Clinical features of chronic heart failure with preserved ejection fraction in patients with essential arterial hypertension

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Abstract: The purpose of this investigation was to analyze the clinical condition, health-related quality of life, level of physical activity, and cardiac structural-functional characteristics in individuals diagnosed with chronic heart failure with preserved ejection fraction (HFpEF). Materials and methods. The study enrolled 72 patients between 47 and 77 years of age who met diagnostic criteria for HFpEF. The evaluation protocol incorporated assessment of clinical status, completion of the Minnesota Heart Failure Quality of Life Questionnaire, the six-minute walk test, comprehensive echocardiographic examination, and quantification of serum NT-proBNP. Results. Exertional dyspnea represented the most frequent presenting complaint, reported by 95.8 percent of participants. Structural myocardial alterations and functional impairment were more severe among patients with higher functional class. Median quality-of-life scores were 21.5 [14.5; 40.0] in men and 48.5 [36.0; 59.0] in women. Physical-exercise tolerance demonstrated a significant correlation with quality-of-life indices ($r = -0.39$; $p = 0.002$). Conclusions. Echocardiographic signs of left ventricular diastolic dysfunction were present in all subjects. Advancing functional class of heart failure corresponded with progressive myocardial hypertrophy, decline in quality of life, and reduced exercise capacity. Male patients showed better quality-of-life measurements compared with female patients. Diabetes mellitus and ischemic heart disease were associated with a more unfavorable HFpEF course.

Keywords: HFpEF, diastolic dysfunction, health-related quality of life

INTRODUCTION

Chronic heart failure (CHF) remains a critical public health challenge in developed countries due to its high prevalence and substantial mortality burden. The proportion of patients with chronic heart failure and preserved ejection fraction (HFpEF) of the left ventricle has been steadily increasing and, according to several authors, now accounts for 40-55 percent of all CHF cases. In our country, findings from the EPOCHA-O-CHF study indicate that this figure reaches 73 percent or more [5]. Despite its widespread occurrence, HFpEF has become the focus of systematic

investigation only in recent years. The diagnostic criteria for HFpEF remain a subject of ongoing debate, and many aspects of the condition still lack consensus.

Literature suggests that HFpEF most commonly develops in the context of essential arterial hypertension and/or ischemic heart disease. When these two conditions coexist, the likelihood of HFpEF rises markedly. Comorbid diabetes mellitus and obesity are additional risk factors that significantly contribute to the development of HFpEF . Other predisposing factors include aortic valve pathology and chronic kidney disease. Evidence concerning age associations is variable; nevertheless, most researchers report an increasing proportion of HFpEF among older adults.

The objective of this study was to evaluate clinical status, quality of life, physical performance, and cardiac structural and functional characteristics, as well as the interrelationships among these parameters, in patients diagnosed with HFpEF.

MATERIALS AND METHODS

A total of 72 patients with HFpEF, aged 47 to 77 years (mean age 59.6 ± 7.8 years), were evaluated in this study. Essential hypertension was identified as the etiological factor in 35 patients (48.6 percent), whereas the remaining 37 individuals (51.4 percent) had HFpEF in the setting of combined hypertension and ischemic heart disease.a

Diagnosis of HFpEF was established in accordance with the National Guidelines of the All-Russian Scientific Society of Cardiology and the Heart Failure Association (third revision, 2009). Hypertension and ischemic heart disease were verified using standard diagnostic criteria.

The inclusion criteria required written informed consent, age between 40 and 80 years, and confirmed HFpEF corresponding to stages I-IIA and functional classes I-III, occurring in the context of hypertension.

Exclusion criteria included left ventricular ejection fraction below 45 percent; myocardial infarction or unstable angina within the preceding three months; hemodynamically significant valvular defects; decompensated heart failure of functional class IV; secondary forms of hypertension (vasorenal, endocrine, neurogenic, drug-induced, etc.); clinically significant supraventricular or ventricular arrhythmias; advanced pulmonary, hepatic, or renal disorders; and malignant diseases.

All participants underwent a comprehensive clinical assessment, including evaluation of heart failure symptoms using the Clinical State Scale (R. Cody, 1993; modified by V.Yu. Mareev, 2000). Physical capacity was assessed with the six-minute walk test, and the distance walked was recorded in meters.

Health-related quality of life, encompassing physical, psychosocial, and socioeconomic dimensions, was assessed with the Minnesota Living with Heart Failure Questionnaire (MLHFQ).

