

DEXA OSTEODENSITOMETRIC STUDY ON A GROUP OF POSTMENOPAUSAL WOMEN

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ABSTRACT. The aim of this study is to analyse the osteodensitometric values – obtained using a DEXA device – on a group of postmenopausal women. The osteodensitometric data thus obtained are represented as T-score. The results obtained are shown in Tables 1-3 and in diagrams of Fig. 1-5.

After their analysis, the following conclusions were drawn:

- a) Practically, it is impossible to establish a representative group in terms of osteopenia/osteoporosis for a local community, because the DEXA tests are not compulsory for the whole population.
- b) the data obtained show that 55,55% correspond to some patients diagnosed with osteopenia, and 21,14% with osteoporosis;
- c) in terms of osteoporosis, the most affected bone segments are the femoral neck (49,18 %) and vertebrae (46,51 %);
- d) also, the results obtained show an inversely proportional report of osteopenia/osteoporosis with the patients' BMI;
- e) the patients diagnosed with osteopenia/osteoporosis suffer from various diseases (risk factors), but especially of thyroid diseases, diabetes mellitus and neoplasia;
- f) the fact that 55,60% of the DEXA investigated subjects and diagnosed with osteoporosis have declared family history and / or personal medical history, leads to the supposition that a genetic predisposition can contribute to the onset of osteoporosis.

KEYWORDS: Postmenopause, osteodensitometry, osteopenia, osteoporosis, T factor

INTRODUCTION

Osteoporosis (OP) is a disease essentially characterised by the reduction of the bone mass and deterioration of the bone tissue micro-architecture, which, most often, causes a significant fracture risk (**Adler at al, 2013**). Simultaneously, the quality of life of patients suffers an obvious progressive degradation; even the usual activities become difficult and painful in time. Along with many other cases of the OP installation, one of the most common is the long-term treatment with gluco-corticoids (**Buehring 2013**). The increase of life expectation, but accompanied by the reduction of the physical activities of older people, makes the OP one of the most common illnesses today.

The aim of this study is to analyse the osteodensitometric values obtained using a DEXA device on a group of postmenopausal women, and its **objectives** are the study: 1) of osteopenia/osteoporosis in some parts of the skeleton in postmenopausal women; 2) of the prevalence of osteopenia/osteoporosis in relation to BMI;

3) of the incidence of several diseases in patients diagnosed with osteopenia/osteoporosis.

MATERIALS AND METHOD

The study group. The study group includes only postmenopausal women (the younger persons were not included, because it is rarely recommended for them to perform DEXA osteodensitometry), who performed in 2014 this test at DEXA Euromedic I.C.M. Arad Laboratory.

The study methodology. In this study, I started from the idea that the best diagnosis method for OP is measuring the BMD using a DEXA device (DXA Bone Densitometry Report), which provides data about the bone densitometry in human subjects.

After measuring the BMD, the patient is handed a sheet, which presents briefly the results of the **DEXA** osteodensitometric evaluation. Punctually, the sheet presents, in fact, two parts: the data resulted from the application of a questioner with the data of the patient and the data, in synthesis, of the osteodensitometric

evaluation of the subject. The *questionnaire* is filled in before the DEXA evaluation. It includes: heredocolateral (family) history, pathological personal history, treatments taken, data specific to women. The *summarised presentation of the evaluation results* indicates: patient identification data, results of the osteodensitometry evaluation (T-score, BMD, changes versus previous, significant changes), conclusions and recommendations, according to the WHO criteria for diagnosing the osteoporosis.

The group of women was divided according to BMI and the T-score values.

The body mass index (BMI). Depending on BMI, the patients are classified into groups regarding their nutritional state (Table 1).

Table No. 1. Classification of patients according to BMI into various groups of nutritional states (Wardlaw, 1996)

Values of BMI	Nutritional state of patient
- 18,50 – 24,99	Underweight
- 25,00 – 29,99	Normal weight
- 30,00 – 34,99	1 st degree obesity
- 35,00 – 39,99	2 nd degree obesity
- > 40,00	3 rd degree obesity

We note that a low BMI is considered a significant risk factor of osteoporosis, while a higher BMI, (26-28 kg/m²) allegedly provides protection against osteoporosis. Indeed, Wardlaw (1996) considers that the lower values, (of 22-24 kg/m²) obviously increase the OP risk. Other authors (Marcus et al 2008, Ribot et al, 1987, Tremollieres at al, 1993) considers that a BMI value of about 30 kg/m² corresponds to a BMD increase, of 4-8% in the spine, by 8-9% in the femoral neck and by 25% in the radius compared to the normal weight subjects. Moreover, the high BMI is indeed a serious protector against the rapid loss of bone, but only in the first years of menopause, because each extra unit in this report 'saves' 5% BMS in vertebrae and distal radius, says Bolosiu (2008).

