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The Bone Mineral Density Values of Women in Alanya and Regional Turkish Community: Cross-sectional Comparative Study

Alanya ve Yöresi Türk Toplumu Kadınlarında Kemik Mineral Yoğunluğu Değerleri: Kesitsel Karşılaştırmalı çalışma

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ABSTRACT

Aim: In this study; we aimed to investigate the BMD values of healthy Turkish women living in Alanya and the region and to compare them with the studies performed in different regions of our country.

Methods: The DXA results of 376 patients who met the inclusion criteria from the healthy participants who applied to Alanya Education and Research Hospital in 2017 were evaluated.

Results: The mean age of the 376 participants included in the study was 62.47, the mean body mass index (BMI) was 28.62, and the mean vertebra t score was -1, 82 ± 2.34 while the mean hip t score was -0.93 ± 1.02. There was a statistically significant difference between the two cities in the 40-49 and 50-59 age groups. Kastamonu mean BMD was higher. No statistically significant difference was found between the two cities in the 60-69 age group, whereas there was a statistically significant difference between the two cities. In the age groups of 70-79 and 80 years, and in the age group above. The mean values of the Alanya BMD were higher. There was no statistically significant difference between the two cities in both the 40-49 age group and the 80 age group. However, there was a statistically significant difference between the two cities in the 50-59 years, 60-69 years and 70-79 age groups. The mean values of Alanya BMD were higher.

Conclusion: regional outcomes and differences are important factors in interpreting BMD values. These differences may be the effect of locally utilizing the sunlight, but may also be influenced by regional nutritional habits. In addition, the differences in DXA devices used for BMD measurement and technical standards should be taken into consideration during measurements.

Key words; Osteoporosis, Osteopenia, Bone mineral density

ÖZ

Amaç: Bu çalışmada; Alanya ve Yöresinde yaşayan sağlıklı Türk kadınlarının KMY değerlerini araştırmayı ve Ülkemizin değişik yörelerinde yapılan çalışmalarla karşılaştırmayı amaçladık.

Yöntem: Alanya Eğitim ve Araştırma Hastanesine 2017 yılında başvuran sağlıklı katılımcılardan dahil etme kriterlerine uyan 376 olgunun DXA sonuçları değerlendirildi.

Bulgular: Çalışmaya dahil edilen 376 katılımcının ortalama yaşı 62,47, ortalama vücut kitle indexi (VKİ) 28,62 ve ortalama vertebra t skoru -1, 82 ±2,34 iken ortalama kalça t skoru -0,93±1,02 idi. 40-49 ve 50-59 yaş grubunda her iki şehir arasında istatistiksel anlamlı fark vardı. Kastamonu KMY ortalamaları daha yüksekti. 60-69 yaş grubunda her iki şehir arasında istatistiksel anlamlı fark bulunamadı. 70-79 ve 80 ve üzeri yaş grubunda ise her iki şehir arasında istatistiksel anlamlı fark vardı. Alanya KMY ortalamaları daha yüksekti. Hem 40-49 yaş grubunda hem de 80 ve üzeri yaş grubunda her iki şehir arasında istatistiksel anlamlı fark yoktu. Ancak 50-59 yaş, 60-69 yaş ve 70-79 yaş gruplarında her iki şehir arasında istatistiksel anlamlı fark vardı. Alanya KMY ortalamaları daha yüksekti.

Sonuç: Bölgesel sonuçlar ve farklılıklar KMY değerlerinin yorumlanmasında önemli etkenlerdir. Bu farklılıklarda bölgesel olarak güneş ışığından yararlanmanın etkisi olabileceği gibi yine bölgesel beslenme alışkanlıklarının etkisi olabilir. Ayrıca KMY ölçümünde kullanılan DXA cihazlarının farklılığı ve ölçümler sırasında teknik standartlarda göz önünde bulundurulmalıdır.

