

# The Relationship Between Hand Osteoarthritis and Osteoporosis in Postmenopausal Women

## POSTMENOPOZAL KADINLARDA EL OSTEoarTRİTİ VE OSTEOPOROZ ARASINDAKİ İLİŞKİ

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### Summary

**Purpose:** In this study, the relationship between hand osteoarthritis and osteoporosis in postmenopausal women was investigated.

**The place of the study:** Mersin University Medical School, Physical Medicine and Rehabilitation Department

**Material and Methods:** 189 postmenopausal women were evaluated. The patients who had hand osteoarthritis were named as hand osteoarthritis group (n:114), other patients were accepted as control group (n: 75). Patients and control groups hand radiographs (anterior-posterior view) were taken and evaluated according to Kellgren Lawrence scale (0-4). Bone mineral density was measured by DEXA at lumbar and femoral region in all women. Age, body mass index, duration of menopause, smoking, history of hysterectomy and using of hormone replacement treatment were also recorded.

**Results:** There was no relationship between the grade of hand osteoarthritis and bone mineral density ( $p=0.615$ ) and between the joint involvement and bone mineral density ( $p=0.21$  for CMC,  $p=0.128$  for PIP,  $p=0.128$  for DIP). Age ( $p=0.422$ ), body mass index ( $p=0.058$ ), duration of menopause ( $p=0.303$ ), smoking ( $p=0.909$ ), history of hysterectomy ( $p=0.723$ ) and using of hormone replacement treatment ( $p=0.664$ ) did not affect on the results.

**Conclusion:** Although hand osteoarthritis and osteoporosis were common in postmenopausal period, we did not find relationship between two diseases and we suggested that osteoarthritis and osteoporosis are different clinical entities.

**Key Words:** Osteoarthritis, Hand, Osteoporosis

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### Özet

**Amaç:** Bu çalışmada postmenopozal kadınlarda el osteoartriti ile osteoporoz arasındaki ilişki araştırılmıştır.

**Çalışmanın Yapıldığı Yer:** Mersin Üniversitesi Tıp Fakültesi, Fiziksel Tıp ve Rehabilitasyon Anabilim Dalı

**Materyal ve Metod:** 189 postmenopozal kadın değerlendirildi. El osteoartriti olanlar 'el osteoartrit grubu' olarak adlandırıldı. Diğer hastalar kontrol grubu olarak kabul edildi (n:75). Hasta ve kontrol grubunun ön arka el grafileri çektilirip Kellgren-Lawrence skalasına göre değerlendirildi. Kemik mineral yoğunlukları DEXA ile lomber ve femoral bölgeden ölçüldü. Vücut kitle indeksi, menopoz süresi, sigara içme, hormon replasman tedavisi kullanımı ve histerektomi öyküsü de kaydedildi.

**Bulgular:** El osteoartriti derecesi ile kemik mineral yoğunluğu ( $p=0.615$ ) ve tutulan eklem ile kemik mineral yoğunluğu arasında ilişki saptanmadı (CMC için DEXA  $p=0.21$ , PIP için DEXA  $p=0.128$ , DIP için DEXA  $p=0.128$ ). Yaş ( $p=0.422$ ), vücut kitle indeksi ( $p=0.058$ ), menopoz süresi ( $p=0.303$ ), sigara içme ( $p=0.909$ ), hormon replasman tedavisi kullanımı ( $p=0.664$ ) ve histerektomi ( $p=0.723$ ) öyküsünün sonuçlar üzerinde etkisi saptanmadı.

**Sonuç:** El osteoartriti ile osteoporoz postmenopozal dönemde sık olarak birarada bulunmasına rağmen, aralarında herhangi bir ilişki bulunmadı ve bu iki hastalığın ayrı klinik antiteler olduğu düşünüldü.

**Anahtar Kelimeler:** Osteoartrit, El, Osteoporoz

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Osteoarthritis (OA) and osteoporosis are the most common disorders at the postmenopausal period in women. The inverse relationship between these disorders has long been considered in the literature. Although previous reports revealed

significant correlation between lumbar and knee radiological OA and bone mineral content of the spine and the total body, (1-3) the correlation of hand OA and osteoporosis is controversial. The association of osteoporosis with large joint OA is

stronger than its relationships with hand OA or primary generalized OA (4). Marcelli and co-workers (5) suggested that bone mineral density (BMD) in patients with hand OA was higher than the values of control group. Contrary, Sowers et al. (6) suggested no difference between patients with hand OA and control groups according to Z scores.

We designed this study to investigate the relationship between hand OA and osteoporosis because of the results are controversial.

