

Evaluation of Bone Mineral Density in Terms of Veiling, Socioeconomical Status and Educational Level in Turkish Women Over 40 Years. Veiling May Be A Risk Factor For Osteoporosis

Kırk Yaş Üzeri Türk kadınlarında Kemik Mineral Yoğunluğunun Giyim Tarzı, Sosyoekonomik Statü ve Eğitim Düzeyi Açısından Değerlendirilmesi. Kapalı Giyinme Osteoporoz İçin Bir Risk Faktörü Olabilir.

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Background and aims: Headscarf is a mild kind of veiling, worn for various intentions. We aimed to evaluate effect of veiling, educational status, living area and nutrition on BMD in women over 40 years. **Subjects and methods:** Four hundred thirty nine moslem women, living in different region (suburb and house provided to workers) of Diyarbakir, aged over 40 years (with mean age 48,9+ 11,3 years) were included to study. The predicted factors influencing BMD were investigated by using a questionnaire. Body weights and heights were measured. BMI was expressed as weight (kilograms) per height (meters) squared. Body fat percent and fat mass were determined by bioelectric impedance. Bone Mineral Density (BMD) was determined with radiographic absorptiometry (RA) in three middle fingers. **Results:** Living in suburban region ($p=0.0001$), family history of osteoporosis ($p<0.002$), low education level ($p=0.0001$), insufficient calcium intake ($p<0.001$), parity over 4 ($p=0.0001$), low body height ($p=0.0001$), veiling ($p=0.0001$) and low body weight ($p<0.002$) and height ($p=0.0001$) and duration of menopause ($p=0.0001$) were the factors with negative effects on BMD. Prevalence of osteoporosis was also higher in illiterate women ($p=0.0001$), women living in slum ($p=0.0001$), veiled women ($p=0.0001$), insufficient nutritional status ($p<0.03$) and positive family history for osteoporosis ($p<0.002$). **Conclusions:** In addition to well known factors for osteoporosis such as living in slum, illiteracy, high parity number, insufficient nutrition, and duration of menopause; veiling may also be an important factor for low BMD. Veiled women should be screened for low BMD and osteoporosis regularly.

Keywords: Osteoporsis, low bone mineral density, veiling, nutrition, living area and educational status

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Giriş ve amaçlar: Başörtüsü kapalı giyim tarzının hafif bir biçimi olup, değişik nedenlerle kullanılmaktadır. Bu çalışmada 40 yaş üzeri kadınlarda kapalı giyinmenin, eğitim durumunun, yaşanan yerin ve beslenme tarzının KMY üzerine etkisini değerlendirmeyi amaçladık. **Kişiler ve Yöntemler:** Diyarbakır'ın değişik bölgelerinde

yaşayan (gecekondu ve lojman) 40 yaş üzeri (ortalama 48,9+ 11,3 yıl) 430 kadın çalışmaya alındı. KMY üzerine etki edebilecek etkenler bir anket aracılığıyla değerlendirildi. Vücut ağırlıkları ve boyları ölçüldü. BKİ metre-kareye düşen kg olarak gösterildi. Vücut yağ yüzdesi ve yağ kütlesi biyoelektrik impedans ile belirlendi. Kemik mineral yoğunluğu (KMY) el parmaklarının orta üçünde radyografik absorbsiyometre (RA) ile belirlendi. Sonuçlar: Gecekondu bölgesinde yaşamak ($p=0.0001$), osteoporoz için aile öyküsünün varlığı ($p<0.002$), düşük eğitim düzeyi ($p=0.0001$), yetersiz kalsiyum alımı ($p<0.001$), 4'ten fazla doğum ($p=0.0001$), küçük boy ($p=0.0001$), kapalı giyinme ($p=0.0001$) ve düşük vücut ağırlığı ($p<0.002$) ve boy ($p=0.0001$) ve menopoz süresi ($p=0.0001$) KMY'ni olumsuz olarak etkileyen faktörlerdi. Osteoporoz prevalansı okur-yazar olmayan ($p=0.0001$), gecekonduya yaşayan ($p=0.0001$), kapalı giyinen ($p=0.0001$), yetersiz beslenme durumu olan ($p<0.03$) ve osteoporoz için aile öyküsü bulunan kadınlarda daha yüksek olarak bulundu. Sonuçlar: Gecekonduya yaşamak, okur-yazar olmamak, yüksek doğum sayısı, yetersiz beslenme ve uzun menopoz süresi gibi osteoporoz için iyi bilinen risk faktörlerine ek olarak, kapalı giyinme de düşük KMY için önemli bir etken olabilir. Kapalı giyinen kadınlar düşük KMY ve osteoporoz açısından düzenli olarak taranmalıdır.