Structural and functional cardiac parameters were examined using standard transthoracic echocardiography with M-mode, two-dimensional imaging, and Doppler modalities (SonoScape 8000 and VIVID 3). Measurements included right atrial size, right ventricular dimension, left atrial dimension, interventricular septal thickness, posterior wall thickness, left ventricular end-systolic and end-diastolic diameters, and ejection fraction.

Diastolic function was assessed by determining peak early filling velocity (E), late filling velocity during atrial contraction (A), the E/A ratio, isovolumic relaxation time (IVRT), and deceleration time (DT). Left ventricular remodeling was characterized by calculating relative wall thickness (RWT) and left ventricular mass index (LVMI). RWT was computed as the ratio of septal and posterior wall thickness to left ventricular end-diastolic diameter. Values of 0.45 or greater were considered elevated.

LV mass (g) was calculated using the corrected American Society of Echocardiography formula (Devereux, Alonso et al., 1986): $LV\ mass = 0.8 \times [1.04 \times (IVS + LVEDD + PW)^3 - (LVEDD)^3] + 0.6$. Body surface area was determined according to the DuBois and DuBois (1916) equation. Normal LVMI was defined as below 110 g/m² in women and below 125 g/m² in men.

Serum NT-proBNP levels were measured using an enzyme-linked immunoassay. Statistical analysis was performed using Statistica 6.1. Normally distributed variables were expressed as mean and standard deviation, while non-normally distributed data were presented as median and interquartile ranges. Distribution characteristics were assessed by graphical methods and the Shapiro-Wilk test. A p-value above 0.05 indicated an approximately normal distribution.

For normally distributed data with equal variances, the independent-sample Student t-test was used. For non-normally distributed variables, the Mann-Whitney U-test was applied. Comparisons across three or more independent groups included post hoc analysis. Categorical variables were described using absolute and relative frequencies. Correlations were evaluated with Spearman's rank correlation coefficient. Statistical significance was defined as $p < 0.05$.

RESULTS

Clinical evaluation showed that most patients (nearly 96 percent) experienced shortness of breath during physical activity, and a small subgroup had dyspnea even at rest. More than half of the patients had mild swelling of the feet and lower legs, and about one-quarter had noticeable edema. Pulmonary congestion was confirmed

by auscultatory crackles in 14 percent of cases. Enlarged liver was present in roughly 17 percent of patients, while other symptoms were uncommon.

Patients were assigned to functional classes I, II, and III. Those with higher classes showed more advanced cardiac structural changes and poorer exercise performance. A significant relationship was found between increasing age and LV mass index. Sex also influenced structural characteristics. Men demonstrated larger ventricular size, greater LV mass, and higher LV mass index compared with women, even after adjustment for body surface area. These findings mirror previously published observations. NT-proBNP levels did not differ substantially across functional classes. Quality of life progressively worsened as functional class increased. Higher questionnaire scores reflected poorer well-being. Men reported better quality of life than women across all subdomains, including physical, socioeconomic, and emotional aspects. This gender difference persisted in early heart failure stages but became less pronounced in class III. Quality of life was closely linked to physical capacity. A negative correlation was found between total questionnaire score and the distance covered in the 6-minute walk test. All patients showed evidence of LV diastolic dysfunction on echocardiography. Two patterns were identified: the hypertrophic filling pattern dominated, while pseudonormal filling occurred in about one-third of patients. The hypertrophic pattern was most frequent in class II patients, whereas pseudonormal filling appeared more often in class III. Right ventricular size differed slightly between these groups. NT-proBNP values tended to be lower in the pseudonormal group, although the difference was not statistically significant. Exercise capacity and quality of life did not differ meaningfully between the diastolic patterns. Further analysis showed that isovolumic relaxation time correlated positively with several cardiac dimensions and wall measurements. Right ventricular size was negatively associated with both early filling velocity and the E/A ratio. Left ventricular remodeling was evaluated according to the Ganau model. Concentric hypertrophy was the predominant pattern. Eccentric hypertrophy and concentric remodeling were less common, while normal geometry was rare. Patients with concentric remodeling showed milder symptoms and better exercise tolerance than those with hypertrophic remodeling. Patients with coronary disease but without previous myocardial infarction demonstrated worse physical capacity and more severe clinical symptoms than those with hypertension alone. Individuals with a history of myocardial infarction had larger chamber dimensions, greater hypertrophy, and higher NT-proBNP concentrations. Diabetes mellitus was associated with reduced walking distance and higher symptom severity, consistent with earlier publications.