The T-score. According to the WHO criteria, the osteodensitometric diagnosis for women is established as T-score, obtained after the DEXA osteodensitometry evaluation, like Table No. 2.

Table No. 2. Establishing the osteodensitometric diagnosis in women, according to the T-score obtained

T-score value	Osteodensitometric diagnosis
- Higher than or equal to 1 SD	Normal
- Between 1 and 2,5 SD	Osteopenia
- Lower than or equal to 2,5 SD	Osteoporosis

The average bone density (BDM). It is expressed in grams/cm². The osteodensitometric diagnosis is also established, depending on BDM.

Changes vs. previous. The changes occurred since the last examination are detected, it the subject has been subjected to this DEXA test.

Significant changes. If the changes are significant regarding the evolution of bone density, the osteodensitometric diagnosis is established based on them.

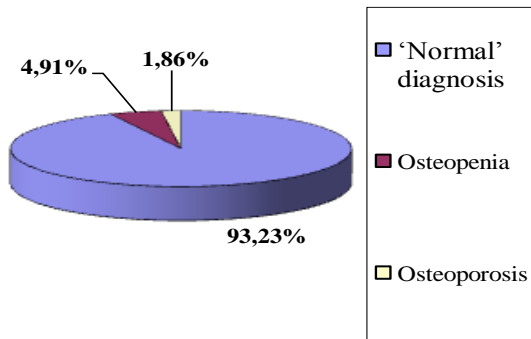
RESULTS AND DISCUSSIONS

After the osteodensitometric diagnosing of those 2214 patients, the following have resulted: 1236 cases diagnosed with osteopenia/osteoporosis and 978 diagnosed as 'normal'. But the last data cannot be interpreted in statistical terms, because this diagnosis shows nothing but the cases suspected to have problems about osteodensity, but not confirmed. As such, this diagnosis category will not be taken under analysis and interpreted statistically. But it can have significance in relation to the population of the area which influent towards this DEXA centre. Specifically, the female population in the influent area (Arad area) aged over 60 years is estimated at 25.190 people, out of 300.000 people, respectively 153.000 women.

(1.) The incidence of osteopenia and osteoporosis in the group of postmenopausal women

The analysis of the data from DEXA Laboratory Arad, on 2014, on the osteodensitometric evaluation shows the following situation: osteopenia – 1230 persons (4,91 %), osteoporosis – 468 persons (1,86 %), and for the diagnosis of 'normal' 23486 persons (93,23 %). The latest data are based on the civil census in the category of people of over 60 years, female. Of course, these data (Fig. 1) are only indicative, because among the population who did not come to this laboratory, there are other persons who would probably receive, in an investigation, the diagnosis of osteopenia/osteoporosis. Therefore, at least 6,77% (if not even more) of the local population is affected by osteopenia, respectively osteoporosis.

Fig. 1. The incidence of osteopenia/osteoporosis in Arad based on the osteodensitometric evaluation of postmenopausal women submitted to the DEXA Centre Arad



(2.) The incidence of osteopenia in the femoral neck and spine

Of all cases of osteopenia identified in the group studied, the most cases occur in the femoral neck (605 cases – 49,18%), followed by spine (572 cases – 46,51

%). A total of 53 cases (4,31 %) of osteopenia have been identified in other bone sections (Fig. 2).

Therefore, the osteopenia occurs with priority in the femoral neck and spine.

