MORPHOFUNCTIONAL PARAMETERS OF THE HEART IN WOMEN SUFFERING FROM ESSENTIAL ARTERIAL HYPERTENSION IN POSTMENOPAUSE AND ON THE BACKGROUND OF TREATMENT

Khusainova Munira Alisherovna
Toirov Doston Rustamovich
Khaydarov Sanjar Nizamitdinovich
Kamolova Diyora Djamshedovna
Samarkand State Medical University

ABSTRACT

The natural cessation of estrogen production occurring during menopausal to the development of endothelial dysfunction and increased thrombosis activity along with a change in the balance of vasoconstrictors/vasodilators. In this connection, the study of the features of morphofunctional heart parameters in women suffering from arterial hypertension that developed during menopause and the therapeutic response to the use of an angiotensin-converting enzyme inhibitor is an urgent research task. With the onset of menopause, the frequency of arterial hypertension (AH) in women significantly increases. In perimenopausal women suffering from menopausal syndrome, the incidence of hypertension increases to 52.4%. This, in turn, increases the risk of coronary heart disease (CHD) by 3 times, and stroke - 7 times. The sex hormones produced throughout the reproductive period of a woman's life, estrogens, have a fairly extensive spectrum of action on the body, but the most important among them is the direct and indirect effect on the cardiovascular system. Direct action is implemented through maintaining balance: endothelium-dependent and endothelium-independent vasodilation. By influencing the cardiomyocyte, estrogens indirectly act on the regulation of the antioxidant and lipid status of the body. In addition, estrogens inhibit the expression of adhesion molecules and platelet aggregation, and also have an antithrombotic effect.

Keywords: *arterial hypertension, menopause, morphofunctional parameters of the heart, left ventricular hypertrophy, ACE inhibitors*

АННОТАЦИЯ

Естественное прекращение продукции эстрогенов, происходящее в период менопаузы с развитием эндотелиальной дисфункции и повышением активности тромбоза, с изменением баланса вазоконстрикторов/вазодилататоров. В связи с этим изучение особенностей морфофункциональных показателей сердца у женщин, страдающих артериальной гипертензией, развившейся в период менопаузы, и терапевтического ответа на применение ингибитора

ангиотензинпревращающего фермента является актуальной исследовательской задачей. С наступлением менопаузы частота артериальной гипертензии (АГ) у женщин значительно возрастает. У женщин в перименопаузе, страдающих климактерическим синдромом, частота артериальной гипертензии возрастает до 52,4%. Это, в свою очередь, повышает риск развития ишемической болезни сердца (ИБС) в 3 раза, а инсульта - в 7 раз. Половые гормоны, вырабатываемые на протяжении всего репродуктивного периода жизни женщины, эстрогены, обладают достаточно широким спектром действия на организм, но наиболее важным среди них является прямое и косвенное влияние на сердечно-сосудистую систему. Прямое действие реализуется за счет поддержания баланса: эндотелийзависимой и эндотелийнезависимой вазодилатации. Влияя на кардиомиоцит, эстрогены опосредованно воздействуют на регуляцию антиоксидантного и липидного статуса организма. Кроме того, эстрогены ингибируют экспрессию молекул адгезии и агрегацию тромбоцитов, а также обладают антитромботическим действием.

Ключевые слова: *артериальная гипертензия, менопауза, морфофункциональные параметры сердца, гипертрофия левого желудочка, ингибиторы АПФ.*

INTRODUCTION

From the perspective of modern concepts, arterial hypertension (AH) is a multifactorial disease, i.e. both internal (genetic) and external factors are involved in its formation. This circumstance determines the possibility of pathophysiological and clinical polymorphism. HYPERTENSION is not a "one-person" disease, it has many faces and is not constant in its course. The level of blood pressure (BP) is determined by two main parameters - minute volume (MO) and total peripheral vascular resistance (OPSS) blood flow in resistive vessels (small arteries and arterioles). In the development of hypertension, violations from the hemodynamic mechanisms of regulation are clearly traced. Thus, the close relationship between the MO and the OPSS is violated. But the nature of changes in cardiac hemodynamics is not the same even in one patient at different stages of the disease. However, almost all patients have an increased or normal MO value in the absence of adequate resistance to blood flow. The progression of the process leads to a decrease in MO indicators and an increase in OPSS. These changes are associated with an increase in structural changes of the heart (myocardial hypertrophy with deterioration of its diastolic relaxation) and blood vessels (hypertrophy of the muscle layer with a decrease in the lumen), remodeling of the cardiovascular system. Traditionally, left ventricular hypertrophy

