Comparative study of the results of heel ultrasound screening and DXA findings (lumbar spine and left hip) of postmenopausal women

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Abstract

Introduction: Osteoporosis is a silent and invisible disease of bone, great presence and is considered to suffer from osteoporosis at least 200 million women worldwide. The goal of this paper is to show average age of postmenopausal respondents, values of anthropometric parameters (weight, height, BMI), anamnestic data on clinical symptoms, fractures of women in menopause, analysis of heel ultrasound screening results, analysis of lumbar spine DXA results, analysis of left hip DXA results.

Methods: In retrospective study 61 respondents were involved, 33 to 79 years old, treated in u Center for Physical Medicine and Acupuncture "AD" in Sarajevo during the period from 01.01.2008 till 31.12.2009. All date are shown numerically and percentage account with calculation of mean value, expressed in the form of tables and charts.

Results: Finding of heel ultrosound screening compared to T values of postmenopausal respondents indicates on osteoporosis in case of 17 (27,87%), in case of 44 (72,13%) respondents osteopenia, while normal values were not found. T value with lumbar spine DXA method in postmenopausal female respondents correspond to 43 (70,5%) respondents, in 15 respondents (24,6%) finding corresponded to osteopenia, while 3 respondents (4,9%) had physiological finding. Left hip DXA finding shows 36 (59%) respondents corresponded osteoporosis, 19 (31,2%) respondents corresponded osteopenia, while physiological finding was found in 6 respondents (9,8%). T value of lumbar spine DXA finding was - 2,71 ± 1,16; DXA finding of left hip -2,35 ± 1,36; heel ultrasound screening -2,19 ± 0,54.

Conclusion: Research results indicate that DXA finding in relation to the heel ultrasound screening confirms gold standard in diagnosing osteoporosis.

Keywords: osteoporosis, heel ultrasound screening, DXA finding

Introduction

Osteoporosis is a disease characterized by a decrease in bone mass and disturbed micro architectures of bone beds, the resulting bone fragility and an increase risk of fractures (1). Osteoporosis is a common disease characterized by reduction of bone mass, which can harm integrity of its structure and favor the fracture, although initially without symptoms, micro fractures and distortion of the skeleton eventually cause pain and disability (2). However, "too little" of the bones which remains with normal structure (for example, has a normal ratio of protein matrix and minerals). This condition can occur under different clinical circumstances, but it is mostly related to aging, especially with menopause. Late menarche may be associated with low bone mass maximum. Late menarche may be associated with low bone mass maximum. Early menopause, especially if the surgically induced before the 45th year of life is a strong determiner of bone density and increased risk of fracture (3). The frequent occurrence of osteoporosis in postmenopausal women explains the ratio of women toward men from 2:1 to 3:1.

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About 25% of women get fractures around age 65 and 50% around the age of 90 years of life (2). The most common fractures are compression fractures of the spine, fracture of femoral neck and distal forearm. Hip fracture in old age is accompanied by increased mortality and half of survivors cannot move without assistance, which represents a growing public health problem in the developed world (4). An important factor for the occurrence of fractures is the tendency of elderly falls and the result is poor coordination of movements and slow reflexes (1). Identification of women with reduced bone mineral density is an important strategy to reduce incidence of osteoporosis fractures. The definition of risk profile based on clinical assessment is an important step in the detection of women at increased risk of osteoporosis. Optimal clinical assessment of the risk of osteoporosis in postmenopausal women to determine measures for the prevention, diagnosis and treatment of disease to avoid complications associated with significant morbidity, mortality, material costs of treatment and rehabilitation as well as lowering the quality of life. The diagnostic evaluation of patients related to osteoporosis, must begin a detailed history, clinical examination, inspection of all diseases and conditions that may be a risk factor based on which doubt arises and conduct other diagnostic procedures. The diagnostic procedures include: physical examination, laboratory test, skiagram of thoracic and lumbar spine, ultrasound, DXA, bone biopsy, bone scintigraphy (5). Ultrasonic measurement of the bone mineral density agrees with the results of DXA, there is no X-ray, but it is not suitable for monitoring treatment effects in clinical work with patients because of the oscillation results, and this is a reason while is more used in epidemiological research. The gold standard for diagnosing osteoporosis is a densitometry. Densitometry as a diagnostic tool due to the significant sensitivity and specificity for predicting the risk of bon fractures. The goals of research include analysis of following parameters: average age of postmenopausal respondents, values of anthropometric parameters (weight, height, BMI), anamnestic data on clinical symptoms, fractures of women in menopause, analysis of heel ultrasound screening results, analysis of lumbar spine DXA results, analysis of left hip DXA results.