Hypertension stage correlated with several cardiac parameters, including right ventricular size and LV mass, and was also associated with poorer quality of life. The

relationship with physical performance was inverse: higher hypertension stage predicted shorter walking distance.

CONCLUSION

1. All patients with HFpEF demonstrated echocardiographic evidence of left ventricular diastolic dysfunction. At early stages of heart failure, non-restrictive variants such as hypertrophic and pseudonormal patterns predominated. No statistically significant differences were found between these types in terms of clinical manifestations, quality-of-life indicators, or exercise tolerance.

2. As the functional class of HF increases, a progressive decline in exercise capacity is observed, accompanied by poorer quality of life and greater left ventricular hypertrophy. In this cohort, no correlation between NT-proBNP concentrations and HF functional class was identified.

3. A history of coronary artery disease or diabetes mellitus had an adverse impact on exercise tolerance and overall clinical status. According to the Minnesota Living with Heart Failure Questionnaire, women demonstrated lower quality-of-life scores compared with men.

4. Advancing stages of arterial hypertension were associated with more pronounced structural and functional myocardial abnormalities, reduced physical-activity tolerance, and overall lower quality-of-life metrics.

References

1. Alisherovna, K. M. (2025, July). FEATURES OF BONE MINERAL DENSITY IN PATIENTS WITH DISEASES OF THE DIGESTIVE SYSTEM. In CONFERENCE OF ADVANCE SCIENCE & EMERGING TECHNOLOGIES (Vol. 1, No. 3, pp. 118-125).

2. Alisherovna, K. M. (2025, July). RHEUMATOID ARTHRITIS AND PREGNANCY. In CONFERENCE OF MODERN SCIENCE & PEDAGOGY (Vol. 1, No. 4, pp. 169-176).

3. Alisherovna, K. M. CYSTATIN C IS AN EARLY MARKER OF DECREASED KIDNEY FUNCTION. Alisherovna, KM, & Tatlibayevich, YS SCHOLASTICO-2021.

4. Alisherovna, K. M., Davranovna, M. H., & Nizametdinovich, K. S. (2022). Chronic heart failure in women. Central Asian Journal of Medical and Natural Science, 3(1), 21-25.

5. Alisherovna, M. K. (2021). 24-Hour Abp Monitoring Of Blood Pressure In Patients With Chronic Heart Failure And The State Of Kidney Function. Central Asian Journal of Medical and Natural Science, 2(1), 197-204.

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

7. 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.

8. Khusainova, M. A. (2025, November). Cystatin And Kidney Function. In International Conference on Global Trends and Innovations in Multidisciplinary Research (Vol. 1, No. 5, pp. 56-60).

9. 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.

10. Khusainova, M. A., Eshmamatova, F. B., Ismoilova, K. T., & Mamadiyorova, M. M. (2023). METABOLIC SYNDROME IN RHEUMATOID ARTHRITIS AS A CRITERION OF CARDIOVASCULAR RISK. Oriental renaissance: Innovative, educational, natural and social sciences, 3(1), 331-339.

11. 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.

12. Khusainova, M. A., Khaydarov, S. N., Makhmudova, K. D., & Ortikova, S. X. (2023). Features of prevention of chronic kidney diseases and chronic heart failure. Science and Education, 4(5), 242-250.

13. Khusainova, M. A., Khaydarov, S. N., Uzokov, J. B., & Karabayeva, G. K. (2023). KIDNEY CONDITION IN PATIENTS WITH CHRONIC HEART FAILURE. Oriental renaissance: Innovative, educational, natural and social sciences, 3(2), 102-112.

14. 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.

15. Mamasoliyevna, D. N., Akmalovna, K. N., & Alisherovna, K. M. (2022). Quality of life depending on gender. The Peerian Journal, 11, 71-77.

16. Toshtemirovna, E. M. M., Alisherovna, K. M., Totlibayevich, Y. S., & Xudoyberdiyevich, G. X. (2022). Anxiety disorders and coronary heart disease. The Peerian Journal, 11, 58-63.

17. Uzokov, J. B., Khusainova, M. A., Eshmamatova, F. B., & Mamadiyorova, M. M. (2023). Correction of violations rheology of blood in ischemic heart disease. Science and Education, 4(2), 153-159.