(LVH) is considered as an independent marker of a high risk of cardiovascular diseases, including the risk of sudden death, as well as as an essential mechanism for the formation of left ventricular (LV) diastolic dysfunction. Last This circumstance is of particular importance, since most researchers associate the change in the abnormal hemodynamic structure of LV cavity filling in LVH with progressive remodeling of the heart and blood vessels and the subsequent high risk of clinically pronounced heart failure. Therefore, recently a lot of attention has been paid to the study of the prospects of regression LVH in patients with arterial hypertension, which is associated with an improvement in the prognosis of the disease. In this regard, the purpose of the study was to study the features of morphofunctional heart parameters in women suffering from arterial hypertension of the II degree of severity, developed during menopause and with the use of an angiotensin converting enzyme inhibitor.

MATERIALS AND METHODS

The study group included 150 postmenopausal women with a last menstrual period of about three years (the average age of patients is 53.5+0.5 years) suffering from grade II hypertension. The control group included 40 postmenopausal women (average age 54.5+1 years) who did not suffer from hypertension. The diagnosis of hypertension was carried out in accordance with the WHO-MOAG recommendations of 1999, and the presence of menopause was determined by the level of follicle-stimulating hormone, which should exceed 31.0 mMU/ml, which is a reliable criterion for its onset. The duration of the disease is 4.3 + 1.2 years. There were no significant differences between the compared subgroups and the control by age composition. In addition to the general clinical examination, all patients underwent daily monitoring of blood pressure using AVRM-02 monitors manufactured by MEDITECH (Hungary) and OMRON (Germany). The results of daily monitoring were statistically calculated on a computer using special computer programs supplied with the monitor. The study of morphometric parameters and percussion of the heart was carried out on the OCUSON device (Japan) in M- and B-modes using Doppler technology. Derived indicators (cardiac index, total peripheral vascular resistance) were calculated according to generally accepted formulas. The patients were on inpatient treatment.

The results of the study. The study of the initial values of the studied morphofunctional parameters of the heart in women with hypertension of II severity, which developed during menopause upon admission to the hospital, showed the following results: significantly higher values of myocardial mass (by 23%), left ventricular mass index (by 3.9 times), final diastolic and systolic sizes (by 17 % and 25%, respectively), final diastolic and systolic volumes (by 42% and 2 times),

average blood pressure (by 33%). At the same time, the initial value of the ejection fraction was 22% lower than the standard value. When studying the effect of the use of enalapril on the studied parameters at the inpatient stage of treatment before discharge, a significant decrease in comparison with the baseline level of all the morphofunctional parameters of the heart listed above was noted: MM - by 7%, IMLJ - by 6%, CDR - by 7%, DAC - by 10%, CDO - by 15%, CSR - by 23 %, AD cf. - by 12%, OPSS - by 19%. At the same time, the PV index significantly increased by 13% compared to the baseline. However, not one of these parameters is not I was returning to the normative values.

The table presents data on changes in morphofunctional parameters of the heart in women with hypertension of II severity, detected in the postmenopausal period at the inpatient stage of treatment.

Table.

Dynamics of morphofunctional parameters of the heart at the inpatient stage of treatment of patients with arterial hypertension

