Impact Factor: 9.9 ISSN-L: 2544-980X

Clinical Features of Osteopathy Development in Patients with Type 2 Diabetes Mellitus

Khaydarova Zarrina Erkinovna [1], *Allaberdiyev Ikrom Gafurovich* [2]

Abstract: Diabetes mellitus is one of the most important problems of clinical endocrinology, as evidenced by its prevalence and changes in all organs and systems. According to forecasts of the World Health Organization (WHO), the number of patients with diabetes mellitus (DM) in developed countries will increase by 41% by 2025 (from 51 million to 72 million people). Globally, the number of DM patients will increase by 122%, from 135 million to 300 million. a person. Among all deaths in the world, DM accounts for 1.4%. The improvement of treatment methods for patients with diabetes contributed to an increase in their life expectancy and, consequently, an increase in the frequency of late complications. They determine the quality of life, and often the life-long prognosis in such patients. Diabetes mellitus is characterized by the appearance of acute and chronic complications, varying in speed and severity. As a rule, they adversely affect the patient's quality of life and lead to significantly earlier disability and death.

Key words: diabetes mellitus, osteoporosis.

INTRODUCTION

Recently, the group of chronic complications of diabetes has increasingly included pathological changes in bone tissue. Convincing evidence suggests that there is a tendency in DM to decrease bone mass and alter bone microarchitectonics. The process, accompanied by a decrease in bone density, leads to an increased risk of fractures. At the same time, inadequate "peak" bone mass can be considered as an important determinant of osteoporosis. The available data indicate that in patients with type 1 diabetes, the "peak" bone mass is significantly higher from childhood. They are smaller than in healthy individuals, and, consequently, they have a low "starting point" from which age-related bone loss begins. Osteoporosis is a systemic skeletal disease characterized by a decrease in bone mass per unit volume and a violation of bone microarchitectonics, which leads to increased bone fragility and a high risk of fractures. This definition was formulated at the International Conferences on Osteoporosis (OP) in Copenhagen. Osteoporosis is one of the most common metabolic diseases of the skeleton, the frequency of which increases with age. According to data, OP problems as causes of disability and mortality of patients from bone fractures (especially proximal femoral bones) occupy the fourth place among non-communicable diseases, second only to diseases of the cardiovascular system, oncological pathology and diabetes mellitus. This is due to the widespread use of OP, its multifactorial nature, late diagnosis, and untimely start of treatment. The most characteristic fractures in osteoporosis are fractures of the proximal femur, vertebral bodies, and distal forearm bones, although fractures of any localization may occur. Bone fractures in older age groups are much more common in women. More than half of all bone fractures among adults may be associated with osteoporosis. Pathophysiological aspects of the development of osteoporosis in patients with diabetes until the end not studied. Nevertheless, the multifactorial nature of this complication can be considered established. In a somewhat simplified form, bone metabolism can be represented by 5 main forms: insufficient bone formation; increased bone destruction; a combination of reduced formation with increased destruction; simultaneous but unequally increased formation and destruction of bone tissue; the combination of a particularly reduced formation with reduced resorption. Laboratory research methods

[1] Samarkand State Medical University, Samarkand, Uzbekistan
[2] Zarmed University, Samarkand, Uzbekistan

are of particular and important importance., although none of them individually correlates with bone density. Biochemical markers of bone metabolism are studied to assess the rate of bone remodeling processes and to diagnose OP with a high or low rate of bone metabolism, or the separation or imbalance of its components, bone resorption and bone formation. Markers of bone formation include the activity of total alkaline phosphatase in the blood and its bone isoenzyme, osteocalcin (a glaprotein synthesized by osteoblasts), and human type 1 collagen propeptide. The study of osteocalcin is currently recognized as the gold standard among bone formation markers: parathyroid hormone; osteocalcin (OK); alkaline phosphatase (ALP); vitamin D and its metabolites; calcitonin (CT). In the diagnosis of osteoporosis, the gold standard is the use of dual-energy X-ray absorptiometry (DEXA), which allows measuring the content of bone mineral in any part of the skeleton, as well as determining the content of calcium salts, fat and muscle mass throughout the body; axial computed tomography It measures the bone mineral density (BMD) of the lumbar vertebrae, separating the trabecular and cortical bone structures, measuring volume parameters in g/cm^3. The standard (automatic) programs for DEXA-densitometers are programs for the lumbar vertebrae, proximal femur, forearm bones, and the "whole body" program. Along with the absolute values of bone density in g/cm3 of the studied area, the Z-criterion is automatically calculated in the results of densitometry as a percentage of the sex and age population norm and in values the standard deviation from it (SD). The T-criterion is also calculated as a percentage or SD values of the peak bone mass of individuals of the corresponding sex. The T-criterion evaluates the severity of osteopenia or osteoporosis according to WHO recommendations. In this case, the term "osteopenia" refers to the preclinical stage of OP.