### Material and Methods

One hundred eighty nine female subjects were evaluated. All women were at postmenopausal period. The women with diabetes mellitus, rheumatic diseases, thyroid and parathyroid diseases, hepatic and renal dysfunction were excluded. The mean age was  $59.67 \pm 7.52$  (40-79). Antero-posterior hand radiographs were taken and evaluated by according to Kellgren-Lawrence scale (7). The values  $\geq$  Grade 2 were accepted as hand OA. The patients who had hand OA were named as hand OA group (n:114). Other patients were accepted as control group (n:75) The evaluation of proximal interphalangeal joints (PIP), distal interphalangeal (DIP) joints and carpo-metacarpal joints (CMC) were also recorded. BMD was measured using dual energy X ray absorpsiometry (DEXA) (Hologic QDR 4500) at femoral neck region and at lumbar vertebrae region (L2-4). The values, which T score  $> - 2.5$  were considered as osteoporosis. The patients were divided into two groups according to age ( $>60$  and  $\leq 60$ ) and body

mass index (BMI) ( $\geq 25$ , and  $<25$ ). In addition smoking, using of HRT, hysterectomy and duration of menopause were also recorded.

Data were analysed using the SPSS for Windows program (Version 9.0; SPSS, Inc., Chicago, Illinois, USA) and expressed as means  $\pm$  SD. Homogeneity of variance were calculated by Levene's test. One-way ANOVA test was used to compare to mean BMD values between different X ray groups and different joint groups. Correlations between the groups were assessed by Pearson correlation coefficient. Chi Square and independent student T test were used to compare the groups. A value of  $p < 0.05$  was considered statistically significant.

### Results

One hundred fourteen patients had hand OA and seventy-five patients were normal. Descriptive statistics were shown in Table 1. There was no statistically significant difference between hand OA group and control group ( $P=0.434$ ). The relationship between the severity of hand OA and mean BMD was shown in Table 2. One hundred fourteen patients with hand OA, 100 had DIP joint involvement, 52 had PIP joint involvement and 65 had CMC joint involvement. The involvements of PIP joints ( $p=0.978$ ), DIP joints ( $p= 0.128$ ) and CMC joints ( $p=0.21$ ) have no effect on BMD (Table 3). Eighteen patients were smoking, fifteen patients were using HRT and 20 patients had hysterectomy in hand OA group and ten patients were smoking, 12 patients were using HRT and 13 pa-

**Table 1.** Characteristics of patients in the hand osteoarthritis group and in the control group (Mean  $\pm$  SD)

	HAND OA (n:114)	CONTROL (n:75)	P
AGE (years)	61.51 $\pm$ 6.43	60.53 $\pm$ 6.21	NS
BMI (kg/m <sup>2</sup> )	28.05 $\pm$ 4.65	27.38 $\pm$ 4.34	NS
MENOPAUSE (years)	8 $\pm$ 1.03	7.3 $\pm$ 1.05	NS
LOMBER BMD (gm/cm <sup>2</sup> )	0,8564 $\pm$ 0.161	0.8196 $\pm$ 0.1713	NS
FEMUR NECK BMD (gm/cm <sup>2</sup> )	0.7491 $\pm$ 0.142	0.7352 $\pm$ 0.109	NS
FEMUR TOTAL BMD (gm/cm <sup>2</sup> )	0.8482 $\pm$ 0.165	0.8186 $\pm$ 0.124	NS

BMI: Body mass index BMD: Bone mineral density Hand OA: Hand osteoarthritis

NS: Not statistically significant differences.

**Table 2.** The relationship between the grade of hand osteoarthritis and bone mineral density at lumbar and femoral regions (Mean  $\pm$  SD)

	HAND OA				P VALUE
	GRADE 0 (n: 75)	GRADE 2 (n:42)	GRADE 3 (n:41)	GRADE 4 (n:31)	
LUMBAR BMD (gm/cm <sup>2</sup> )	0.819 $\pm$ 0.17	0.844 $\pm$ 0.20	0.850 $\pm$ 0.15	0.874 $\pm$ 0.17	NS
FEMUR NECK BMD (gm/cm <sup>2</sup> )	0.735 $\pm$ 0.10	0.774 $\pm$ 0.18	0.735 $\pm$ 0.12	0.737 $\pm$ 0.19	NS
FEMUR TOTAL BMD (gm/cm <sup>2</sup> )	0.818 $\pm$ 0.12	0.851 $\pm$ 0.24	0.827 $\pm$ 0.16	0.864 $\pm$ 0.13	NS

Hand OA: Hand Osteoarthritis BMD: Bone mineral density

NS: Not statistically significant differences

**Table 3.** The mean BMD values and joint involvement in hand OA. (mean  $\pm$  SD) There was no statistically significant relationship between the groups