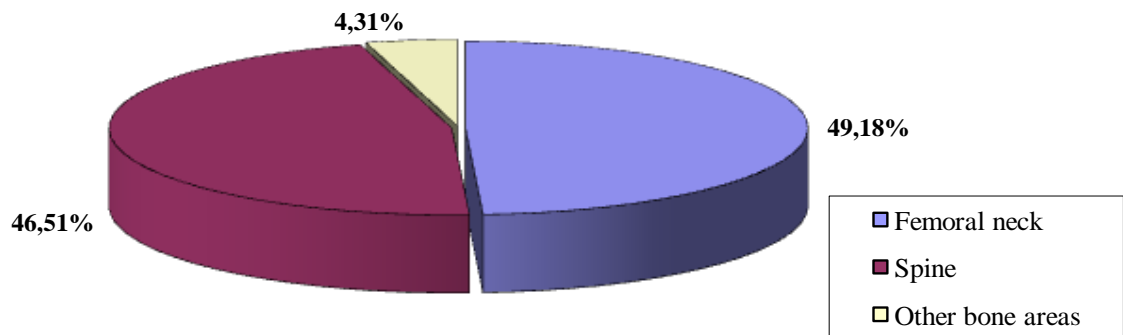


Fig. 2. The incidence of osteopenia in some bone segments of the postmenopausal women in the group investigated

(3.) The incidence of osteoporosis in the femoral neck and spine

The most cases of osteoporosis in postmenopausal women in the group studied were identified, like in the case of osteopenia, in the femoral neck (95 cases – 20,34%) and spine (83 cases – 17,56%), the difference (290 cases – 61,94%), is as shown in Fig. 3.

The situation is similar to that already described for osteopenia. The osteoporotic phenomenon seem to be generalised and almost equalized to the level of all bones of the body, which means that its evolution speed is different, from bone to bone and from one section to another.

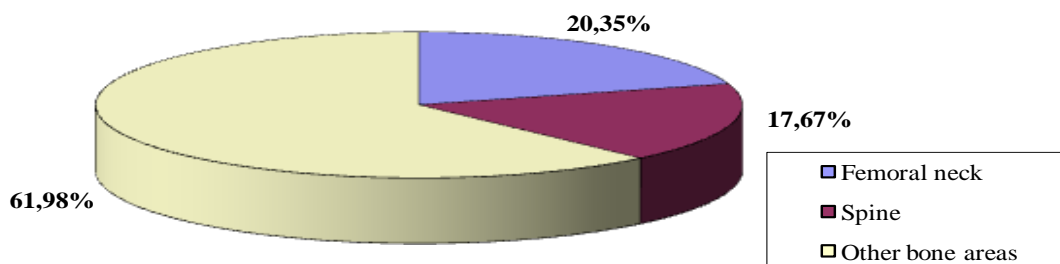


Fig. 3. The incidence of osteoporosis in some bone segments of the group study of postmenopausal women

(4.) The prevalence of osteopenia/osteoporosis in relation to the body mass index (BMI)

Table No. 3 and Fig. No. 4 show some changes of osteopenia/osteoporosis prevalence in relation to BMI.

Table No. 3. Prevalence of osteopenia/osteoporosis correlated with BMI in the group of postmenopausal women investigated

BMI	18,5-24,9	25,0-29,9	30,0-34,9	35,0-39,9	>40
Of osteopenia No.	878	662	552	538	615
%	71,42	53,84	44,89	43,75	50,00
Of osteoporosis No.	67	130	105	-	176
%	14,28	27,69	22,44	-	37,50