Indicators	Normative values	Indicators before the start of treatment	Indicators at the end of the inpatient stage of treatment
Weight myocardium, g	153,8 + 4,33	189,1 + 4,331	175,7 + 3,561,2
IMMLJ, g/m^2	24,8 + 0,65	97,1 + 1,871	91,2 + 1,731,2
CDR, mm	46,0 + 0,60	53,7 + 1,311	49,9 + 1,151,2
DAC, mm	29,1 + 0,60	39,2 + 1,261	35,2 + 0,741,2
BWW, ml	98,5 + 2,71	140,0 + 7,461	119,5 + 5,791,2
CSR, ml	33,3 + 1,43	67,7 + 5,021	51,8 + 2,621,2
UO, ml	65,2 + 1,86	72,6 + 6,11	72,7 + 4,51
UI, ml/m2	-	37,3 + 2,83	37,6 + 2,24
FW, %	65,8 + 0,96	51,6 + 1,421	58,2 + 1,181,2
Heart rate, beats/min	-	73,1 + 2,49	75,4 + 3,74
MOQ, l/min	4,8 + 1,2	5,3 + 0,54	5,4 + 0,31
SI, l/min x m2	-	2,7 + 0,25	2,8 + 0,13
Average blood pressure, mmHg.	89,8 + 1,45	119,1 + 2,671	104,5 + 2,171,2
OPSS, din/s x cm-5	-	1964,4 + 131,8	1597,1 + 99,12

Note: 1 - values significantly (P<0.05) different from the standard values; 2 - values significantly different from the results before treatment. IMLJ - left ventricular myocardial mass index; IMLJ - left ventricular myocardial mass index; Heart rate -

heart rate; SI - heart index; IOC - minute blood volume; PV - ejection fraction; OPSS - total peripheral vascular resistance. CDR - the final diastolic size; CSR - the final systolic size;> KDO - the final diastolic volume; CSR - the final systolic volume; UO - impact volume; UI is a shock index.

Along with the normalization of intracardiac hemodynamics in women suffering from hypertension of the II degree of severity, which developed during menopause, by the time of discharge from the hospital, there was a persistent decrease in systolic blood pressure by an average of 20-25 mmHg, diastolic - by 10-15 mmHg, a significant decrease in pathogenic complaints, improved sleep and general well-being, which indicated the normalizing effect of the applied antihypertensive therapy with enalapril (enap) on the main clinical manifestations of hypertension.

DISCUSSION OF THE RESULTS

The adverse effect of menopause on the risk of developing cardiovascular diseases, in particular hypertension, can be explained by the various metabolic disorders occurring during this period of a woman's life, developing in conditions of estrogen deficiency and, first of all, atherogenic changes in the blood lipid spectrum. The progressive frequency of hypertension in women after 50 years with a slight change in this indicator in men indicates the possible role of sex hormone deficiency as an additional risk factor for hypertension. The cause of LVH can be both internal and external factors. Internal factors are disorders of expression or mutations in genes for proteins of the contractile apparatus of cardiomyocytes, among which the most studied are mutations in genes for heavy chains of β-myosin, cardiac troponin T, atropomyosin, myosin-binding protein C, light chains of myosin and cardiac a- actin. The most significant external factors can be considered overload by pressure and volume, stretching of myocytes and the impact of neurohumoral agents such as angiotensin, endothelin-1, catecholamines (KA), interleukin-1, etc. Despite the variety of stimuli for the development of hypertrophy, the final mechanisms of the hypertrophic response of cardiomyocytes are realized at the cellular level through stimulation of intracellular signaling cascades and changes in the expression of a number of genes. At the same time, the mechanisms of hypertrophy development at the cellular level in vivo have not been fully established. Whereas a deeper and more detailed study of the sequence of intracellular events is extremely necessary, since it can to promote the development of new directions in the treatment of hypertrophy. At the same time, it is known that LVH regression is an active process, largely not caused by hemodynamic factors, controlled by numerous neurohumoral influences and associated with the intensity of antiproliferative effects of the drug used. The leading role of hyperactivation of the renin-angiotensin system (RAS) in the

