

Assessment of Osteoporosis in Family Medicine Obtained by Ultrasound Densitometry

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Original paper ABSTRACT

Introduction: Osteoporosis is a disease characterized by a decrease in bone mineral density, making bones become less rigid, and therefore susceptible to fractures, either spontaneously or with force, which is lower than otherwise needed for healthy bones fractured. Nearly 10% of the world population and 30% of women after menopause, suffer from osteoporosis. Clinical assessment of osteoporosis in family medicine is key to prevention, early detection and treatment of osteoporosis. **Objective:** To investigate the possibility of early detection and diagnosis of osteoporosis by analyzing the risk factors for osteoporosis and to compare the results with the parameters obtained by ultrasound densitometry of calcaneus, and determine the relationship of calcaneus densitometry with DXA findings, as the gold standard for the diagnosis of osteoporosis. **Patients and methods:** The study included all patients of Family Medicine Kalesija Team 1, aged 50 years and over, a total of 711 patients, of whom 425 were women and 286 men. In all patients we assessed the existence of the following risk factors for osteoporosis: Constitutional:

gender, age, weight, constitution, menarche and menopause, loss of height and stooped posture; Living habits: smoking, alcohol consumption, coffee, physical activity, and medications: long-term use corticosteroids, anticonvulsants, antacids, thyroid hormones. Comorbidity: history of fractures, hyperthyroidism, COPD, Chushing's disease, diabetes. In the group of high-risk patients determined by the clinical assessment, quantitative ultrasound densitometry screening was carried out. Monitoring parameters derived with densitometry: the value of T-score, BUA (Broadband Ultrasound Attenuation), SOS (Speed of Sound), QUI (Quantitative Ultrasound Index). To confirm the diagnosis of osteoporosis, in all patients with positive findings using ultrasound densitometry (T score lower than 2.5), another densitometry was performed by standard DXA method. **Results:** The incidence of osteoporosis was 96% in women and 4% in men. Differences in prevalence between men and women are statistically significant. People with and without osteoporosis significantly differ in gender, age, weight, constitution (BMI-Body Mass Index). The parameters that distinguish those with and without osteoporosis: age, weight,

height, BMI, gender. Out of the total of 711 patients, in 11% of patients the clinical evaluation showed the existence of high risk of osteoporosis. In 9.8% patients, the values were determined by ultrasound densitometry, where T score was lower than 2.5 what induces a high risk of fractures, and for 8.8% patients the DXA confirmed the diagnosis of osteoporosis. **Conclusion:** Clinical assessment of osteoporosis in the family medicine clinic performed in timely and focused history of risk factors for osteoporosis, with additional findings from quantitative densitometry of calcaneus, was sufficient for the early detection and screening of patients with high risk for osteoporosis. With good clinical assessment of osteoporosis it will be necessary to send all patients who enter the high-risk group to undergo ultrasound densitometry of calcaneus, to make it possible to determine the risk of bone fractures and osteoporosis in time, and then refer patients for further processing and DXA measurements according to the guidelines by the WHO.

Key words: bone density, early detection, risk factors, quantitative ultrasound densitometry, osteoporosis

1. INTRODUCTION

Osteoporosis is a disease characterized by a decrease in bone mineral density, making bones become less rigid, and therefore susceptible to fractures, either spontaneously or with force, which is lower than otherwise needed for healthy bones fractured (1). Osteoporosis is a disease that has great socioeconomic significance and represents a serious public health and socioeconomic consequences. Menopause and high age are considered physiological factors that contribute to loss of bone mass. Osteoporotic fractures are an impor-

tant contributor to the problem, and they affect 50% of women and 30% of men aged over 50 (2). Risk factors for osteoporosis are numerous and in practice usually paired: genetic factors, female, deficient nutrition, especially inadequate intake of calcium and vitamin D, physical inactivity and immobilization; different hormonal and metabolic disorders; harmful habits (smoking, overuse of alcohol, coffee), long term treatment with corticosteroids, and the presence of other chronic diseases. Report of the National Osteoporosis Foundation has proposed that the fol-

lowing factors were useful in identifying individuals at risk for fracture: low body weight (<58 kg), smoking, fractures in the first cousins, and a personal history of previous fractures (3).

