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Dynamics Of Osteoporosis Development In Perimenopausal Women

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Abstract: Osteoporosis is one of the most common diseases, which occupies a leading place in the structure of morbidity and mortality of the population. According to the WHO, osteoporosis is the fourth leading cause of disability and mortality among patients with bone fractures (only 25% of patients fully recover from a hip fracture, 50% remain disabled, and 25% die from complications). The perimenopausal period is known to be a risk factor for bone disease. We assessed the skeletal health of 62 perimenopausal women, including their complaints, clinical symptoms of menopause, hormonal status, calcium and vitamin D metabolism, and use of the transdermal gel Estrogel. Based on the data obtained, we developed a scale for assessing the clinical signs of osteoporosis in menopause. A point-based assessment of the 10 parameters studied allows us to create risk groups for bone fractures in perimenopause.

Keywords: Osteopenia, osteoporosis, diagnostics, bone disease risk factors, perimenopause, estradiol, steroid hormone.

1. Introduction: Osteoporosis is known as a "silent" disease. People with osteoporosis do not seek medical attention until back pain develops, posture changes, or fractures occur in various locations. Osteoporosis prevention refers to the prevention of fractures, which can lead to premature death or disability, limited self-care, and a deterioration in overall quality of life. Osteoporosis is a systemic skeletal disease characterized by decreased bone mass and microarchitectural deterioration, leading to increased bone fragility and a high risk of fractures. Osteoporosis

significantly impacts bone function, leading to tubular bone fractures, especially in the perimenopausal period. According to Asilova S. and Yugay A. (2016), a significant decrease in bone mass leads to a decrease in matrix structure and impaired mineralization, resulting in less dense bone. The architecture of trabecular (spongy) bone tissue is disrupted, with thinning and loss of trabeculae (7, 9, 12, 21). According to the WHO, osteoporosis ranks fourth among non-communicable diseases as a cause of disability and mortality from bone fractures. Only 25% of patients fully recover from a hip fracture, 50% of patients remain disabled, and 25% die from complications (3, 5, 22, 26). S.B. Malichenko (2009) describes the main causes of the disease as decreased bone formation and decreased ability of the kidneys to metabolize vitamin D. Vitamin D deficiency leads to decreased calcium absorption, resulting in increased parathyroid hormone levels, i.e., hyperparathyroidism, which leads to bone resorption (8, 23, 25). Osteoporosis is divided into primary and secondary (12). Primary osteoporosis includes postmenopausal, senile and idiopathic osteoporosis. Secondary osteoporosis occurs against the background of diseases: endocrine, gastrointestinal tract diseases, rheumatic lesions, etc. Risk factors for primary osteoporosis include genetic and constitutional race. In this case, of great importance are white or Negroid people, as well as family history, gender, menopause < 50 years, irregular menstruation, no children, more than 3 pregnancies, no lactation, lactation > 6 months, old age, asthenic body type. Decreased calcium intake with food (< 1000 mg / day), lack of physical activity, smoking, alcohol, coffee (> 5 cups per day), high protein content in food, high fiber content in food and an abundance of acidic foods in the diet (1, 2, 6, 9, 29, 32). Research Lesnyak O.M. and Benevolenskaya L.I. (2009) indicate that osteoporosis is clinically characterized by acute or chronic back pain, a feeling of heaviness between the shoulder blades, fatigue, the need for repeated rest in a lying position, stooping, a decrease in height by 3-10 cm over 1-2 years, abdominal folds and their asymmetry, a decrease in the distance between the ribs and the iliac crests, as well as fractures of the ulna, radius, vertebral bodies, femoral neck, and thinness. That is, by studying the external parameters of physique, one can already assume the presence of osteoporosis in a particular woman. An analysis of the literature indicates the presence of a fairly large number of studies, however, they are devoted to specific aspects of the diagnosis, prevention, and treatment of osteoporosis among women of menopausal age. There is an urgent need for a comprehensive study of the diagnosis, prevention, and treatment of older women based on an assessment of constitutional, functional, hormonal, and biochemical parameters.

Study objective: To conduct osteoporosis preventive measures in perimenopausal women in Uzbekistan. To develop a scale for assessing the risk and severity of osteoporosis in primary healthcare.