Methods

Retrospective study was done in sample of 61 respondents, which involved target analysis in the Center for Physical Medicine and Acupuncture "AD". All date are shown numerically and percentage account with calculation of mean value, expressed in the form of tables and charts.

Results

TABLE 1. The average age of postmenopausal women

Age	Number of years
Minimum	39.00
Maximum	79.00
Average	58.90
Standard deviation	± 7.97

TABLE 2. Overview of respondents compared to the average values of anthropometric parameters and BMI

Anthropometric parameters	Arithmetic mean	Standard deviation (SD)
Height (m)	1.64	± 0.06
Weight (kg)	70	± 11.20
BMI	25.70	± 3.50

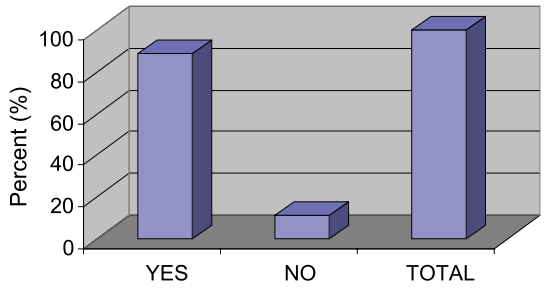

FIGURE 1. The presence of clinical symptoms of patients

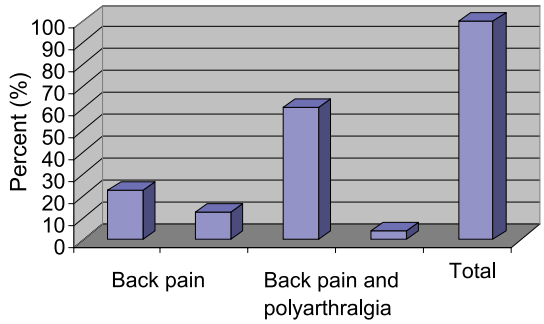

FIGURE 2. The main clinical symptoms in patients

TABLE 3. Localization of the fracture in relation to the average age of postmenopausal women

Fracture	Average age	Standard deviation
Forearm	62.00	± 7.56
Spine	65.75	± 11.38
Hip	59.00	± 8.72
Other	56.71	± 3.68

TABLE 4. Analysis of results of heel ultrasound screening compared to the T values gained of postmenopausal women (n = 61)

Heel ultrasound screening	Number	Percent (%)
Osteoporosis	17	27.87
Osteopenia	44	72.13
Physiological finding	0	0.00
Total	61	100.00

TABLE 5. Analysis of results DXA lumbar spine compared to the T values gained of postmenopausal women (n=61)

Duoenergetic absorptiometry X-ray (DXA) of lumbar spine	Number	Percent (%)
Osteoporosis	43	70.5
Osteopenia	15	24.6
Physiological finding	3	4.9
Total	61	100

TABLE 6. Analysis of results DXA of left hip compared to the T value gained of postmenopausal women

Duoenergetic absorptiometry X-ray (DXA) of left hip	Number	Percent (%)
Osteoporosis	36	59.0
Osteopenia	19	31.2
Physiological finding	6	9.8
Total	61	100.0

TABLE 7. Overview of performed diagnostic procedures of all patients (n = 61) compared to the average T value

Diagnostic method	Average T value (T- score)	Standard deviation (SD)
heel ultrasound screening	-2.30	± 0.55
DXA- lumbar spine	-2.81	± 1.27
DXA- left hip	-2.49	± 1.42