Densitometric method is based on the principle DXA (dual-energy X-ray absorptiometry), which is the "gold" standard in diagnosing, also quantitative ultrasound densitometric methods developed in recent years, which in previous studies showed very good correlation established between calcaneus mineral density and risk for fracture. Bone density

measurement is useful in making the diagnosis of osteoporosis and in the decisions of the initial therapy. T score lower than 2.5, especially in the presence of risk factors, indicating the need for prevention of fractures. (4) The objective of this study is to examine the possibility of early detection and diagnosis of osteoporosis by analyzing the risk factors for osteoporosis and comparing the results with the parameters obtained by ultrasound calcaneus densitometry, and determine the relationship between calcaneus densitometry and DXA findings as the gold standard for the diagnosis of osteoporosis.

2. PATIENTS AND METHODS

The study included all patients of Team 1 of Family Medicine Kalešija, aged 50 and over, a total of 711 patients, of whom 425 were women and 286 men. All patients were assessed for existence of the following risk factors for osteoporosis: Constitutional: gender, age, weight, constitution, menarche and menopause, loss of height and stooped posture; Living habits: smoking, overuse of alcohol, coffee, physical activity, and medications: long-term use corticosteroids, anticonvulsants, antacids, thyroid hormones; Comorbidity: history of fracture, hyperthyroidism, COPD, Chussing's disease, diabetes. Estimate the amount of risk was done according to the number and order of risk factors: age, gender (female), history of fractures, loss of height and stooped posture, bad habits (smoking, coffee, alcohol), low physical activity, long-term use of corticosteroids.

In all high-risk patients determined by clinical assessment, we performed quantitative ultrasound densitometry. Monitoring parameters obtained with densitometry: the value of T-score, QUI/Stiffnes and BMD. To confirm the diagnosis of osteoporosis in all patients with positive ultrasound densitometry findings (T score lower than 2.5), densitometry was performed by standard DXA.

Data on risk factors for osteoporosis were compared with the results of T scores obtained by calcaneus ultrasound densitometry and T scores

with findings done later by classical DXA densitometry.

Results are expressed as average values with standard deviation. Comparison between the groups of patients was made using the Student t-test for continuous variables and Chi square or Fisher's test for categorical variables. To calculate the correlation of variables used Pearson's correlation coefficient.

3. RESULTS

The study included a total of 711 patients, 425 women and 286 men.

Out of total of 711 patients, 11% is determined by the clinical judgment as a high risk for osteoporosis and all high risk patients were referred for ultrasound densitometry screening.

9.8% patients had the values T score lower than 2.5 determined by densitometry and a high risk of fractures, and in 8.8% patients were confirmed osteoporosis by DXA method (Table 1).

Osteoporosis diagnosed	Out of total of 711 patients	(%)
Clinical	79	11 %
Ultrasound	70	9.8%
DXA	63	8.8%

Table 1. The incidence of osteoporosis determined by diagnostic methods

Body weight is an important parameter that distinguishes people with and without osteoporosis (Figure 1).

Age is an important parameter that distinguishes people with and without osteoporosis (Figure 2).

Gender is an important parameter that distinguishes people with osteoporosis (Figure 3).