MATERIALS AND METHODS OF RESEARCH

We examined 40 patients, 35 women and 5 men, with type 2 diabetes. The inclusion criteria were: absence of severe somatic diseases — CRF, severe anemia, respiratory failure, indications in the anamnesis of stroke, heart attack, etc. Individuals with proteinuric nephropathy and proliferative retinopathy were also excluded. During the examination period, the patients did not receive medications that could affect the state of bone density. The duration of DM was 14.10 ± 1.64 years, the average age was 52.89 ± 3.63 years. The mandatory volume of diagnostic tests corresponded to the methodological recommendations of the WHO Committee of Experts and included clinical blood and urine tests, biochemical blood tests, instrumental research methods—measurement of arterial pressure (BP) using the Korotkov method, ECG, chest X-ray, ultrasound of the abdominal cavity and kidneys. All patients were examined by an optometrist and a neurologist to identify symptoms of retinopathy and neuropathy. The history of the disease, the features of the course, and the age at which diabetes debuted were studied in detail. In retrospect The degree of DIABETES compensation, the presence of acute complications of diabetes, ketoacidosis, and hypoglycemic conditions were assessed. Along with the typical symptoms of diabetes, complaints from the bone system were actively identified. Attention was paid to the lifestyle of patients—compliance with the treatment regimen prescribed by the endocrinologist, nutrition, physical activity, the presence of bad habits, and factors of osteoporosis. When studying the anamnesis of the disease, such features as age were revealed., when diabetes manifested itself, adherence to the treatment regimen (in the patient's own mind), the burden of a family history of diabetes, osteoporosis, the presence of bad habits — smoking, alcohol abuse. Complications of diabetes occurred: diabetic polyneuropathy — in 100% of cases; diabetic retinopathy — 37.5%. Of the 35 women in this group, 3 (8.5%) had a history of early menopause., 2 (5.7%) — menstrual cycle disorders. The patients were treated with hypoglycemic drugs or combined therapy: insulin therapy and tablet therapy. When assessing the features of the course of the disease, we tried first of all to find out the attitude of patients to their disease, compliance with the treatment regimen, the timeliness of passing the recommended examination by an optometrist, neurologist, specialist in diabetic foot (podiatrician), the possibility of self-monitoring (the presence of a glucose meter), and keeping a self-monitoring diary. We were interested in the level of glycemia that patients considered normal for themselves, the frequency of hypoglycemic reactions, and sensitivity to hypoglycemia. The study was performed in three standard skeletal sections (lumbar spine, proximal thigh, and forearm). The bone mineral density of the lumbar region was assessed L1–L4 of the spine, proximal femur and

distal forearm. The statistical analysis program "StatSoft Statistica v.6" was used for statistical processing of the obtained data.

