General pathogenetic links: Chronic heart failure and osteoporosis.

Nadirova Yulduz Isomovna Assistant of the Department of Faculty and Hospital Therapy, Nephrology and Hemodialysis No2
Tashkent Medical Academy, Tashkent, Uzbekistan

Bobosharipov Feruzjon Gofurzhonovich Assistant of the Department of Surgery
Tashkent Medical Academy, Tashkent, Uzbekistan

ABSTRACT

Human Fc gamma-receptor II alpha (FcγRIIA) Polymorphism has been linked with predisposition to susceptibility and/or severity degrees of several infectious diseases. To find if there is any link between these genetic polymorphisms and the intensity of the severe acute respiratory syndrome coronavirus-2 (SARS-Cov-2) disease. FcγRIIA polymorphism has been evaluated in the DNA extracts of 100 SARS-Cov-2 patients from Iraq. The participants included 74 mildly and moderately infected patients and 26 severely infected patients. A significant correlation was detected among FcγRIIA-131 polymorphism and severity of COVID-19, with higher frequency of FcγRIIA G/G 131 homozygote in severely infected individuals compared to that in the mildly/moderately infected patients in codominant and recessive mode; ($p = 0.004$ and $p = 0.003$), respectively. While AG and AA genotype could act as a protective factor. The outcomes demonstrate that FcγRIIA polymorphic genotype may affect the severity of the SARS-Cov-2

Keywords: chronic heart failure, osteoporosis, bone mineral density, bone metabolism

Introduction

In developed countries, the prevalence of chronic heart failure (CHF) varies from 1 to 12%, increasing in older age groups, especially after 65 years [1]. Heart failure (HF) is the most common cause of hospitalization among patients in this age group [2]. A total of >60 million people worldwide suffer from HF [3]. Osteoporosis (OP) is a common age-associated comorbidity in people with HF, affecting one in three women and one in four men aged >50 years [4]. HF is a syndrome that develops as a result of impaired ability of the heart to fill and/or empty, occurring in conditions of imbalance of vasoconstrictor and vasodilating neurohormonal systems, and accompanied by insufficient perfusion of organs and tissues [5]. Most often, CHF is the outcome of arterial hypertension (AH) and coronary heart disease (CHD) caused by atherosclerosis. OP is a metabolic disease of the skeleton characterized by low bone mass and impaired bone microarchitecture, which lead to the development of fractures. At present, the results of many studies have confirmed the relationship between increased vascular stiffness, manifestations of subclinical atherosclerosis, and decreased bone mass [6, 7], and the detection of a high incidence of cardiovascular disease (CVD) in patients with osteoporotic

fractures necessitated specific screening of OP in cardiac patients [8]. The combination of OP or its complications (fractures) with CHF was previously explained by their independent simultaneous development with age, as well as a decrease in physical activity (PA), the use of vasoactive and diuretic drugs. However, current epidemiological and clinical evidence supports a relationship between the two conditions that cannot be explained by aging and the use of pharmacological drugs alone. The purpose of the scientific review was to analyze the literature data and search for common pathogenetic links of CHF and OP based on available clinical and experimental studies. The information presented in the review will allow physicians of a wide range of therapeutic specialties, especially therapists, cardiologists, rheumatologists and endocrinologists, to familiarize themselves with current data on the interaction of CHF and low bone mass, as well as on the need to prevent osteoporotic fractures in patients with CHF.

Material and methods

A search of literature sources and analysis of publications in the PubMed, Medline, Web of Science and Cochrane Library databases was carried out, eLIBRARY.RU using the keywords "chronic heart failure", "heart failure", "osteoporosis", "bone mineral density", "bone metabolism", "low-energy fractures". The depth of the search was 20 years.