Differences between patients with and without osteoporosis showed statistically significant differences in gender,

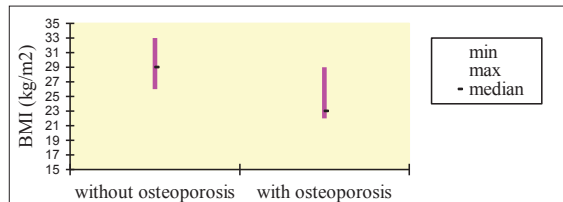


Figure 1. The difference between persons with and without osteoporosis in relation to body mass index (BMI)

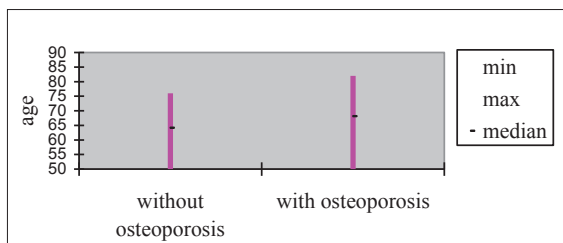


Figure 2. The difference between persons with and without osteoporosis in reference to age

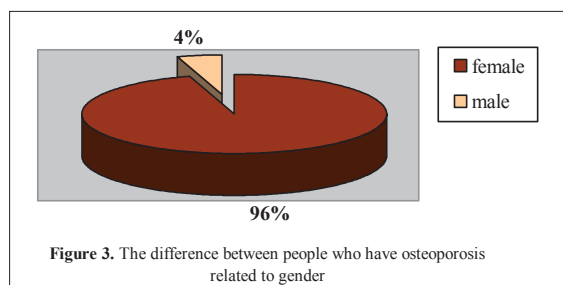


Figure 3. The difference between people who have osteoporosis related to gender

age, body weight (BW), constitution (BMI-Body Mass Index), and these are the most common parameters that distinguish persons with and without osteoporosis (Table 2).

There was a negative correlation between T score and BMI and body weight values (Table 3).

There is a positive correlation between T score and age.

4. DISCUSSION

Osteoporosis is one of the major public health problems in developed countries. The population is becoming older, thanks to advances in medicine and technology, which also allows early detection of osteo-

	Mean	Median	Min	Max	Lower	Upper
Age	70	69	50	84	68	72
BW (kg)	59	63	55	83	61	65
BMI (kg/m ²)	22	22,5	21	29	23	24

Table 2. Description of the most common parameters that define osteoporosis

	BM (kg)	BMI (kg/m ²)	Age
T score	-0.31	-0.83	0.08

Table 3. Correlation between T scores and parameters of risk factors for osteoporosis

porosis. In this study, osteoporosis assessment was made on the basis of clinical suspicion and the selection and referral of high-risk patients to ultrasound densitometry and conventional DXA. According to the results of calcaneus ultrasound densitometry, the ECUM Studies (Epidemiology of Calcaneus Ultrasound in Males) conducted in Croatia, 16.2% of men and 28.2% of women aged over 50 have osteoporosis (5). Our results are different, but the goal of this research was different as well. Recommendation of the Croatian Society for Osteoporosis is that all patients who enter the risk group should be referred to the ultrasound calcaneus densitometry, in order to determine the risk of bone fractures and osteoporosis in time, and to refer patients for further processing and DXA measurements according to guidelines from the WHO. Some studies have shown that patients treated with glucocorticoids for long time, have reduced bone mineral density and increased risk of fractures, especially in postmenopausal women (6) what was confirmed by our research too.

Our result shows that it is possible to early identify all patients who enter the high-risk group for osteoporosis in family medicine by good assessment of risk factors, then promptly

refer them to ultrasound densitometry screening, which is less precise, but it is cheaper and faster, and has proven significance in the timely diagnosis of osteoporosis, and it has confirmed high correlation between calcaneus BMD measured by ultrasound densitometry and conventional DXA (7).

5. CONCLUSION

Good clinical evaluation for patients of high risk for osteoporosis in family medicine, early referral of high-risk patients to ultrasound densitometry, are sufficient for the early detection of patients with low bone mineral density and increased risk of fracture. Clinical assessment and identification of high-risk patients for osteoporosis in family medicine, and timely referral to quantitative ultrasound densitometry screening, which is cheap and fast, are a valuable tools for the prevention, early diagnosis and DXA measurements according to guidelines of the WHO.

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