolation and emotional reactions subgroups of NHP (p>0.05).

Discussion

Osteoporosis is a public health problem worldwide. Osteoporosis causes pain and reduced mobility. Reduced mobility can lead to social isolation and depression. All these factors have a negative impact on HRQoL (13).

There are some studies in the literature where HRQoL of postmenopausal osteoporosis with fractures was assessed. Oleksik et al. (13) conducted a study in 751 osteoporotic women from Europe and found impairment in HRQoL of women with vertebral fractures compared to those without fractures. They evaluated quality of life by using Quality of Life Questionnaire of the European Foundation for Osteoporosis (QUALEFFO), NHP and EuroQoL. In a study of Abourazzak et al. (14) where 357 postmenopausal women were investigated, it was reported that quality of life assessed with ECOS-16 was decreased in osteoporotic women with vertebral fractures. Similarly, Salaffi et al. (15) reported poorer HRQoL scores in the postmenopausal women with vertebral fractures in their study where quality of life was assessed with Short Form-36 (SF-36) and EuroQoL. On the other hand, Jahelka et al. (16) found HRQoL scores of their patients with osteoporosis as lower than those of osteopenic subjects. Paker et al. (17) suggested that vertebral fractures might have a negative impact on the quality of life. Differently from these studies, our group of patients had no vertebral fracture.

The present study investigated the HRQoL in postmenopausal women without vertebral fractures. We evaluated HRQoL by using both general and disease-specific scales. In our study, osteoporotic women scored significantly higher in ECOS-16 and pain, physical mobility, energy and sleep subgroups of NHP when compared with controls. Presence of osteoporosis was not found to be associated with

mental domains of HRQoL including social isolation and emotional reactions. This finding was previously reported in the study of Adiguzel et al. (18) where the patients with postmenopausal osteoporosis had poorer NHP scores except emotional reaction scores. Altindag et al. (19) reported poorer HRQoL scores in postmenopausal women with osteoporosis than healthy controls. Similarly, they used ECOS-16 for evaluating HRQoL. Also Pamuk et al. (6) and Yılmaz et al. (20) suggested that osteoporosis negatively impaired quality of life scores which were assessed with QUALEFFO.

We found higher VAS-pain scores in the patients than in controls. This was previously found in the study of Altindag et al. (19) where osteoporotic women without vertebral fractures were assessed. Moreover we found an association between BMD lumbar and

femoral neck values and severity of back pain. In contrast, Lee et al. (21) suggested that BMD was not associated with musculoskeletal pain in their study conducted in 387 postmenopausal Korean women without fractures.

Theoretically, osteoporosis without vertebral fractures is silence, it does not cause pain. However, there is some evidence that osteoporosis leads to pain. It can be due to concomitant osteoarthritis, musculoskeletal malfunction or muscular atrophy (21). Also in the previous studies, it was reported that pain was relieved after osteoporosis therapy (22, 23). Larger studies are necessary to understand the pain mechanisms in postmenopausal osteoporosis.

We found a negative correlation between lumbar spine and femoral neck BMD values and HRQoL including pain, sleep, and functional status. BMD values did not affect quality of life in terms of social and mental functions. Similar relationship has been found in previous studies. Altindag et al. (19) also found a negative correlation between BMD values at lumbar spine and femoral neck and ECOS-16 scores. Paker et al. (17) found a relationship between lumbar spine and femoral neck BMD values and QUALEFFO-41 subgroups including pain, physical, social and mental functions, and general health. In the study of Yılmaz et al. (20) it was indicated that quality of life assessed with QUALEFFO was negatively associated with BMD values. Similarly, Pamuk et al. (6) reported a similar relationship between BMD and QUALEFFO-41 scores in the study conducted in 280 Turkish postmenopausal women.

There were some limitations in our study. The first one was relatively small number of subjects. The second one was lack of evaluation of the patients in terms of concomitant diseases such as osteoarthritis and fibromyalgia whic may contribute to pain.
Our study demonstrated that women with postmenopausal osteoporosis without vertebral fractures had poorer quality of life than healthy women in terms of severity of pain, sleep and physical functions. Thus physicians should take into consideration pain and HRQoL of the osteoporotic women despite the fact that they had no vertebral fracture. A better understanding of pain mechanisms in postmenopausal osteoporosis will provide us a comprehensive approach to the pain therapy.

Conflict of interests

The authors declare no conflict of interests.

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