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Morphological Features Of The Proximal Hip In Women Of Different Age Groups According To The X-ray Population Research.

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Summary*: The data screening population study of women using X-ray absorptiometry . The analysis of the dynamics of parameters in different age groups . The dynamics of bone mineral density in different areas of proximal femur, as well as in the femoral neck were compared. Radiation monitoring data in the group over 50 years reflect the demineralization of bone matrix during perimenopause varying severity . The neck of the femur has shown significantly lower optical density compared to total hip region in all age groups studied .*
Abstract*: the woman screening population analysis by dual energy x -ray absorptiometry had been researched. The dynamic analysis in different age groups had been made.*
Key words*: DEXA, age groups, absorptiometry,osteopenia screening, proximal femur, hip region.*

I. Relevance:

Demographic processes in modern society lead to an increase of degenerative diseases of the Musculo-Skeletal System .

Metabolic bone disease and in particular their complications are the actual social problem in all developed countries.

In many countries, there is no official approval , no national recommendation at the state level for the diagnosis and treatment of osteoporosis . In between 21 countries, represented in the report on the audit results in Eastern Europe and Central Asia in 2010 , only in the Republic of Belarus and Bulgaria, osteoporosis recognized by the State Government as an important public health problem. According to epidemiological estimation, based on data for 2010, in the Russian Federation osteoporosis can be diagnosed in 14 million people, accounting for about 10 % of the population . Osteopenia can be found in 20 million peoples. Thus , 34 million peoples have a high risk of fracture. [1] .

Osteoporosis , like Arterial hypertension, also coupled with the defeat of target organs . Among a wide range of low-energy fractures of the greatest social relevance, fractures of the proximal hip, are associated with high mortality , require significant resources of the health system and even using the spectrum of modern surgical techniques and rehabilitation often do not allow to restore the previous level of functional activity of such patients.[2]

Diagnosis of osteoporosis is a significant problem, since this pathology is subclinical , which often is not the reason for the application of instrumental methods of diagnosis. Evaluation of the results of X-ray absorptiometry is associated with a significant probability of subjective interpretation of the results , due to the lack of regional standards . This circumstance gave rise to the present study.[3]

Objective: to study the data screening population survey of bone mineral density in women of different age groups by X-ray absorptiometry in the proximal hip .

II. Materials and Methods:

The results of screening - the first survey 4128 women aged 16 to 89 years , mean age was 55.2 years . The distribution of patients over the age is shown in Fig . 1. Diagnostic procedures were performed on dual-energy X-ray absorptiometry «Hologic discovery w» with the patient in a standard position, laying on back.

Those Were subjected to quantitative analysis of parameters of bone mineral density (BMD) in the femoral neck , as well as in the **<<total hip>> region**.