THE RESULTS AND THEIR DISCUSSION

It was revealed that the patients' attitudes towards the disease were different. Only 15 (37.5%) patients with type 2 diabetes considered it necessary to maintain those indicators that meet the criteria for compensation according to modern concepts (5.0–6.0 mmol/l on an empty stomach and up to 7.8 mmol/l after meals). They systematically monitored glycemia, were observed by an endocrinologist, fully mastered the method of self-control, and attended the "Diabetes School." Urgent conditions in these patients they rarely developed. The rest of the patients did not adhere to a strict treatment regimen, compensation for diabetes was judged by their well-being, and they rarely visited an endocrinologist. They considered fasting glycemia of 8-10 mmol/l to be quite satisfactory. Ketoacidosis, hypoglycemia, and emergency hospital admissions were the most common in this subgroup. Compensation for DM was — glycated hemoglobin 7.5 ± 0.22%. The study of heredity revealed a high incidence of family history of DM and OP in patients with type 2 diabetes mellitus. The presence of bad habits — smoking, alcohol consumption — was noted with the same frequency: 5 patients were smokers (12.5%), 5 patients consumed alcohol (12.5%). The results of the biochemical examination of this group of patients included the determination of the lipid spectrum and the state of phosphorus-calcium metabolism. The following data were obtained for lipid metabolism: total cholesterol — 5.81 ± 0.5 mmol/l; low—density lipoproteins (LDL) - 1.52 ± 0.02 mmol/l; high-density lipoproteins density of HDL is 1.78 ± 0.03 mmol/L; triglycerides are 1.12 ± 0.02 mmol/L; atherogenicity coefficient is 1.87 ± 0.04 mmol/L. In addition to the determination of total calcium, phosphorus, and alkaline phosphatase in biochemical analysis. the level of parathyroid hormone and osteocalcin was determined in patients. Thyroid dysfunction was not detected in this group of patients. Background hormone indicators: TSH — 2,470.1 μme/ml; total T4 — 107.31±1.5 pmol/l; Total T3 is 3.93±0.58 pmol/l. In all patients included in the study, in three parts of the skeleton, the severity of bone mineral density deficiency (proportions of osteopenia: -2.5 < T < -1.0 and osteoporosis – T < 2.5) was observed in 26 patients (65%). At the same time, the proportion of patients diagnosed with osteoporosis (T < -2.5) was 25% — 16 people. There was an uneven severity of bone mineral density deficiency in various parts of the skeleton. Osteoporosis was most often found in the lumbar spine — 24 patients (89%); followed by the proximal femur — 18 (66.7%) and least often osteoporosis was detected in the distal forearm — 9 patients (33.3%). The most characteristic was the change in tissue mineral density in all standard departments (lumbar spine, proximal femur, forearm) — in 15 patients (55.5%) or at two standard points — in the lumbar spine and proximal thigh, much less often in the lumbar spine and forearm — in 8 patients (29.7 %) and only in 4 patients (14.8 %), changes occurred in only one standard skeletal department — in this group of patients it was the lumbar spine. In this study, densitometry data from three standard skeletal sections (lumbar spine, proximal femur, and distal forearm) were analyzed in 40 patients with type 2 diabetes. It was found that in the majority of patients — 26 (65%) — there is a deficiency of bone tissue (T < -1.0) in all studied parts of the skeleton. At the same time, the proportion of patients with an established diagnosis of osteoporosis (T < -2.5) is 25% (16 people). Of the three skeletal divisions studied, this group has osteoporosis. The patients were most often found in the lumbar spine — 24 patients (89%) and the proximal thigh — 17 patients (66.7%). Accordingly, the frequency of changes in bone mineral density in patients with type 2 diabetes ranged from 20 to 68% of cases. Impaired phosphorus-calcium metabolism is possible at different stages of the disease, however, information about the nature and severity of these disorders they are few and contradictory. There are also indications of normocalcemia and normophosphoremia in these patients, which is consistent with our results. Parathyroid hormone (PTH) plays a major role in the regulation of calcium and phosphorus homeostasis. There is evidence of an increased concentration of PTH in DM patients, which, according to some researchers, normalizes with adequate insulin therapy. However , other researchers report both abnormal and decreased concentrations of PTH. In this regard, we also did not obtain significant changes in the concentration of PTH. The most informative parameter of bone formation is currently recognized as the level of osteocalcin in the blood. In our study, 40 patients with type 2 diabetes had The average osteocalcin level did not exceed

normal values . The content of osteocalcin in the blood with varying degrees of DM compensation did not differ from each other, and did not differ from the normal value, which indicates a sufficient level of bone formation in this group of patients. At the same time, the activity of PTH did not change. After analyzing the frequency of osteopenic syndrome in this group of patients, the degree of influence of various factors determining BMD in patients with type 2 diabetes was investigated.

CONCLUSIONS

Thus, osteoporosis in type 2 diabetes is a common complication, but not always diagnosed. The duration and compensation of DM turned out to be one of the most serious factors determining BMD indicators in this group of patients. The possibility of developing irreversible bone disorders in DM makes it necessary for us to address the issue of early diagnosis of bone changes and the search for effective treatment methods.