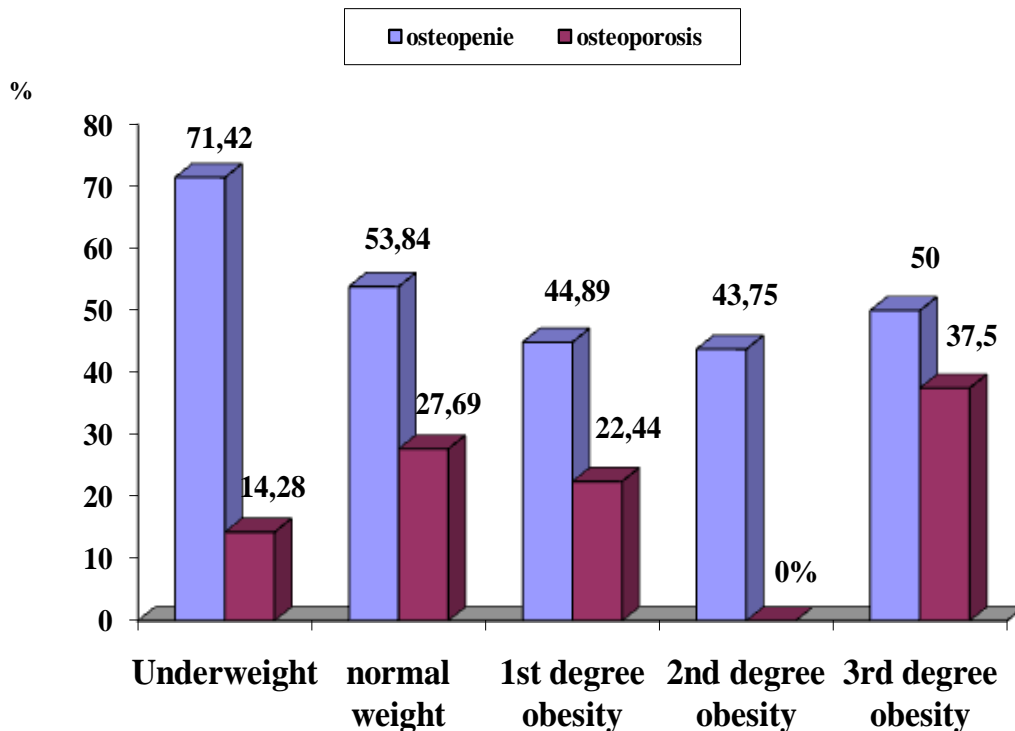


Fig. 4. Changes in the osteopenic/osteoporotic prevalence correlated with BMI in the group of postmenopausal women investigated

The analysis of the above table and graph show, generally, an inversely proportional report between the prevalence of osteopenia/osteoporosis and BMI. There was a decrease in the prevalence of osteopenia and osteoporosis along with the increase of BMI. BMI between 25 and 29,9 is considered overweight, normal weight between 18,5-24,9 and underweight below 18,5.

(5.) The incidence of some diseases in the group of women diagnosed with osteopenia or osteoporosis

This incidence is apparent from the analysis of

the answers to section 3 of DEXA osteodensitometric questionnaire on the personal pathological history. After the summation of data from the patients' records, it results that a total of 154 patients (9,09%) suffers from thyroid disorders, 127 patients (7,48%) from diabetes mellitus, 109 patients (6,41%), from neoplasia, and 1308 patients (77,02%) from other diseases. The situation of the incidence of some diseases in the group of women diagnosed with osteopenia/osteoporosis is shown in Fig. 5.

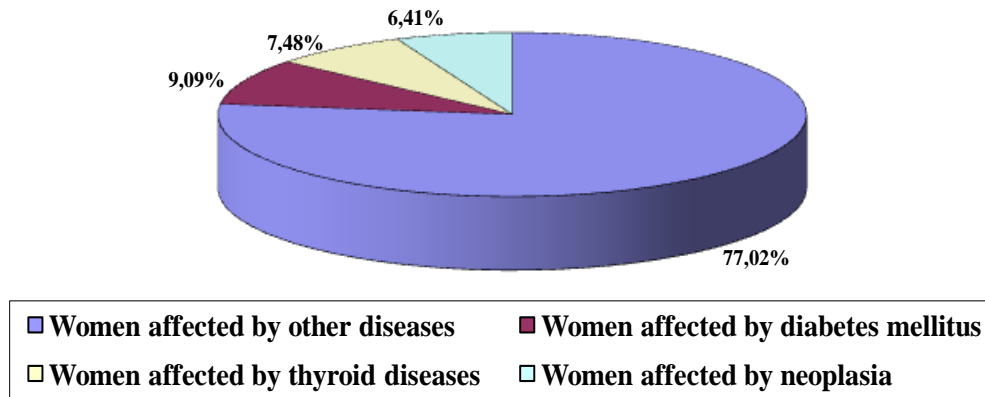


Fig. 5. The incidence of some diseases in the group of postmenopausal women investigated

The situation presented shows that in the group of postmenopausal women diagnosed with osteopenia/osteoporosis, the highest incidence is represented by the thyroid disorders (9,09%), diabetes mellitus (7,48%) and neoplasia (6,41), which also are significant risk factors in the installation of osteopenia phenomenon and in the development of osteoporosis in women.