Anahtar Kelimeler; Osteoporoz, Osteopeni, Kemik Mineral Yoğunluğu

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Osteoporosis (OP) is a metabolic bone disease characterized by deterioration in the microstructure of bone tissue, bone mineral density (BMD), decrease in bone strength, and increase in bone fracture and fracture risk. It is stated that bone mineral density (BMD) values and osteoporosis (OP) prevalence are influenced by ethnic, genetic, gender, age, environmental and regional factors [1-4]. BMD measurement is an important numerical value used in OP diagnosis and identification of fracture risk. Dual Energy X-ray Absorptiometry (DXA) used in the diagnosis and follow-up of OP is a proven, widely used, sensitive and non-invasive method for determining BMD [1,2].

In order to be able to interpret the values of BMD, it should be compared with the reference values made from a number of examples selected from different geographical regions specific to age and sex, and collected from a healthy community showing similar characteristics [1]. In the world and in our country, there are many DXA devices in different brands that measure BMD values. In these devices, white race (Caucasian) standardization data is usually used. Some studies have been carried out on the BMD values of Turkish society in various regions of our country [1-7].

In this study; we aimed to investigate the BMD values of healthy Turkish women living in Alanya and the region and to compare them with the studies made in different regions of our country.

METHODS

Out of all healthy participants applied to Alanya Education and Research Hospital in 2017, the results of 376 patients who met the inclusion criteria were evaluated. Local Ethics Committee approved. The consent of participants was taken, and they were informed that their results would be used in a scientific study. Besides sick-abed participants', the results of those participants with the risk factor for OP and/or secondary cause for OP, participants with metabolic, endocrine, neuropsychiatric, and malignant diseases, participants with long-term use of alcohol, smoking, and in the steroid (≥5 mg and ≥3 months), participants with implants in the parts to be shot were not included in the study. Bone densitometry was scanned in Alanya Training and Research Hospital with STRATOS dR 20016 (DMS Imaging, Maugio France) DXA device.

In the anteroposterior vertebrae and femur upper end measurements, the positions of the persons were adjusted with the equipment of the relevant device. Issues to be considered in screening, and device maintenance and calibration was made according to the recommendations of Turkey Association of Nuclear Medicine [8] and the International Society for Clinical Densitometry (ISCD) [9]. BMD measurements were performed on the anterior-posterior spine (L1-L4) and on the femur upper end (total).

Statistical Method: Descriptive analyzes were presented as mean ± standard deviation. The normal distribution compatibility of our data was checked by the Kolmogorov-Smirnov test. For comparing with different regions, test of significance was done with Statistical Calculator ® (StatPac Inc. Minneapolis, Minnesota, USA) statistical package program. For the mean data in the analysis of parametric data; Independent groups t-test between means test was used. P <0.05 values were considered significant.

RESULTS

The mean age of the 376 participants included in the study was 62.47, the mean body mass index (BMI) was 28.62, and the mean vertebra t score was -1, 82 ± 2.34 while the mean hip t score was -0.93 ± 1.02 (Table 1).

When vertebra BMD averages are evaluated according to age groups;

There was a statistically significant difference between the two cities in the 40-49 and 50-59 age groups (p = 0.0001 and p = 0.0000, respectively) and Kastamonu mean BMD was higher. No statistically significant difference was found between the two cities in the 60-69 age group. There was a statistically significant difference between the two cities (p = 0,0462 and p = 0,0035, respectively) in the age groups of 70-79 and 80 years, and in the age group above, and the mean values of the Alanya BMD were higher (Table 2).

When the hip BMD average is evaluated according to age groups;

There was no statistically significant difference between the two cities in both the 40-49 age group and the 80 age group. However, there was a statistically significant difference between the two cities (p = 0,0075, p = 0,000 and p = 0,000, respectively) in the 50-59 years, 60-69 years and 70-79 age groups, and the mean values of the Alanya BMD were higher (Table 3).

The highest BMD was determined in the 40-49 age

group for both vertebrae and hip. As the age group increased, both vertebrae and hip BMD decreased (Table 2 and 3).

According to the Meteorological Service (MS) data, the long-term (1930-2017) annual mean temperature for Kastamonu is 9.8 ^{0}C and the mean sunshine duration is 70.4 hours [10] while the average annual temperature (1930-2017) for Alanya (Antalya) was 18.7 ^{0}C and the mean sunshine duration was 97.6 hours per year [11].