		LUMBAR BMD (gm/cm <sup>2</sup> )	FEMUR NECK BMD (gm/cm <sup>2</sup> )	FEMUR TOTAL BMD (gm/cm <sup>2</sup> )
CMC OA	(+)	0.860 $\pm$ 0.16	0.733 $\pm$ 0.15	0.831 $\pm$ 0.17
	(-)	0.829 $\pm$ 0.16	0.739 $\pm$ 0.12	0.827 $\pm$ 0.13
PIP OA	(+)	0.841 $\pm$ 0.17	0.733 $\pm$ 0.13	0.828 $\pm$ 0.14
	(-)	0.840 $\pm$ 0.17	0.738 $\pm$ 0.13	0.829 $\pm$ 0.15
DIP OA	(+)	0.857 $\pm$ 0.17	0.739 $\pm$ 0.15	0.835 $\pm$ 0.17
	(-)	0.821 $\pm$ 0.16	0.734 $\pm$ 0.10	0.821 $\pm$ 0.12

BMD: Bone mineral density, CMC OA: Carpometacarpal osteoarthritis, PIP OA: Proximal interphalangeal osteoarthritis, DIP OA: Distal interphalangeal osteoarthritis

tients had hysterectomy in control group (Table 4). Age (p=0.422), BMI (0.058), duration of menopause (p=0.303), smoking (p=0.09), using HRT (p= 0.664) and history of hysterectomy (p=0.723) had no effect on the relationship between hand OA and osteoporosis.

### Discussion

Hand OA is more common in patients with 65 years or older ages. Van Saase et al (8) found that this ratio was 70%. Similarly, osteoporosis is common in postmenopausal women. Many researchers investigated to the relationship of two diseases. While some researchers found no relationship between two diseases (9,10), the others showed that BMD increased in the presence of radiographic OA of the knee or hip (2,11,12). There are several possible reasons such as genetic factors, common risk factors and growth factors for

**Table 4.** The distribution of the patients according to age, BMI, smoking, using HRT and history of hysterectomy

		HAND OA	CONTROL
Age	<60	39 (%20.6)	51 (%27)
	$\geq$ 60	75 (%39.7)	24 (%12.7)
BMI	<25	31 (%16.4)	22 (%11.6)
	$\geq$ 25	83 (%43.9)	53 (%28.1)
Smoking		18 (%9.52)	10 (%5.29)
HRT		15 (%7.93)	12 (%6.34)
Hysterectomy		20 (%10.58)	13 (%6.87)

Hand OA: Hand osteoarthritis, BMI: Body mass index  
HRT: Hormone replacement therapy

explaining the relationship between OA and osteoporosis (13). Dequeker et al (14) suggested that increased bone density in patients with OA may be associated with insulin like 1 growth fac-

tor 1 and 2 (IGF 1, IGF 2) and transforming growth factor beta (TGF- $\beta$ ).

The nature of the relationship between osteoporosis and OA may be associated with the site of involvement. Sambrook et al (5) suggested that the evidence for relationship between osteoporosis and OA is stronger for large joint OA than hand OA or primary generalized OA. Similarly Hochberg et al (15) found that the hand OA is not associated with increased bone mass. However, Marcelli et al (5) suggested that the severity of hand OA is positively correlated with bone mass in elderly women. Recent studies indicated that higher BMD was less associated with hand osteoarthritis (13). In our study the BMD findings were similar in hand OA and control groups and the grade of hand OA did not correlate with bone mass. This finding is consistent with the recent studies.

Increased age, low BMI, duration of menopause, HRT and history of hysterectomy are risk factors which may effect on bone mass. We divided the patients into two groups according to age ( $> 60$  and  $60 \geq$ ) for investigating the effect of age factor, but we did not find any significant difference between two age groups according to BMD.

It has also been suggested that OA and osteoporosis might be associated with body size. Dequeker et al (14) reported that women with OA were more obese and their muscle strength had greater than women with osteoporosis. They suggested that these characteristics may explain the increased bone mass. Contrary, Price et al (16) observed that bone mass values were similar in female patients with OA and in normal controls, after adjustment for age and weight. In this study we divided the patients as two groups according to BMI ( $\geq 25$ , and  $<25$ ), we adjusted these patients for age and weight. We did not find any difference between the two groups.

The Chingford study demonstrated that HRT was protective effect on osteoarthritis, but the effect was weaker in the hand joints. We did not find any significant protective effect but the number of patients with using HRT was low in our study

group. Similarly we found that smoking and history of hysterectomy had no effect on the relationship of these two diseases but the number of these patients were low in our study group.

In conclusion we did not find any significant difference between hand OA and control groups regarding BMD. Also age, BMI, duration of menopause, smoking and using HRT had no effects on this relationship. Therefore, we can suggest that hand osteoarthritis and axial osteoporosis are different clinical entities although they are seen commonly in postmenopausal period. But, further studies investigating bone metabolism markers and IGF1, 2, TFGF are needed.

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