(6.) The genetic determinism in producing osteoporosis in the group of women analysed

The situation was determined based on the patients' answer to DEXA osteodensitometric

questionnaire, section 2 – family history (AHC – persons in the family with osteoporosis, fracture after 50 years, kyphosis, etc.) and section 3 –personal pathological history (PPH). Of all the patients investigated, found with osteopenia/osteoporosis, 527 (31,01%) had a family history, and 418 (24,59%) had personal pathological history; only a total of 753 (44,40%) of patients declared that they do not have FH, and nor PPH (Fig. 6)

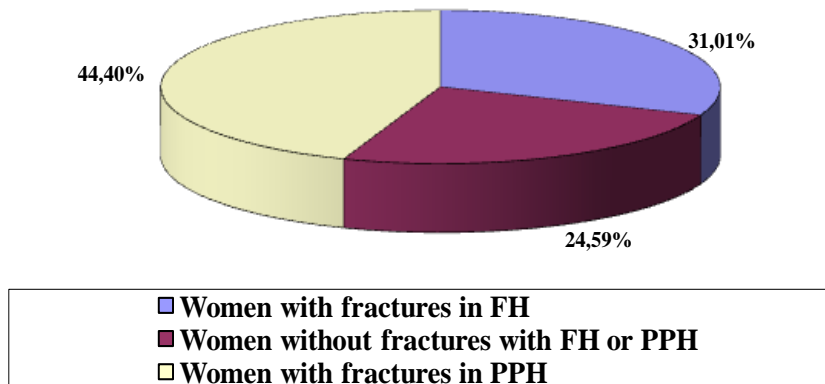


Fig. 6. The genetic determinism in producing osteoporosis in the group of postmenopausal women analysed

CONCLUSIONS

After conducting the study, the following conclusions were drawn:

1. Practically, it is impossible to establish a representative group of persons in terms of osteopenia and osteoporosis in a local community, because the persons with 'normal' osteodensitometric diagnosis are not known (not all population in a community that is not sent to DEXA is healthy). The group of persons DEXA investigated is composed only of the persons suspected by the doctor and only those that have been to the doctor. In general, the doctors are sending to DEXA a very small number of people compared to the number of those who have real osteodensitometry issues.

2. Because the young people are not frequently suspected of osteopenia/osteoporosis, this category is missing from the group investigated by us. Their presence would have allowed us to have a lot more representative group and to make more suggestive comparisons regarding the evolution of the diseases from childhood to old age.

3. In these circumstances, the establishment of the group of population with normal bone density is made only with certain approximations, of which cause the prevalence of osteopenia/osteoporosis is represented only by indicative values, as in the case of our evaluations.

4. Along with DEXA evaluations, the preparation of the data questionnaire on the history is of great importance for establishing the risk factors involved in osteopenia/osteoporosis, especially in terms of their genetic component.

5. The incidence in the population of postmenopausal women in Arad area is at least 4,91% for osteopenia and 1,86% for osteoporosis. In reality, their incidence is probably much higher, which shows that the bone thinning comprises an important segment of senior population, especially of women.

6. Of the subjects evaluated by DEXA, osteopenia primarily affects the femoral neck (49,18%) and vertebrae (46,51%) and less the other bone segments of the skeleton.

7. Analysing the DEXA values in the subjects of the group investigated by us, it also shows that the osteoporotic phenomenon has the tendency to generalize to all bone segments of the body as getting older, but with a slight intensification of the process in the femoral neck and vertebrae.

8. In the entire group investigated, osteopenia/osteoporosis is in an inversely proportional report with the patients' BMI. However, the incidence of osteopenia/osteoporosis seems lower in normal weight subjects and 1st degree obese subjects, which is in agreement with the idea that a slight obesity in postmenopausal women, in an initial phase, is even beneficial.

9. The patients in the group investigated with osteopenia/osteoporosis suffer from various diseases, which represent risk factors, especially the thyroid diseases, diabetes mellitus and neoplasia are standing

out, which means that at the same time with the diagnosis of this diseases, the patients should be mandatory investigated also in terms of osteodensitometry.

10. Along with DEXA evaluation, we must be sure that the relevant questionnaire was filled in more accurately, (probably by a qualified personnel), because, especially the FM and PPH can provide valuable information about the genetic determinism in producing osteoporosis. The analysis of the data provided by the patients in the group investigated shows that more than half (55,60%) of the cases of osteoporosis are determined by FH and PPH.

The data obtained by us at DEXA Centre are consistent with those drawn up from our previous statistical and clinical study of the fragility fractures in the postmenopausal women segment.

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