Table 1: Demographic data of Turkish women living in Alanya. *

	N	Minimum	Maximum	Mean	Std. Sapma
Age (year)	376	40,00	96,00	62,4681	9,91452
Height (cm)	376	115,00	177,00	155,5851	6,61660
Weight (kg)	376	35,00	155,00	69,1303	14,85975
BMI	376	16,51	117,20	28,6243	7,14869
V-BMD (gr/cm2)	376	,43	2,77	,8703	,19136
V-T score	376	-35,00	14,00	-1,8194	2,33833
F- BMD (gr/cm2)	376	,51	1,45	,8961	,14701
F-T score	376	-3,60	3,10	-,9285	1,02378

*** Descriptive Statistics; BMI: Body Mass Index, V-BMD: Vertebrae (L1-L4) Bone Mineral Density , V-T score: Vertebral body T-score, F- BMD: Femoral Bone Mineral Density, F-T score: Femoral T score**

Table 2: Comparison of Alanya and Kastamonu Vertebra BMD

Vertebrae (L1-L4) Mean ± SD (all patients older than 40 years)					
Age groups	BMD-AK (gr/cm2)	N	BMD -KK (gr/cm2)	N	P*
40-49	0,955±0,18	33	1.116 ± 0.16	47	0,0001
50-59	0,866±0,16	122	0.997 ± 0.17	67	0,0000
60-69	0,870±0,24	136	0.904 ± 0.16	143	0,1631
70-79	0,849±0,15	67	0.803 ± 0.16	156	0,0462
80-+	0,828±0,14	18	0.719 ± 0.13	54	0,0035

***İndepentedt gorups t-test between means, BMD-KK: Kastamonu Women Bone Mineral Density, BMD -AK: Alanya Women Bone Mineral Density, SD: Standard deviation**

Table 3: Comparison of Alanya and Kastamonu Femoral BMD:

Femur Proximal (Hip) Mean ± SD (all cases older than 40 years)					
Age groups	BMD-AK (gr/cm2)	N	BMD -KK (gr/cm2)	N	P*
40-49	0,994±0,14	33	0.949 ± 0.18	47	0,2328
50-59	0,934±0,13	122	0.874 ± 0.17	66	0,0075
60-69	0,891±0,14	136	0.788 ± 0.18	143	0,0000
70-79	0,838±0,12	67	0.725 ± 0.13	158	0,0000
80-+	0,717±0,13	18	0.709 ± 0.10	51	0,7886

***İndepentedt gorups t-test between means, BMD-KK: Kastamonu Women Bone Mineral Density, BMD -AK: Alanya Women Bone Mineral Density, SD: Standard deviation**

DISCUSSION

In addition to unchangeable risk factors such as race, heredity, gender and age, all of which have a role in determining BMD, many interchangeable risk factors such as BMI, nutrition, sun exposure, and exercise also play a role in the etiopathogenesis of OP [1-5]. Bone loss is accelerated in women in parallel with menopause, low BMI and age [4-6].

In many studies with DEXA, peak BMD was found in women at the third or fourth decade and was reported to be negative correlation with age [3-6]. Aslan et al. [1] reported that the mean BMD values of Kastamonu and women residents in all age groups were lower than those of the Lunar DXA device Turkish Society standardization and peak BMD was reached in the third decade but decreased with age. In our study, as the age group increased, BMD values were observed to decrease (Table 1). Gölge et al. [11] point out that there is a significant difference in BMD values and T scores between the two different regions of our country (Hakkari and Çanakkale) with different DXA devices.

In the KASTURKOS study conducted by Aslan et al. [4]; it is reported that Turkish women living in Kastamonu have lower BMD values than women living in other regions and OP prevalence is higher. The authors noted that less of the sunlight exposure may be an effective factor in this. In contrast, İmerci et al. [12] found that femur neck BMD values in the Muğla region were significantly lower than Erzurum region.

Even though the duration of sunshine exposure and regional differences are important risk factors for low BMD and OP, the BMD values in Erzurum region were found higher. The authors explained this situation by stating that eating habits might have been effective in the outcome.