regulation of myocardial and vascular remodeling processes, including in LVH modeling, is shown. In this regard, the use of inhibitors angiotensin converting enzyme (ACE) limiting excessive activity RAS, for adequate control of blood pressure (BP) and LVH regression is very promising. It is expected that the regression of LVH with the help of ACE inhibitors, along with the implementation of the antihypertensive effect of the drug, will contribute to improving the profile of LV diastolic filling. ACE inhibitors also contribute to the normalization of myocardial relaxation without direct connection with adequate control of the level of systemic pressure. Decrease in systemic blood pressure with a decrease post-loading simultaneously with a decrease in venous return of blood to the heart causes a decrease in ventricular filling pressure. The cardioprotective effect of ACE inhibitors is also due to their effect on the local renin-angiotensin system with effects on hypertrophy, dilation, remodeling of the myocardium, as well as on the structure of the vascular wall of the coronary arterie. As clinical studies have shown, enalapril (ednit) after 16 weeks of therapy, along with a decrease in the average daily systolic and diastolic blood pressure, contributes to reduction of left ventricular myocardial mass. Long-term course therapy with ACE inhibitors improves the contractile function of the myocardium, significantly reducing the final diastolic volume and final systolic volume with an increase in cardiac output and ejection fraction. At the same time, correction of pathological asynchrony of the myocardium of the right and left ventricles was noted. Nevertheless, it is assumed that diastolic dysfunction, which is closely related to the remodeling processes not only of the myocardium, but also of the vessels, may contribute to contribution to the total risk of complications of cardiovascular diseases.

CONCLUSION

Thus, changes in the profile of LV diastolic filling and arterial endothelial dysfunction during treatment with enalapril in patients with hypertension may affect a decrease in the total risk of complications of cardiovascular diseases.

REFERENCES

1. Alisherovna, K. M. (2023). CYSTATIN C AND COLLAGEN TYPE IV IN CHRONIC KIDNEY DISEASE DIAGNOSIS IN PATIENTS WITH TYPE 2 DIABETES MELLITUS. *Web of Scientist: International Scientific Research Journal*, *4*(1), 100-110.
2. 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.

3. 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.
4. Jamshedovna, K. D., Alisherovna, K. M., Davranovna, M. K., & Xudoyberdiyevich, G. X. (2022). EPIDEMIOLOGY AND FEATURES OF ESSENTIAL THERAPY HYPERTENSION IN PREGNANT WOMEN. *Web of Scientist: International Scientific Research Journal*, *3*(5), 606-611.
5. Jamshedovna, K. D., Alisherovna, K. M., Erkinovna, K. Z., & Davranovna, M. K. (2022). LEFT VENTRICULAR SYSTOLIC DYSFUNCTION IN PREGNANT WOMEN WITH PRE-ECLAMPSIA WITHOUT PROTEINURIA. *Spectrum Journal of Innovation, Reforms and Development*, *10*, 135-140.
6. Khabibovna, Y. S., & Abdukodirovna, A. S. (2021). CHANGES IN THE DIASTOLIC FUNCTION OF THE RIGHT VENTRICLE IN ARTERIAL HYPERTENSION. *Web of Scientist: International Scientific Research Journal*, *2*(11), 161-169.
7. Nizamitdinovich, K. S., & Alisherovna, K. M. (2022). Quality of Life in Patients with Chronic Heart Failure, After Cardiac Resynchronization Therapy. *Texas Journal of Medical Science*, *14*, 168-173.
8. Nizamitdinovich, K. S., Alisherovna, K. M., Erkinovna, K. Z., & Davranovna, M. K. (2022). Heart Lesions in Rheumatological Diseases. *Texas Journal of Medical Science*, *13*, 91-94.
9. Rustamovich, T. D., Alisherovna, K. M., Baxtiyorovich, U. J., & Abdurakhmonovich, M. M. (2022). Painless Cardiac Ischemia in Women with Rheumatoid Arthritis. *Texas Journal of Medical Science*, *13*, 95-98.
10. Rustamovich, T. D., Alisherovna, K. M., Nizamitdinovich, K. S., & Djamshedovna, K. D. (2022). Gastrointestinal Conditions in Rheumatoid Arthritis Patients. *Texas Journal of Medical Science*, *15*, 68-72.
11. Toshtemirovna, E. M. M., Alisherovna, K. M., Erkinovna, K. Z., & Xudoyberdiyevich, G. X. (2022). DIAGNOSIS OF CIRRHOTIC CARDIOMYOPATHY. *Spectrum Journal of Innovation, Reforms and Development*, *10*, 141-147.
12. 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.
13. Toshtemirovna, E. M. M., Alisherovna, K. M., Totlibayevich, Y. S., & Muxtorovna, E. M. (2022). Hearts In Rheumatoid Arthritis: The Relationship With

Immunological Disorders. *Spectrum Journal of Innovation, Reforms and Development*, *4*, 34-41.