2. methods

We observed 62 perimenopausal women. Patients, aged 45 to 60 years, were divided into two groups. The first group received Osteo K2, a supplement containing vitamin D3 and vitamin K2 (30 women). The second group included 32 patients who received Osteo K2 and the transdermal gel Estrogel. Estrogel is applied in a thin layer to the skin of the abdomen, lumbar region, shoulders, or forearms once daily. The application area should be at least the size of 2 palms. The study utilized anthropometric (height, weight, BMI), functional (densitometry, X-ray, hormonal (parathyroid hormone, estriol), and biochemical (plasma concentrations of Vit. D and Ca) measurements.

3. Results And Discussion

When examining the clinical signs of bone density disorders, 5 patients in Group 1 (16.7%) complained of severe back pain, 16 patients (53.3%) experienced moderate pain, and 9 women had no pain. In Group 2, 14 out of 32 patients (43.8%) experienced severe back pain, 13 (40.6%) experienced moderate pain, and 5 patients had no pain. Anthropometric measurements revealed varying degrees of height loss. A decrease of up to 10 cm was not observed in any woman in Group 1.

A decrease of up to 5 cm in height was noted in 9 women. patients (30%), a decrease of up to 2 cm was noted in 5 women (16.7%). In the 2nd group, a decrease in height of up to 10 cm was noted in 5 patients (15.6%), a decrease of up to 5 cm was noted in 15 women (46.8%), a decrease of up to 2 cm was noted in 12 patients 9 (37.5%).

Hormonal disorders of parathyroid hormones In group 1, a complete disorder was noted (90-95 pg / ml) in 2 patients, a slight disorder (68-70 pg \ ml) in 10 patients, in 18 patients (36-43 pg \ ml) no change of this hormone was noted. In group 2, a complete disorder (97-102 pg / ml) was noted in 5 patients, a slight disorder (48-54 pg \ ml) in 20 patients, and in 7 patients no change (36-42 pg \ ml) of this hormone.

The blood esterol content in Group 1 was observed in normal concentrations (62 pg/ml) in 10 women (33.3%),

sharply decreased (up to 10 pg/ml) in 5 patients (17%), moderately decreased (up to 15 pg/ml) in 7 patients (23.3%). In Group 2, a sharp decrease (up to 10 pg/ml) was observed in 37.5% of patients, a moderate decrease (up to 15 pg/ml) in 10 (31.3%), and in 8 patients it was within the normal range (78-80 pg/ml).

We also assessed the degree of climacteric syndrome. Frequent hot flashes (up to 10-12 times a day) were observed in 5 patients (17%) of women in Group 1, 73.3% of patients complained of rare hot flashes (3-4 times per day) and were absent in 3 patients. In group 2, frequent hot flashes were observed in 2 patients, rare ones – in 50%, and absent in 15 patients.

In group 1, pronounced stooping was observed in 2 patients, mild stooping was observed in 18 patients (60%), and postural disorders were not observed in 10 patients (33.3%). In group 2, pronounced stooping was observed in 8 patients, mild stooping was observed in 17 patients (53.1%), and postural disorders were not observed in 5 patients. When studying the content of Ca and Vit D in the blood plasma of group 1, a sharp decrease in the parameters was found in 3 women, values below the norm were observed in 19 (63.3%) and within the normal range in 8 (27%) women. Studies of the same parameters among patients of group 2 indicate a sharp decrease in the concentrations of Ca and Vit D in the blood plasma. 9 (28%), below normal 18 (56%) and within normal limits in 3 women.

Radiographic examination revealed multiple cystic formations of tubular bones, mainly of the hands. In Group 1, this occurred in 17% of women in Group 1, while single cystic formations were observed in 27%. In 17 women in Group 1, no radiographic changes were detected. In Group 2, multiple cystic formations were noted in 22% of cases, while single cystic formations were observed in 19 (59.3%) and in 6 women, no radiographic changes were noted. Densitometric studies in Group 1 revealed severe osteoporosis (3 patients). Osteopenia was noted in 13 (43%) and no signs of osteoporosis were detected in 14 women (47%). Our study revealed that with age, the content of esterodiol decreases, as well as a decrease in the content of Ca and Vit D in the blood, and an increase in the production of parathyroid hormone is noted. In the early stages of osteoporosis, X-ray examination reveals isolated cystic changes in the bones, which develop into multiple cystic lesions with age. Densitometric examination reveals that osteopenia, which develops into osteoporosis with age, is present at the onset of the disease. Based on clinical signs, osteoporosis in perimenopausal women can be divided into four stages. With increasing age, clinical signs of osteoporosis become more pronounced.