According to MS data [10], the annual average temperature and sunshine duration in Alanya were higher than in Kastamonu. In our study, in Turkish women population living in Alanya and its surroundings, hip BMDs were higher in all age groups than Kastamonu, and there was a statistically significant difference between the two cities in the 50-59 age group, 60-69 age group and 70-79 age group (Table 3). On the other hand, there was a statistically significant difference between 70-79 and 80 age groups and over the two cities, and Alanya BMD averages were higher (Table 2). There was a statistically significant difference between the two cities in the age group of 40-49 and 50-59 years, and Kastamonu mean BMD was higher. Some of our results were compatible with the results of the study by Aslan et al. [4] while some other results of ours seemed consistent with the results of İmerci et al. [12]. Therefore, regional outcomes and differences are important factors in interpreting BMD values. These differences may be the effect of locally utilizing the sunlight, but may also be influenced by regional nutritional habits.

Limitations: The fact that the DXA devices used in our studies compared to other studies are different may have affected our findings. Also some considerations during DXA shooting can be another effective factor. On the other hand, we did not investigate the occupational groups of the participants in our study.

In fact, the limitations we have mentioned for our study are the factors that can be effective in many studies in our country. DXA used in the diagnosis and follow-up of OP is an important method in determining BMD, but a mistake may ocur during measurement and reporting [2,13-15]. On the other hand, it is stated that not only the BMD and t scores but also other factors such as bone architecture and bone turnover markers should be taken into consideration in the evaluation of the fracture of OP and in the determination of the treatment [15-17].

In addition to environmental factors such as dietary, exercise and sunlight utilization, ethnic and genetic factors, as mentioned in the literature, even occupational groups may also play a role in determining BMD [1-4,18].

On the other hand, some factors can influence the DXA measurement and therefore the BMD value. Although the difference between right or left femur BMD measurements cannot be shown, the rotational position of the hip during measurement can affect the outcome [4,19]. Moreover, the fact that the DXA instruments used in BMD measurements are different can also cause differences in BMD measurements made in different regions. In particular, it has been shown that standardization problems arise from the absence of any compromise in reference population selection among manufacturers. In addition, different areas and density detection algorithms used by manufacturers and different calibration applications make standardization efforts even more difficult [20]. Finally, although DXA has been used for many years for diagnostic and therapeutic purposes in our country, the lack of a clear standard of operator (technician) training can lead to errors in the acquisition, analysis and interpretation of the scan. It is very important to be aware of and resolve potential technical and clinical error sources [21].

Conclusion: Therefore, regional outcomes and differences are important factors in interpreting BMD values. These differences may be the effect of locally utilizing the sunlight, but may also be influenced by regional nutritional habits. In addition, the differences in DXA devices used for BMD measurement and technical standards should be taken into consideration during measurements.

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REFERENCES

1. Aslan A, Uysal E, Karakoyun Ö. Kastamonu ve yöresi Türk Toplumu Kadınlarında kemik mineral yoğunluğu değerleri. Journal of Clinical and Analytical Medicine 2013;4(3):209-12.
2. Aslan A, Mehmet Nuri Konya, Şule Yağcı, Özgür Karakoyun. Is Turkish FRAX® Model Sufficient? The Analysis of Osteoporotic Fracture Risk In Turkish Population By Using FRAX®. 2014; 20(1):21-25.
3. Baykara M. Bölgesel Kadın Populasyonunda DEXA ile saptanan kemik mineral yoğunluğu değerlerinin Türk Toplum Standartlarıyla karşılaştırılması. F.Ü. Sağlık Bil. Dergisi 2005;19(4):231-9.
4. Aslan A, Karakoyun Ö, Güler E, Aydın S, Gök MV, Akkurt S. [Evaluation of bone mineral density, osteoporosis prevalence and regional risk factors in Turkish women living in Kastamonu: KASTÜRKOS study]. Eklem Hastalık Cerrahisi. 2012;23(2):62-7.
5. Paker N, Soy D, Erbil M, Uysal E, Otlu Z. Bone Mineral Density in Healthy Turkish

Women. J Miner Stoffwechs 2005;12(3):73-6.