LITERATURE

1. Alisherovna, K. M., Erkinovna, K. Z., Davranovna, M. K., & Pulotovna, Z. D. (2022). Positive Effect of Sorbitol in Patients with Chronic Renal Insufficiency. *Miasto Przyszłości*, *30*, 214-217.
2. Alisherovna, K. M., Erkinovna, K. Z., Davranovna, M. K., & Pulotovna, Z. D. (2022). Positive Effect of Sorbitol in Patients with Chronic Renal Insufficiency. *Miasto Przyszłości*, *30*, 214-217.
3. Alisherovna, M. K. (2021). Stages of development of renal dysfunction and anemia in patients with chronic heart failure. *International Journal of Innovations in Engineering Research and Technology*, *8*(05), 50-53.
4. ALISHEROVNA, M. K., SHAXMAXMUDOVNA, S. Z., & TATLIBAYEVICH, Y. S. (2021). Effectiveness of Treatment of Chronic Heart Disease Insufficiency Depending on the Functional State of the Kidneys. *JournalNX*, *7*(02), 240-333.
5. Avazova, T., & Rogelio, P. (2024). Effects of Ursodeoxycholic Acid on Inflammatory Markers IL-6 and IL-17 in Patients with Metabolic Syndrome. *Frontiers of Global Science*, *2*(1), 12-16.
6. Avazova, T., Khaitova, N., & Ismailova, A. (2013). Significance of IL-6 and IL-17 cytokines in diagnostics and prognosis of the metabolic syndrome. *Medical and Health Science Journal*, *14*(1), 40-45.
7. Davranovna, M. K., Alisherovna, K. M., Erkinovna, K. Z., & Nizamitdinovich, K. S. (2022). Assessment of the quality of life of patients with coronary heart disease. *The Peerian Journal*, *11*, 44-50.
8. Davranovna, M. K., Alisherovna, K. M., Erkinovna, K. Z., & Nizamitdinovich, K. S. (2022). Assessment of the quality of life of patients with coronary heart disease. *The Peerian Journal*, *11*, 44-50.
9. Erkinovna, K. Z. (2024). Quality of Life After Stenting in Patients With Diabetes Mellitus Type 2 Diabetes. *Miasto Przyszłości*, *54*, 624-629.
10. Erkinovna, K. Z., Alisherovna, K. M., Davranovna, M. K., & Nizamitdinovich, K. S. (2022). Correction of Cytokine Imbalance in the Treatment of Stable Angina Pectoris. *The Peerian Journal*, *11*, 64-70.
11. Erkinovna, K. Z., Davranovna, M. K., Toshtemirovna, E. M. M., & Xudoyberdiyevich, G. X. (2022). Correction of complications in chronic heart failure depending on the functional state of the kidneys.
12. Hamraeva, N. A., Sultonov, I. I., & Hasanov, F. S. (2020). Systemic lupus erythematosus treatment strategy. *Journal of Critical Reviews*, *7*(9), 269-270.
13. Ibragimov, K., Sultonov, I., & Ravshanova, M. (2024). The Effectiveness of the Combination Therapy with biologic DMARDS in Rheumatoid Arthritis. *Frontiers of Global Science*, *2*(1), 17-24.

14. Islomovich, S. I. (2024). FEATURES OF THE COURSE OF PREGNANCY IN RHEUMATOID ARTHRITIS. *International journal of medical sciences*, *4*(10), 77-84.

15. Islomovich, S. I. (2024). Gender characteristics of the current rheumatoid arthritis. *International journal of medical sciences*, *4*(10), 3-8.

16. Ismailova, A. A., Uralova, S. A., Nigmatova, L. M., Adylov, D. G., Petrova, T. A., Nabieva, U. P., & Avazova, T. A. (2017). The optimization of technique of detection of cryoglobulins in conditions of clinical diagnostic laboratory. *Klinicheskaia Laboratornaia Diagnostika*, *62*(1), 50-52.

17. Khusainova, M. A. (2023). Comorbidity thyrotoxicosis with coronary heart disease. *Science and Education*, *4*(5), 205-213.

18. Khusainova, M. A. (2023). Cystatin C is an early marker of decreased kidney function. *Oriental renaissance: Innovative, educational, natural and social sciences*, *3*(1), 485-490.

19. Khusainova, M. A., & Yarmatov, S. T. (2021). CARDIAC ARRHYTHMIAS AND CARDIOHEMODYNAMIC DISORDERS IN PATIENTS VIRAL CIRRHOSIS OF THE LIVER. *Scientific progress*, *2*(2), 196-202.

20. Khusainova, M. A., Ergashova, M. M., Eshmamatova, F. B., & Khayitov, S. M. (2023). Features of quality of life indicators in patients with pneumonia. *Science and Education*, *4*(2), 138-144.

21. Khusainova, M. A., Khaydarov, S. N., Makhmudova, K. D., & Nayimov, A. S. (2023). Prevalence of bronchiolitis in patients with Rheumatoid arthritis. *Science and Education*, *4*(5), 232-241.

22. Khusainova, M. A., Vakhidov, J. J., Khayitov, S. M., & Mamadiyorova, M. M. (2023). Cardiac arrhythmias in patients with rheumatoid arthritis. *Science and Education*, *4*(2), 130-137.