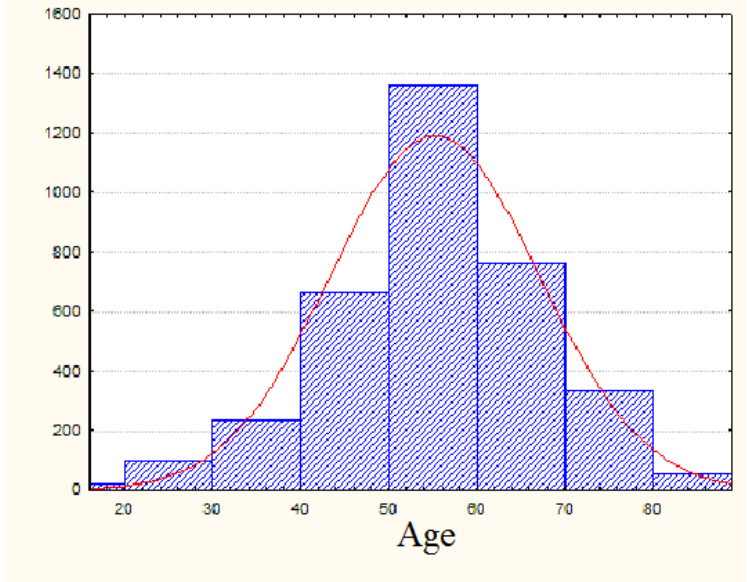

Fig.1. **Distribution of the surveyed age**

Processing performed using the methods of descriptive statistics . Analysis of the average population values of the parameters studied was made by approximating the data with the calculation of the equation and the construction of a quadratic regression line by least squares . When comparing groups of data, used methods are not parametric statistics , in particular
U - criterion Mann - Whitney. Differences were considered significant at a significance level of $p < 0,05$

Fig . 2 shows the X-ray absorptiometry parameters of proximal left hip,
Femoral neck T – score - 4,4 SD, Total hip T – score - 3.6 SD.

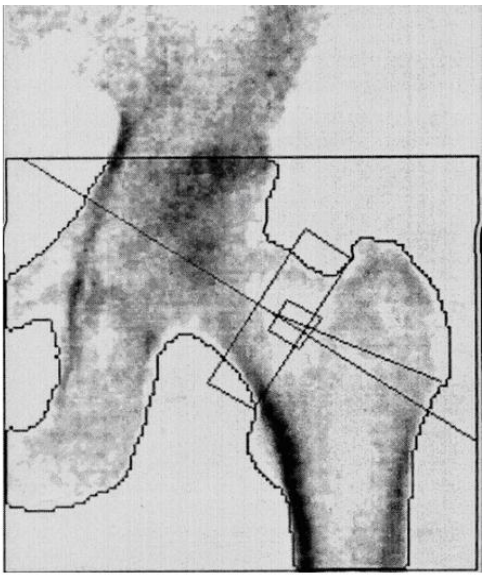

Fig .2. X-ray absorptiometry parameters of proximal left hip

III. Results Of The Study:

An increase in median parameters BMD at the femoral neck in the surveyed age group from 16 to 30 years , with a range from 0.5 to 1.2 g/cm2. Stabilized parameter of mineral density was found in the age range 30 - 40 years, with the average value of 0.82 g/cm2 with fluctuations in the range of 0.6 to 1.3 g/cm2. In patients aged over 40 years have seen a decline in median BMD from 0.8 to 0.6 g/cm2 , with 90 % of the values were located in the range of 1.2 to 1.4 g/cm2 (Fig. 3) .