6. Tüzün Ş, Karacan İ , Selim N, Tüzün F. Bone Mineral Density in a Normal Turkish Female Population. Turk J Phys Med Rehab 2004;50(1):10-6.
7. İmerci A, Aydoğan NH, Aydın A. An evaluation of the 10-year major osteoporotic and hip facture risk using the FRAX score in Erzurum. J Clin Anal Med 2018;9(1): 1-4.
8. Erselcan T, Özen A, Yüksel D, Altun GD, Öztürk E, Balcı TA ve ark. Kemik Mineral Yoğunluğu Ölçümü Uygulama Kılavuzu.Turk J Nucl Med 2009;18(1):31-40.
9. Baim S, Binkley N, Bilezikian JP, Kendler DL, Hans DB, Lewiecki EM et al. Official Positions of the International Society for Clinical Densitometry and executive summary of the 2007 ISCD Position Development Conference. J Clin Densitom. 2008;11(1):75-91.
10. https://www.mgm.gov.tr/veridegerlendirme/il-ve-ilceler-istatistik.aspx-?k=A&m=KASTAMONU and https://www.mgm.gov.tr/veridegerlendirme/il-ve-ilceler-istatistik.aspx?k=A&m=ANTALYA Erişim: 21.05.2018
11. Gölge UH, Kömürcü E, Kaymaz B, Göksel F, Güzel Y, Adam G, ve ark. Türkiye'nin iki farklı bölgesindeki osteoporozun karşılaştırılması. Turk J Osteopros 2014;20:56-9.
12. İmerci A, Aydoğan NH, Yeniçeri Ö. A Comparison of Bone Mineral Density Measurements in Two Different Regions of Turkey. Turk J Osteoporos 2017;23:52-6.
13. Çetin A. Kas İskelet Sistemi ve Dual Enerji X-ışını AbsorbsiyometreTurkiye Klinikleri J PM&R-Special Topics 2016;9(3):40-8.
14. Tuna F, Yavuz S, Kabayel DD, Sarıkaya A. Effects of clinical reanalysis in dual energy X-ray absorptiometry reports. Turk J Phys Med Rehab 2017;63(3):201-206.
15. Atik SO. Is DXA the gold standard? Eklem Hastalık Cerrahisi 2011;22(2):63.
16. Aslan A, .zmeri. A, Bilal ., Doğar F, .zkaya Z and Uysal E. Comparative evaluation of clinical effectivity and side effects of two different parenteral agents used in the treatment of osteoporosis . J Rheumatol Orthop .2014; 1 :1.
17. Aslan A, Sargın S, Özmeriç A, Yağcı Ş. Treatments of patients with postmenopausal osteoporosis: A comparative study. OA Musculoskeletal Medicine 2014 Feb 01;2(1):4.
18. Yıldızgören MT, Baki AE, Ekiz T, Eroğlu PK, Tutkun E, Yılmaz H. Dört Farklı Meslek Grubunda Kemik Mineral Yoğunluğunun Değerlendirilmesi Türk Osteoporoz Dergisi 20 2015;21:19-22.
19. Özelçi R, Dilbaz B, Cırık DA, Zengin T, Demir P, Yeğenoğlu B. Post Menopozal Kadınlarda Sağ Ve Sol Femur Kemik Mineral Yoğunluğu Arasındaki Farkın Değerlendirilmesi. Jinekoloji - Obstetrik ve Neonatoloji Tıp Dergisi 2014;11(2):37–40.
20. Tunç G, Doğan SC, Hizmetli S, Hayta E. Sivas İli Kentsel Bölgede Cumhuriyet Üniversitesi Hastanesi Fiziksel Tıp ve Rehabilitasyon Polikliniğine Başvuran Sağlıklı Kadınların Kemik Mineral Yoğunluğu Referans Değerlerinin Belirlenmesi. Turk J Osteopros 2014;20:104-9.
21. Karahan AY, Kaya B, Kuran B et al. Common mistakes in the Dual-Energy X-ray Absorptiometry (DXA) in Turkey. A Retrospective Descriptive Multicenter Study. Acta Medica (Hradec Králové) 2016; 59(4):117–123.

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