Discussion

In this study 61 respondents were involved, average age of respondents was 58.9 ± 7.97, while the youngest respondent was 39 years old and the oldest 79 years old. Results of tests that are conducted Hadziavdic with associates in the study of 836 patients confirmed the average age of 52.6 years (6). The average values of anthropometric parameters were: 1.64 ± 0.06 m (body height), 70 ± 11.20 kg (body weight). BMI was 25.70 ± 3.50. This corresponds to the literature data in which women with osteoporosis usually have normal or low BMI and patients with higher BMI values, the high BMI preventive action, in the sense that it reduces the risk of fractures- especially hip, while in the work of Milenkovic D., and colleagues report that of 186 patients were older age, lower body height and weight and had lower BMI (7). In paper work of Kapetanovic A. and associates on 60 patients found a lower BMI at 6.66% female respondents (8). In terms of clinical symptoms in patients, 52 patients (85.25%) had significant clinical symptoms, while 9 patients (14.75%) were asymptomatic. The main clinical symptoms were back pain and polyarthralgia (joint), which were demonstrated in 43 patients (70.50%). The literature states that one of the leading symptoms of osteoporosis, back pain due to vertebral compressive fractures (1), which was confirmed here. Compared to the average age of the patients who had fractures, spine fractures in the average age of patients was 65.75 ± 11.38 years, with the forearm fracture 62.00 ± 7.56 years and the average age of hip fracture was 59.00 ± 8.72 years. Here, some discrepancy occurs with respect to the information specified in the literature according to which hip fractures usually aged about 70 years old. The study showed concordance with the literature data related to vertebral fractures because this fractures here also occurred in most of the cases in the sixties years of life. Kern D. states in his study of 50 patients that previously had no fractures in 84% of patients (9). In his paper work Muftic M. states that the analysis of 100 patients with osteoporosis, 28 (28%) patients had a fracture. Most of the interviewees had a fracture of the forearm 18 (64%), followed by patients with fractures of the spine 7 (25%) and lowest number of patients 2 (10.8%) with hip fracture (10). Interpretation of the results obtained T value of

the screening method with the heel in postmenopausal women, came to the conclusion that the US screening method referred to the osteoporosis screening in 17 patients (27.87%), in 44 (72.13%) patients the findings were in favor of osteopenia, while a physiological finding was present even in one patient. Interpretation of results obtained using DXA T score of lumbar spine in postmenopausal women, in 43 patients (70.5%) the findings were in favor of osteoporosis in 15 patients or 24.6% to an osteopenia, and physiological findings have had 3 patients or 4.9%. The literature states that DXA is the gold standard for diagnosing osteoporosis and noted the sensitivity and specificity of this method for predicting the risk of bone fractures (11). In 36 (59%) postmenopausal women left hip DXA finding corresponds to osteoporosis, in 19 (31.2%) corresponds to the findings of osteopenia, and 6 (9.8%) patients the finding was physiologically. Diagnostic procedures were performed in all patients were: heel ultrasound screening, DXA of lumbar spine, DXA of left hip. The mean T score at lumbar spine DXA was -2.81 ± 1.27. The mean T score for DXA left hip was -2.49 ± 1.42, while the average T value of heel ultrasound screening of the fifth sample of 61 postmenopausal patients was -2.30 ± 0.55.

Conclusion

Average age of respondents was 58.9 ± 7.97, while the youngest respondent was 39 years old and the oldest 79 years old. Average value of Body Mass Index (BMI) of respondents total number was 25.70 ± 3.50 SD. Values of BMI have great importance in development of disease. Low BMI values are very important predisposing factor for the development of osteoporosis and fractures as a complication of this disease. On the other hand, higher BMI values have a protective effect, preventing the occurrence of the fracture. The most common clinical symptoms were back pain and polyarthralgia. 52 (85.25%) analyzed patients has had clinical symptoms, while only 9 female respondents (14.75%) had no symptoms. The average age of respondents who had forearm fractures was 62.00 ± 7.56 years, in case of respondents who had spine fractures 65.75 ± 11.38 years, while with hip fractures average age of female respondents was 59.00 ± 8.72 years. There is a certain discrepancy with the literature data mentioned in relation to the age when most fractures occur each. Heel ultrasound screening suggested on osteoporosis at 27.87% of postmenopausal respondents, while on osteopenia in 72.13% of respondents. Physiological finding was not present. In case of 70.5% female respondents in menopause with lumbar spine DXA osteoporosis was found, while 24.6% of postmenopausal respondents had osteopenia and physiological finding in case of 4.9% respondents. With DXA finding of left hip osteoporosis was found in case of 59% respondents, osteopenia in 31.2% postmenopausal respondents, while physiological finding in case of 9.8% respondents. Average T value of DXA lumbar spine was -2.81 ± 1.27. Average T value of left hip DXA was -2.49 ± 1.42, while average T value heel US screening in sample of 61 postmenopausal women was -2.30 ± 0.55.

Competing interest

The authors declare that they have no financial or personal relationship with people or organizations that could influence this work inappropriately.

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