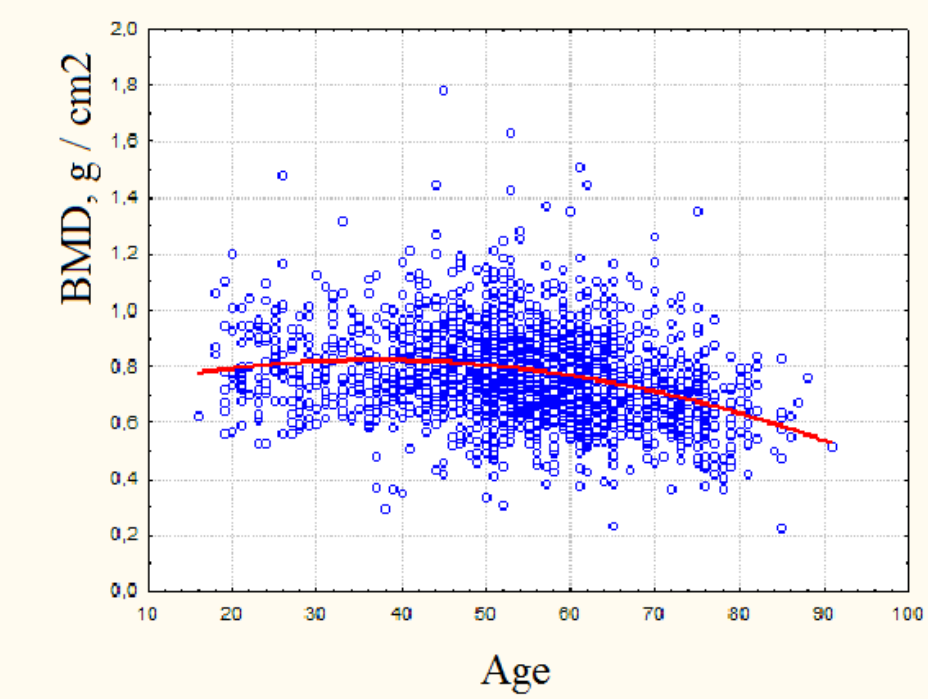

Figure 3. The Femoral Neck BMD

Comparison of the quadratic regression lines based on the parameters of BMD «femoral neck» and «total hip» revealed significantly lower rates in all age groups in the femoral neck (Fig. 4)

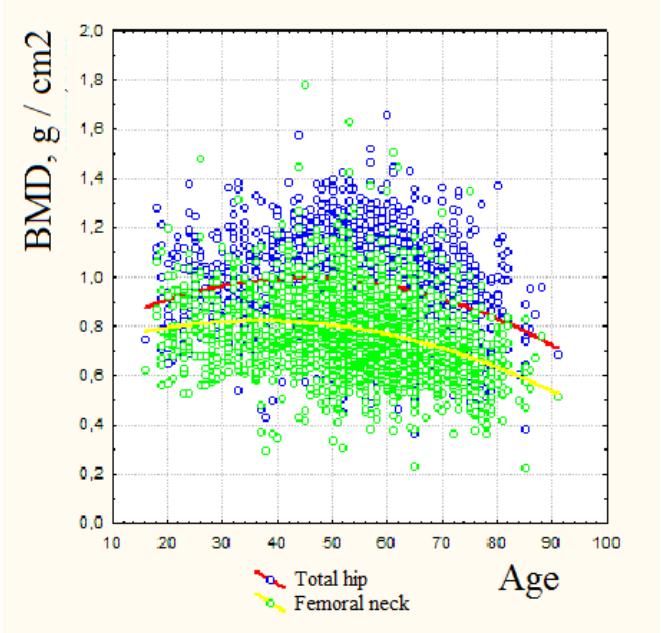

Figure 4. Quadratic Regression of BMD Line Parameters.
[Green :in Femoral Neck, Blue:in Total Hip]

Changes in BMD «total hip» characterized by increasing parameters from 16 to 30 years , but the maximum values were observed in the age groups from 16 to 40 years , average value of 1.0 g/cm2 , with 90 % values were located in the range of 0.7 - 1.2 g/cm2. At the age of 50 years, average BMD was similar , but the range of variation was 0.45 - 1.4 g/cm2 (Fig. 5) .

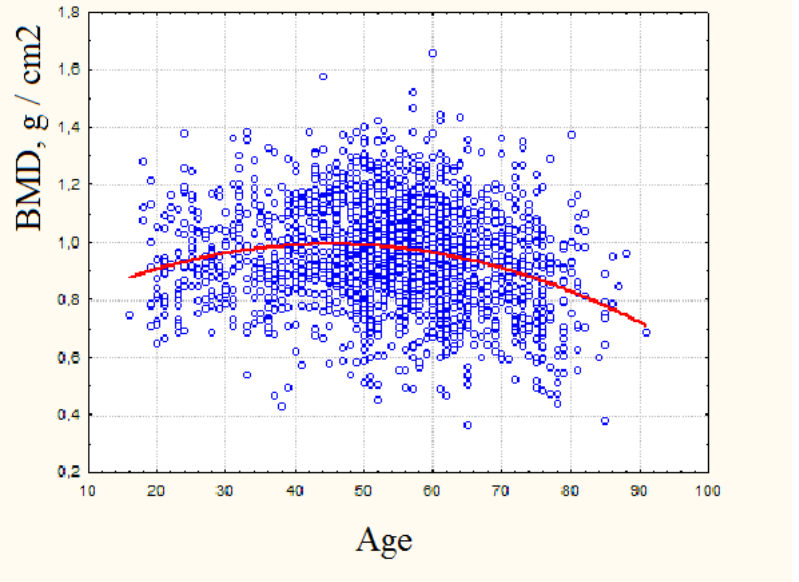

Figure 5. total hip BMD

Mean value of total population surveyed for BMD of "total hip" was 0,8552 ± 0,149 SD, which was significantly higher compared to the area of the femoral neck , which was 0,7421 ± 0,144 SD, p <0,05.(Fig. 6) .