Anahtar Kelimeler: Osteoporoz, düşük kemik mineral yoğunluğu, kapalı giyinme, beslenme, yaşam alanı ve eğitim durumu.

Introduction

Osteoporosis is "a skeletal disorder characterized by compromised bone strength predisposing a person to an increased risk of fracture" and it results in millions of fractures and a substantial burden in health care costs and disability among older women (1, 2). Low bone mineral density (BMD) is a good predictor of the development of non pathologic fractures (3). According to the World Health Organization (WHO) criteria, osteoporosis is defined as a BMD 2.5 SD or more below the peak bone mass of a young, healthy sex- and race-matched reference population (4), and osteopenia is defined as a BMD between 1.0 and 2.5 SD below the peak bone mass (5). Several techniques have been developed, but dual-energy x-ray absorptiometry (DEXA) currently offers the most precise measurements at multiple skeletal sites for the least amount of radiation exposure (6). The MetriScan uses radiographic absorptiometry (RA) to estimate relative phalangeal bone density of the three middle fingers with RA a high resolution radiographic image of a patient's phalanges (Patient x-ray dose is 0.001 mrem). The WHO estimated the prevalence of osteoporosis in western women (adjusted to 1990 US white women) at any site as 14.8% in women aged 50-59, 21.6% for ages 60-69, 38.5% for ages 70-79, rising to 70.0% in women aged 80 or more (4). Various risk factor for osteoporosis were determined; age, BMD (t-

score), fracture after age 50 years, maternal hip fracture after age 50, weight less than or equal to 125 lbs (57 kg), smoking status and use of arms to get up from a chair (7). It was shown that bone mineral density values in Turkey were similar to reference values of western countries, and stated that low body mass index, low dietary calcium intake, low physical activity, a short fertile period, and a short period of education are associated with increased risk of hip fracture in Turkish population (8,9). Headscarf is a mild kind of veiling, worn for religious intentions. Lots of veiled women (devout or women/girls who forced to use of headscarf with various conditions by husband and/or her family members such as father) start to wear a headscarf with the onset of puberty in Islamic Peoples. Despite of common use of veiling in Moslem populations, this issue was not investigated properly. We aimed to evaluate effect of various factors such as parity, post menopausal period, education level and antropometrical parameters and especially veiling, on BMD in women over 40 years.

Subjects and Methods

Subjects

This study was conducted in Bağlar and Sehitlik primary health centers, and health centers of three different governmental sectors. Four hundred thirty nine moslem women living in city center of

Table 1. All mean BMD parameters related to osteoporosis.

Parameters		BMD \pm SD	p
Living area	house provided to workers (n:168)	56,5 \pm 6,9	0,0001
	Slum (n:271)	53,1 \pm 8,0	
Dressing type	Veiling (n:115)	52,6 \pm 8,0	0,0001
	Non-Veiling (n:324)	58,1 \pm 5,8	
Family history	Positive (n:160)	55,9 \pm 7,1	0,002
	Negative (n:279)	53,5 \pm 8,0	
Education level	High school /+ (n:105)	58,1 \pm 5,7	0,0001
	Primary School (n:82)	57,8 \pm 6,9	
	Illiterate (n:252)	51,7 \pm 7,7	
Nutrition Status	Sufficient (n:216)	54,9 \pm 7,6	0,001
	Insufficient (n:171)	52,1 \pm 8,4	
Parity	0-3 (n:116)	58,2 \pm 6,3	0,0001
	4+ (n:323)	53,0 \pm 7,8	
Body height (cm)	<150 (n:76)	49,7 \pm 9,6	0,0001
	\geq 151 (n:363)	55,4 \pm 7,0	
Body weight (kg)	\geq 51 (n:393)	54,8 \pm 7,6	0,002
	<50 (n:46)	50,9 \pm 8,3	
Menopause duration (yr)	0-3 (n:270)	57,4 \pm 6,4	0,0001
	4+ (n:169)	49,5 \pm 7,4	