Results of the study

In which the association of CHF with bone mineral density (BMD) was studied, they were combined into meta-analyses. In one of them, which included 6 clinical prospective and observational case-control studies (552 patients with CHF and 243 patients without CHF), it was found that patients with CHF had lower skeletal BMD compared to patients without CHF, and the degree of BMD reduction correlated with the severity of the disease. 3 studies involved only men, the rest involved men and women. The BMD (T-score) of the whole skeleton in patients of functional classes I and II of CHF functional classes (FC) according to the classification of the New York Heart Association (NYHA - New York Heart Association) was -0.62 standard deviations (SD), while in patients with CHF III, IV FC, the T-test was -0.87 SD. Similarly, the BMD of the femur in patients with FC III III AND IV was significantly lower than in patients with FC I and II, amounting to -1.07 vs -0.47 SD [9].

A large population-based cohort study was conducted in Canada, which included 45,509 patients (92% women): of these, 1,841 (4%) had recently developed CHF. Patients with CHF were significantly older, had a greater number of previous fractures and a lower total BMD of the proximal femur (T test -1.3 vs -0.9 SD)

At present, among domestic publications, there are single original studies concerning the study of the frequency and role of OP in patients with CHF and a significantly smaller number of patients. In one of them, in the group of men and women (n=201) with FC I-IV CHF developed in patients with hypertension and coronary artery disease, a significantly more frequent development of spinal OP was observed than in the control group, and the severity of OP increased as the severity of CHF increased [12]. Another comparative prospective study included 70 outpatients with CHF and 40 patients with CVD but no CHF as a control group. Decreased BMD and bone metabolism disorders were significantly more common in CHF patients and were associated with the severity and duration of the underlying disease. Low BMD correlated with high levels of N-terminal fragment of brain natriuretic peptide precursor (NT-proBNP) and reduced renal function [13].

Thus, clinical and epidemiological studies show that CHF is often accompanied by a low BMD, a high risk of fractures, and, moreover, a 4-fold increase in the risk of any fracture requiring hospitalization compared to patients with other CVDs [15]. The most devastating complication of OP is hip fracture, which increases mortality in CHF. A prospective cohort study with a follow-up period of 11.5 years involved 5613 patients, among whom 1526 were diagnosed with CHF. Mortality after hip fracture in both men and women with CHF was 2 times higher compared to patients without a hip fracture [16].

In part, the relationship between CHF and OP and fractures can be explained by a decrease in Phe, loss of muscle mass, and sometimes the

development of cachexia as HF progresses, which contributes to a deterioration in quality of life and an increase in the risk of falls. In addition, patients with severe CHF are often bedridden, deprived of insolation, which can lead to a decrease in cutaneous synthesis of vitamin D and the development of its insufficiency or deficiency. In cases of severe right ventricular failure accompanied by congestion in the liver and intestines, there may be a decrease in the synthesis of 25-hydroxyvitamin D (25(OH)D) and a decrease in the absorption of vitamin D in food.

Conclusion.

In conclusion, it can be stated that further research on the relationship between CHF and OP is needed, since understanding the common mechanisms of the development of diseases will serve as a platform for preventive and therapeutic measures aimed at both conditions. Nevertheless, the data available to date indicate the need to pay attention to the problem of bone metabolism disorders in patients with CHF and take measures to reduce the risk of osteoporotic fractures. Screening for OP with modification of potential RFs, determination and correction of blood vitamin D levels, and appropriate prescription of drugs are important preventive measures in patients with CHF who have been taking cardiac drugs for a long time that adversely affect bone metabolism.