14. Totlibayevich, Y. S., Alisherovna, K. M., Xudoyberdiyevich, G. X., & Toshtemirovna, E. M. M. (2022). Risk Factors for Kidney Damage in Rheumatoid Arthritis. *Texas Journal of Medical Science*, *13*, 79-84.

15. Xudoyberdiyevich, G. X., Alisherovna, K. M., Davranovna, M. K., & Toshtemirovna, E. M. M. (2022). FEATURES OF HEART DAMAGE IN PATIENTS WITH VIRAL CIRRHOSIS OF THE LIVER. *Spectrum Journal of Innovation, Reforms and Development*, *10*, 127-134.

16. Xudoyberdiyevich, G. X., Alisherovna, K. M., Toshtemirovna, E. M. M., & Totlibayevich, Y. S. (2022). Characteristics Of Neuropeptides-Cytokines in Patients with Cardiovascular Pathology Occurring Against the Background of Anxiety and Depressive Disorders. *The Peerian Journal*, *11*, 51-57.

17. Xudoyberdiyevich, G. X., Alisherovna, K. M., Toshtemirovna, E. M., & Jamshedovna, K. D. (2022). FEATURES OF PORTAL BLOOD CIRCULATION AND ECHOGRAPHIC STRUCTURE OF THE LIVER IN PATIENTS WITH CHRONIC HEART FAILURE. *Web of Scientist: International Scientific Research Journal*, *3*(5), 576-581.

18. Yarmatov, S. T., & Xusainova, M. A. (2021). BRONXIAL ASTMA MAVJUD BO'LGAN BEMORLARDA GASTROEZOFAGIAL REFLYUKS KASALLIGI DIAGNOSTIKASI VA OLIB BORISH ALGORITMI. *Scientific progress*, *2*(2), 208-213.

19. Yarmatov, S. T., & Xusainova, M. A. (2021). YURAK ISHEMIK KASALLIGI MAVJUD BO'LGAN BEMORLARDA. *Scientific progress*, *2*(3), 785-791.

20. Yarmukhamedova, S., Nazarov, F., Mahmudova, X., Vafoeva, N., Bekmuradova, M., Gaffarov, X., ... & Xusainova, M. (2020). Features of diastolic dysfunction of the right ventricle in patients with hypertonic disease. *Journal of Advanced Medical and Dental Sciences Research*, *8*(9), 74-77.

21. Yarmukhamedova, S., Nazarov, F., Mahmudova, X., Vafoeva, N., Bekmuradova, M., Gafarov, X., ... & Xusainova, M. (2020). Study of indicators of intracardial hemodynamics and structural state of the myocardium in monotherapy of patients with arterial hypertension with moxonidin. *Journal of Advanced Medical and Dental Sciences Research*, *8*(9), 78-81.

22. Yusufovich, N. F., & Khabibovna, Y. S. (2022). MEDICAL AND SOCIAL ASPECTS OF PREVENTION AMONG STUDENTS IN THE CONDITIONS OF COVID-19 PANDEMICS. *Web of Scientist: International Scientific Research Journal*, *3*(12), 860-865.

23. Хусаинова, М. (2021). CHRONIC HEART FAILURE IN PATIENTS WITH EARLY RHEUMATOID ARTHRITIS. *Журнал кардиореспираторных исследований*, *2*(4), 67-69.
24. Хусаинова, М. А. (2022). OZONETHERAPY IN RESTORATIVE TREATMENT PATIENTS WITH CORONARY HEART DISEASE. *Журнал кардиореспираторных исследований*, *3*(4).
25. Ярмухамедова, С. Х., & Афмирова, Ш. А. (2022). Изменения диастолической функции правого желудочка при гипертонической болезни. *Science and Education*, *3*(11), 270-280.
26. Ярмухаммедова, С. (2020). ОЦЕНКА ПРИЗНАКОВ ДИАСТОЛИЧЕСКОЙ ДИСФУНКЦИИ ПРАВОГО ЖЕЛУДОЧКА У БОЛЬНЫХ С АРТЕРИАЛЬНОЙ ГИПЕРТОНИЕЙ. *Журнал кардиореспираторных исследований*, *1*(2), 88-92.