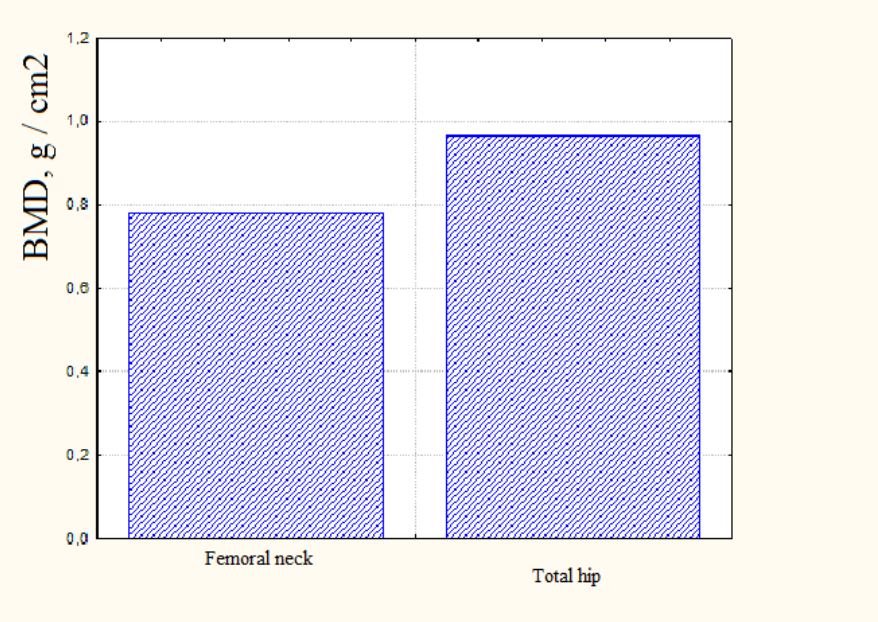

Figure 6. Mean values of BMD of femoral neck and total hip differently.

IV. Discussion :

The pathogenesis of peri-menopausal osteoporosis is still an unsolved problem in connection with eclecticism diagnostic and treatment approaches to causal therapy. Fractures of the proximal femur are an important medical and social problem because of high mortality and complication risk . Analysis of the dynamics of developmental features of formation reflects peculiarities of the studied segment

of the skeleton. Increasing bone density observed in the first three decades of life , which reflects the formation of the skeleton and peak bone mass. Significant reduction of the parameters studied in the older age groups reflects the state of perimenopause and following that period inevitable loss of bone mass. The decrease in BMD was more intense in the area of the femoral neck . It is known that bone loss has a direct correlation with the mechanical properties of the segment, and undoubtedly affect the risk of low-energy fractures . [4] It was noted that the neck of the femur has a significantly lesser optical density compared with the region of " total hip" , which can be explained by the predominance of trabecular bone substance in this segment.[5] lower optical density of the femoral neck proves its great diagnostic value in detection of systemic metabolic diseases, that apparently known as this segment of the skeleton sponsored clinical beam system «Frax», to calculate fracture risk [6].

V. **Conclusions** :

1. The dynamics of parameters of BMD in the age range of 35 years reflects the developmental features of the development segment and peak bone mass formation
2. Radiation monitoring data in the group surveyed over 50 years reflect the demineralization of bone matrix during perimenopause varying severity .
3. The femoral neck of the has a significantly lower optical density compared to the “total hip region" in all age groups studied.

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