Literature

1. C.W. Yancy *et al.* 2013 ACCF/AHA Guideline for the Management of Heart Failure: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. J Am Coll Cardiol/(2013)
2. Mirzayeva, G. P., Jabbarov, O. O., Umarova, Z. F., Qodirova Sh, I., Tursunova, L. D., Nadirova Yu, I., & Rahmatov, A. M. (2023). Assessment of Efficacy and Optimization of Antiplatelet Therapy in Patients with Ischemic Heart Disease.
3. Teshaev, O. R., & Zhumaev, N. A. (2023). IMMEDIATE RESULTS OF SURGICAL TREATMENT OF OBESITY. *Eurasian Journal of Medical and Natural Sciences*, *3*(2), 200-208.
4. Khaitov, I. B., & Jumaev, N. A. (2023). SIMULTANEOUS OPERATION: LIVER ECHINOCOCCOSIS AND SLEEVE RESECTION (CLINICAL CASE).
5. Teshaev, O. R., Ruziev, U. S., Murodov, A. S., & Zhumaev, N. A. (2019). THE EFFECTIVENESS OF BARIATRIC AND METABOLIC SURGERY IN THE TREATMENT OF OBESITY. *Toshkent tibbiyot akademiyasi axborotnomasi*, (5), 132-138.
6. Teshaev, O. R., Ruziev, U. S., Tavasharov, B. N., & Zhumaev, N. A. (2020). Efficacy of bariatric and metabolic surgery in the treatment of obesity. *Medical News*, (6 (309)), 64-66.
7. Khayotjonovna, M. D., Ataxanoa, J. A., & Otabekovna, N. N. (2020). Disorders of kidney function in patients with covid-19. *ACADEMICIA: An International Multidisciplinary Research Journal*, *10*(11), 178-183.
8. Avezov, D. K., Tursunova, L. D., Nazarova, N. O., & Khayitov, H. A. (2021). CLINICAL AND FUNCTIONAL STATUS OF THE CARDIOVASCULAR SYSTEM IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE WITH COVID-19. *Internauka*, (20-2), 15-16.
9. Qizi, N. N. O., Atakhanovich, J. A., Fahriddinovna, A. N., & Xayotjonovna, M. D. (2020). Lupus Nephritis In Systemic Lupus Erythematosus. *The American Journal of Medical Sciences and Pharmaceutical Research*, *2*(10), 145-150.
10. Khabibullaev, M. U., Zhabbarov, O. O., Umarova, Z. F., Nazarova, N. O., Kodirova, Sh. A., & Khodzhanova, Sh. I. (2024). STRUCTURAL AND FUNCTIONAL FEATURES OF THE LEFT VENTRICLE OF THE HEART AND THEIR RELATIONSHIP WITH THE CIRCADIAN BLOOD PRESSURE PROFILE IN PATIENTS WITH ARTERIAL HYPERTENSION. *Academic Research in Modern Science*, *3*(19), 186-188.
11. Atakhanovich, J. A. (2023). The Prognostic Importance of Clinical

Aspects of Lyupus Nephritis. *SCIENTIFIC JOURNAL OF APPLIED AND MEDICAL* SCIENCES, *2*(12), 74-78.