Table-2. All results of prevalence of osteoporosis in various conditions

	Osteoporotic women* (n)	%	n	p
Educational status				
High school and above	6	5,7	129	0,000
Primary school	5	6,1	58	
Illiterate	84	33,3	252	
Living area				
Slum	75	27,7	271	0,000
House provided to workers	20	11,9	168	
Dressing				
Veiled	9	45,0	20	0,000
Headscarfe	81	26,6	304	
Bareheaded	5	4,3	115	
Family history of osteoporosis				
+	26	16,3	160	0,03
-	69	24,7	279	
Nutritional status				
Sufficient	37	17,1	216	0,002
Moderately	24	19,4	124	
Insufficient	34	34,3	99	

*T-score below -2.5 SD

Diyarbakir-Turkey, aged over 40 years (mean age 48.9 \pm 11.3 yr) were included to study. In primary health centers women aged over 40 years recruited from the records of primary health centers, in

governmental sectors women were called by health centers' administrations. An inquiry form was filled about life style, nutritional status and family history in all subjects.

Methods. Body fat analyses, antropometric evaluation and evaluation of Bone mineral density

Body weights were measured without shoes and in light clothing, and were recorded to the nearest 0.5 kg. Body heights were measured without shoes and/or cap, and were recorded to the nearest centimeter. BMI was expressed as weight (kilograms) per height (meters) squared. Waist circumference was taken as the maximum abdominal girth and recorded to the nearest centimeter. Hip circumference was taken as the maximum circumference at the level of the greater trochanter and also recorded to the nearest centimeter. Body fat percent and fat mass were determined by bioelectric impedance (Tanita body composition analyzer. TANITA Corporation 14-2, 1-chome, Maeno-cho, Itabashi-ku Tokyo, Japan). Bone Mineral Density (BMD) was determined with MetriScan 500-1210-00 in three middle fingers. The predicted factors influencing BMD was investigated by using a questionnaire. Informed and written consent were obtained from all subjects.

Statistical analysis

Mean BMD of women from different subgroups were compared by using t test and ANOVA. PostHoc Tukey analysis was used to identify which subgroup was different. Frequencies of women with T score >2.5 SD were calculated according to various risk factors like education status, living area, dressing style, family history of osteoporosis and nutritional status. Frequencies were analyzed by using chi-square analyses. Adjusted odds ratios and 95%CI of those risk factors were calculated by using logistic regression models.

Results

a-Comparison of Mean BMD of the Groups: Living in suburban region in slum ($p=0.0001$), positive family history of osteoporosis ($p<0.002$), low education level ($p=0.0001$), insufficient calcium intake ($p=0.001$), parity over 4 ($p=0.000$), low body height ($p=0.0001$), low body weight ($p<0.002$) and long menopausal period ($p=0.0001$) were the factors with negative effects on BMD. Additional to those well known factors veiling was also found to be an important risk factor for low

BMD ($p=0.0001$). All results related to osteoporosis were shown in Table 1.

b- Comparison of Osteoporosis prevalence of Groups: Prevalence of osteoporosis (T-score below -2.5 SD) was higher in illiterate women ($p=0.0001$), women living in slum ($p=0.0001$), veiled women or women ($p=0.0001$), insufficient nutritional status ($p<0.03$) and positive family history for osteoporosis ($p<0.002$). All results of prevalence of osteoporosis in various conditions were presented in Table 2. In logistic regression analysis we found that veiling, illiteracy, high tea consumption, long menopause duration, high parity number and short stature were important risk factor for osteoporosis. All risk ratio of osteoporosis for various conditions (with 95%CI) were shown Table 3.