Based on the results of our research, we developed a computer program that allows us to assess the severity of bone disease predictors and, accordingly, initiate individualized fracture prevention strategies for perimenopausal women. Ten parameters were assessed using a scoring system based on severity, allowing us to identify risk groups based on the total score.

Table for predicting risk factors and degrees of osteoporosis and long bone fractures among perimenopausal women

№	*Indicators*	*Main characteristics*	*Points*
1	**BMI**	BMI> =18.5<25 kg/m^2	**1**
		BMI> =25.1<30 kg/m^2	**5**
		BMI> =30.1<40 kg/m^2	**10**
2	**1. Back pain**	Absent	**1**
		Weak	**5**

		Severe	**10**
3	**Decrease in growth**	Absent	**1**
		Up to 5 cm	**5**
		Up to 10 cm	**10**
4	**Disorders of parathyroid hormone production**	No impairment	**1**
		Minor impairment	**5**
		Severe impairment	**10**
5	**Blood esterol levels**	Absent impairment	**1**
		Moderate reduction	**5**
		Significant reduction	**10**
6	**Tides**	Absent	**1**
		Rare	**5**
		Common	**10**
7	Stooped posture Blood calcium and vitamin D levels	Absent	**1**
		Mildly expressed	**5**
		Significantly expressed	**10**
8	Cholesterol concentration indicators (	Normal	**1**
			5
		Slightly decreased	**10**

9	High-density lipoproteins)	Sharply decreased	1
		No abnormalities	5
	X-ray examination	Moderately increased	10
10	(multiple cystic lesions)	Sharply increased	1
		Absent	5
		Single	10
11	Stooped posture	Multiple	1
		Normal bone density	5
		Osteopenia	10

In this case:

86–100 points - pronounced clinical signs of stage 4 osteoporosis

85–73 points - mild clinical signs of stage 3

72–55 points - mild clinical signs of stage 2

55 points and below - no clinical signs of stage 1

According to this scoring system, the scores of all women in the two groups ranged from

86 to 100 points. In group 2, severe osteoporosis was observed in 7 women, osteopenia in 19, and no signs of osteoporosis in 6 women. Clinical example: Patient A., 58, presented with complaints of severe back pain, hot flashes 3–4 times a day, and has noted a height loss of up to 5 cm in recent years, a slight stoop, vaginal dryness, and urinary incontinence. Laboratory tests revealed decreased calcium (1.98 mmol/L) and vitamin D (700 IU) levels in the blood, moderately decreased esterol levels (48 pg/mL), and slightly increased parathyroid hormone (PTH) levels (68 pg/mL). Radiographic examination revealed isolated cystic lesions at the distal end of the metacarpal bones. A densitometry study also diagnosed osteopenia. The total score was 55. The diagnosis was: Postmenopausal period, senile syndrome. Osteopenia. The woman was classified as having an average risk for bone fractures. Corrective therapy was prescribed.

Thus, the data obtained indicate that with increasing age in women, blood esterol levels decrease, parathyroid hormone levels increase, and there is a decrease in calcium and vitamin D levels in the blood. Additionally, X-ray changes are revealed: at the onset of osteoporosis, there are isolated cystic changes in the bones, which develop into multiple cystic changes with age. Densitometric examination clearly diagnoses the transition from osteopenia to osteoporosis. In the second group of patients using the transdermal gel Estrogel, hot flashes decreased, sleep returned to normal, and back pain decreased within 4-5 days compared to the first group. Calcium and vitamin D3 supplementation is also a mandatory component of any osteoporosis treatment regimen, due to the frequent hypocalcemic effect of most antiresorptive drugs. The use of the transdermal gel Estrogel also rapidly improves a woman's quality of life.

4. Conclusions

1. As a woman transitions from perimenopause to the postmenopausal period, clinical symptoms and laboratory signs of abnormalities in the structure of tubular bones increase, which is associated with the decline of hormonal function and the transition from osteopenia to osteoporosis.

2. Based on the proposed prognostic scale, it is necessary to form risk groups for tubular bone fractures among perimenopausal women for the purpose of individualized treatment and fracture prevention.

3. The most reliable diagnostic tests for detecting osteoporosis are densitometry, MRI, and X-rays.

4. The use of the transdermal gel Estrogel relatively quickly improves the general condition of perimenopausal women and is very easy to use.

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