23. Kireev, V. V., Sultonov, I. I., Ziyadulaaev, S. K., Suyarov, A. A., Aripova, T. U., Usmanbekova, K. T., & Nasretdinova, M. T. (2021). Genetic Engineered Preparations-An Innovative Approach in the Treatment of Rheumatoid Arthritis. *Annals of the Romanian Society for Cell Biology*, *25*(3), 4114-4119.

24. Nizamitdinovich, K. S., Khabibovna, Y. S., Alisherovna, K. M., & Tashtemirovna, E. M. M. (2023). Spinal Injury for Rheumatoid Arthritis. *Miasto Przyszłości*, *40*, 426-432.

25. Sobirov, A., & Sultonov, I. (2024). COMPREHENSIVE ANALYSIS OF CLINICAL NEUROPSYCHOLOGICAL AND NEUROIMAGING ASPECTS OF ALZHEIMER'S DISEASE. *Frontiers of Global Science*, *2*(1), 25-29.

26. Sultonov, I. I., Kh, Z. S., Ruzybakieva, M. R., Kireev, V. V., Aripova, T. U., & Suyarov, A. A. (2021). Pharmacogenetic Aspects of Drug Resistance in Rheumatoid Arthritis. *Annals of the Romanian Society for Cell Biology*, *25*(3), 4147-4150.

27. Sultonov, I. I., Xasanov, F. S., Eshmuratov, S., Uralov, R. S., Shukurova, D., & Ziyadullayev, S. X. Predictors of Systemic Lupus Erythematosus: A Case-control Study. *International journal of health sciences*, *6*(S10), 175-182.

28. Tashtemirovna, E. M. M., Khabibovna, Y. S., Alisherovna, K. M., & Erkinovna, K. Z. (2023). Angiopathy in Rheumatoid Arthritis. *Miasto Przyszłości*, *40*, 418-425.

29. Xasanov, F. S., & Sultonov, I. I. (2023). RHEUMATOID ARTHRITIS TREATED WITH DMARDS AND CARDIOVASCULAR DISEASE RISK. *Oriental Journal of Medicine and Pharmacology*, *3*(02), 45-52.

30. Хаитова, Н., Авазова, Т., Маджидова, Г., & Сунатова, Г. (2012). Изменение уровня ил-6 и ил-17 у пациентов с метаболическим синдромом. *Журнал вестник врача*, *1*(3), 184-186.

31. Авазова, Т. (2012). Метаболический синдром (обзор литературы). *Журнал вестник врача*, *1*(3), 217-219.

32. Авазова, Т. А., & Хаитова, Н. М. (2011). ЭФФЕКТИВНОСТЬ ПРИМЕНЕНИЯ ПРЕПАРАТА" ТАF" ЛАКТОФЛОР У БОЛЬНЫХ МЕТАБОЛИЧЕСКИМ СИНДРОМОМ. *Врач-аспирант*, *49*(6.1), 209-212.
33. Иргашева, У. З., Султонов, И. И., & Тоиров, Д. Р. (2013). Признаки дебюта системной красной волчанки. *Академический журнал Западной Сибири*, *9*(1), 15-15.
34. Тоиров, А. Э., Султонов, И. И., & Тоиров, Э. С. (2020). ЗНАЧЕНИЕ ДИСФУНКЦИИ ПОЧЕК У БОЛЬНЫХ ОСТРЫМ ИНФАРКТОМ МИОКАРДА НА ФОНЕ САХАРНОГО ДИАБЕТА 2-ГО ТИПА. *Вестник науки и образования*, (9-3 (87)), 86-91.
35. Хайдарова, З. Э. (2021). ЭНТРОПИЯ И НАРУШЕНИЯ СЕРДЕЧНОГО РИТМА У БОЛЬНЫХ, ПЕРЕНЕСШИХ ИНФАРКТ МИОКАРДА. *Journal of cardiorespiratory research*, *2*(4), 59-62.
36. Хайдарова, З. Э. (2021). ЭНТРОПИЯ И НАРУШЕНИЯ СЕРДЕЧНОГО РИТМА У БОЛЬНЫХ, ПЕРЕНЕСШИХ ИНФАРКТ МИОКАРДА. *Journal of cardiorespiratory research*, *2*(4), 59-62.
37. Хайдарова, З. Э. (2023). Ригидность сердечного ритма у больных с инфарктом миокарда. *Science and Education*, *4*(5), 627-635.
38. Хамраева, Н. А., Султонов, И. И., & Хасанов, Ф. Ш. У. (2019). Кожные проявления у больных системной красной волчанкой. *Вопросы науки и образования*, (28 (77)), 128-131.