12. Nadirova, Y., Jabbarov, O., Bobosharipov, F., Umarova, Z., Saidaliev, R., Kodirova, Sh., ... & Zhumanazarov, S. (2023). OPTIMIZATION OF COMBINATION THERAPY IN ARTERIAL HYPERTENSION WITH A CALCIUM CHANNEL BLOCKER AND AN ACE INHIBITOR. *Solution of social problems in management and economy*, *2*(2), 181-186.
13. Bobosharipov, F. G., Kholov, H. A., Teshaev, O. R., & Nadirova, Y. I. (2023). POST-BARIATRIC HYPOGLYCEMIA AND HYPOTENSION. *EDUCATION SCIENCE AND INNOVATIVE IDEAS IN THE WORLD*, *21*(5), 105-113.
14. Nadirova, Y. I., Jabbarov, O. O., Bobosharipov, F. G., Tursunova, L. D., & Mirzaeva, G. P. (2023). EVALUATION OF THE EFFICACY AND OPTIMIZATION OF DISAGGREGANT THERAPY IN PATIENTS WITH CORONARY ARTERY DISEASE.
15. Nadirova, Y. I., Bobosharipov, F. G., Kodirova, Sh. A., & Mirzaeva, G. P. (2023). OSTEOPOROSIS IN CHRONIC KIDNEY DISEASE. *EDUCATION SCIENCE AND INNOVATIVE IDEAS IN THE WORLD*, *21*(5), 89-96.
16. Ataliev, A., Murodov, A., Shatemirov, V., Kholov, Kh., Ernazarov, Kh., Malikov, N., ... & Atabaev, K. (2017). Improving the results of the complex treatment of Fournier's gangrene with the use of 2 lasers and photodynamic therapy. *Journal of Problems of Biology and Medicine*, (1 (93)), 30-32.
17. Nadirova, Y. I., & Bobosharipov, F. G. (2024). Clinical and diagnostic aspects of the early development of osteoporosis in chronic heart failure.
18. Bobosharipov, F. G., Ruxullayevich, T. O., Amonullayevich, X. X., & Isomovna, N. Y. (2024). GENETIC INFLUENCES FOR PEPTIC ULCER DISEASE ARE INDEPENDENT OF GENETIC FACTORS IMPORTANT FOR HP INFECTION.
19. Bobosharipov, F. G., Nadirova, Y. I., & Alimov, S. U. (2024). MORTALITY AFTER CONSERVATIVE TREATMENT IN ULCERATIVE GASTRODUODENAL BLEEDING.
20. Isomovna, N. Y., Otaxonovich, J. O., & Bobosharipov, F. G. (2024). MOST IMPORTANT ADVANCEMENTS IN THE CARDIORENAL SYNDROME.
21. Bobosharipov, F. G., Xolov, X. A., & Yu, N. (2024, June). ACUTE PANCREATITIS AFTER ELECTIVE LAPAROSCOPIC CHOLECYSTECTOMY: RETROSPECTIVE STUDY. In *Proceedings of Scientific Conference on Multidisciplinary Studies* (Vol. 3, No. 6, pp. 132-136).
22. Sagatov, T. A., Tavasharov, B. N., & Ermatov, N. Zh. (2019). Morphological state of the hemocirculatory bed and tissue structures of the small intestine in chronic pesticide intoxication against the background of alloxan diabetes. *Medical News*, (10 (301)), 55-57.
23. Zhuraeva, Sh. U., Urmanov, I. F., Khayitov, I. B., & Tavasharov, B. N. (2012). Morphological substantiation of microsurgical reconstruction of the isthmic portion of the fallopian tubes in infertility. *Doctor-Graduate Student*, *51*(2.3), 395-400.
24. Nadirova, Y., & Zhabbarov, O. (2023). RISK FACTORS FOR DECREASED BONE STRENGTH AND FRACTURES IN CKD.
25. Nadirova, Y. I., Bobosharipov, F. G., Kodirova, Sh. A., & Mirzaeva, G. P. (2023). OSTEOPOROSIS IN CHRONIC KIDNEY DISEASE. *EDUCATION SCIENCE AND INNOVATIVE IDEAS IN THE WORLD*, *21*(5), 89-96.
26. Kodirova, Sh. A. (2023). Features of the course of cholelithiasis in patients with coronary heart disease.
27. Isomovna, N. Y., Otaxonovich, J. O., Payzullayevna, M. G., & Toxirovna, B. N. (2023). ASPECTS OF CLINICAL PATHOGENETIC EARLY DIAGNOSIS OF CHRONIC HEART FAILURE IN CHRONIC KIDNEY DISEASE.
28. Jabbarov, O. O., Umarova, Z. F., Saidaliev, R. S., Tursunova, L. D., Khuzhaniyazova, N. K., Kodirova, Sh. A., & Nadirova, Y. I. (2023). STUDY OF THE INFLUENCE OF

VARIOUS GENES ON THE DEVELOPMENT OF DIABETIC NEPHROPATHY IN TYPE 2 DIABETES MELLITUS.

29. Jabbarov, O., Aminova, G. A., Mambetova, D. K., Saydaliyev, R., Maksudova, M., Tursunova, L., ... & Nadirova, Y. (2023). *OPTIMIZATION OF THERAPY FOR CARDIORENAL SYNDROME IN PATIENTS WITH CHRONIC HEART FAILURE* (Doctoral dissertation, OPTIMIZATION OF THERAPY FOR CARDIORENAL SYNDROME IN PATIENTS WITH CHRONIC HEART FAILURE).
30. Jumanazarov, S. B., & Bobosharipov, F. G. TREATMENT OF STABLE CORONARY HEART DISEASE: FOCUS ON B-ADRENOBLOCKE