Table 3. Risk ratios of osteoporosis for various conditions (with 95%CI)

Risk factors	Risk ratio	CI 95%	p value
Illiteracy	1,345	0,044 – 1.115	0.068
Veiling	7,236	1,991- 26,18	0.003
Smoker	1,054	0,368 - 3,022	0.921
Living in slum	1,112	0,470- 2,431	0.809
Tea consumption (cup/d)	0,426	0,426- 0,828	0.012
Menapouse duration (yr)	7,426	3,972- 13,882	0.000
Parity number	2,944	1,035- 8,374	0.043
Height (<150 cm)	3,781	1,973– 7,245	0.000

Discussion

Because this was the fieldwork study and this method was well correlated with DEXA, we determined bone mineral density (BMD) with radiographic absorptiometry (RA) in three middle fingers. Bone density at the phalanges was as well-correlated with the hip and spine as the hip and spine were correlated with each other. In this study, we found that living in suburban region in slum, positive family history for osteoporosis, veiling, low education level, insufficient calcium intake, parity over 4, low body height and body weight, and long postmenopausal period may affect bone mineral density (BMD) negatively. These were well known concomitant factors for osteoporosis apart from veiling. In addition we found that veiling, illiteracy, high tea consumption, long postmenopausal duration, high parity number and short stature were also important risk factors

for osteoporosis in logistic regression analysis (with 95%CI). A large risk factor study identified seven variables for osteoporosis: age, BMD T-score, fracture after age 50 years, maternal hip fracture after age 50, weight less than or equal to 125 lbs (57 kg), smoking status and use of arms to get up from a chair (7). Perez Cano R et al. (8) demonstrated that low body mass index, low dietary calcium intake, low physical activity, a short fertile period, and a short period of education are associated with increased risk of hip fracture in Turkish population.

Headscarf, a mild kind of veiling, worn for various intentions such as religious conditions, and it is widespread dressing model among moslem women. Lots of veiled women start to use a headscarf with the onset of puberty, and they may be veiled completely in a course of time. Despite of to be prevalent condition in Moslem populations, effect of veiling on BMD was not investigated properly. In this manner, we could find only one study in medline searching about veiling and bone mineral density and osteoporosis. In this study Guzel R et al.(10) compared veiled women with the control group and they found that 25-OHD levels were negatively correlated with the duration of being veiled. They concluded that veiled women have low 25-OHD status, and vitamin D supplementation should strictly be advised to these women for the prevention of osteomalacia and osteoporosis. Our study showed that veiling at different grade (from headscarfe to completely veiling) was related to low BMD, and veiled women should be evaluated in terms of osteoporosis, properly. In fact vitamin D is formed in the skin from 7- dehydrocholesterol, and this process requires ultraviolet light. Inadequate exposure to sunlight may be responsible for this result. But we could not measure 25-OH vitamin D levels due to financial probelms and this was main lack of our study.

We also want to determine whether prevalence of osteoporosis related to grade of veiling or not, and we took into account prevalence of osteoporosis in subgroups. While prevalence of osteoporosis was only 4,3% in bareheaded women, it was found to be 26.6% in women with headscarfe and 45% in veiled women respectively. Therefore, it may indicate that grade of veiling is related to prevalence of osteoporosis. As a result our findings

pointed out that, in addition to well known factors for osteoporosis such as parity, insufficient nutrition, and long menopausal period; veiling may also be an important factor for low BMD and therefore, osteoporosis. Veiled women should be evaluated in terms of low BMD and osteoporosis properly, and adequate approach should be performed to prevention of osteoporosis and osteomalacia in veiled women.

Conclusions

In addition to well known factors for osteoporosis such as living in slum, illiteracy, high parity number, insufficient nutrition, and long menopausal period; veiling may also be an important factor for low BMD. Veiled women should be screened for low BMD and osteoporosis regularly.

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