International Journal of Pediatrics and Genetics
Vol. 3 No. 06 (2025)
ISSN: 2995-5483

STATE OF THE SYMPATHO-ADRENAL SYSTEM IN WOMEN WITH METABOLIC SYNDROME DURING THE CLIMACTERIC PERIOD

Tashtemirova I.M., Kosimov I.S.
Andijan State Medical Institute, Uzbekistan

Abstract: The aim of this work was to study the relationship between disorders of the functional state of the sympathetic-adrenal system in women in the climacteric period and metabolic syndrome. The results of the studies showed that with metabolic syndrome, the sympathetic-adrenal system and lipid peroxidation processes are activated. With the onset of menopause, women with hypertension experience an increase in the average daily systolic blood pressure, as well as the speed and magnitude of its morning rise, which are more pronounced in the postmenopausal period. The formation and development of hypertension in women in the climacteric period occurs against the background of activation of the sympathetic nervous system.

Keywords: Metabolic syndrome , limacteric syndrome , sympatho - adrenal system , arterial hypertension, menopause.

Introduction: Metabolic syndrome MS is a comorbid disease that includes several pathologies at once: **diabetes** mellitus , arterial hypertension , obesity , coronary heart disease . The term "syndrome X" was first introduced at the end of the 20th century by the American scientist Gerald Reaven . The disease most often affects people aged 35 to 65 years, mainly male patients suffer. In women, the risk of developing the syndrome after menopause increases 5 times. AG is often one of the first clinical manifestations of MS. [4 , 10] To understand atherosclerosis, hypertension and coronary heart disease , it is necessary to study biogenic amines (adrenaline, noradrenaline, serotonin, etc.) and their precursors, metabolic products and enzymes involved in their metabolism . [1, 2]. Of course, the fundamental role in the formation of hypertension in perimenopause is attributed to the deficiency of female sex hormones, which is natural for the climacteric period, but the main mechanisms of increasing blood pressure are universal and are associated primarily with the activation of the sympathetic-adrenal (SAS) and renin-angiotensin- aldosterone systems (RAAS), as well as with dysfunction of the vascular endothelium. [3, 4]. During the climacteric period, as a result of a deficiency of sex hormones, arterial hypertension often develops, the general somatic and cardiohemodynamic manifestations of which reduce the quality of life of women and shorten its duration. However, the characteristics and patterns of manifestation of psychosomatic disorders in arterial hypertension in women in the climacteric period require further study.

The aim of the work : to study the functional activity of the sympathetic-adrenal system and clinical and functional features in women in the climacteric period. with metabolic syndrome.

Materials and methods: In a hospital setting, 42 examined women aged 25-49 years were randomized into the following 3 groups: Group I (control) – healthy individuals aged 25-40 years – 15 people; Group II – patients with arterial hypertension – 14 people aged 30-49 years; Group III – patients with MS – 28 women aged 30-49 years. The diagnosis in all examined patients was made on the basis of clinical observation data, laboratory analysis and functional diagnostics. MS was made on the basis of recommendations of experts from the All-Russian Society of Cardiologists. The stage and degree of hypertension were determined according to the recommendations of WHO and the International Society of Hypertension (1999) and in accordance with the classification adopted at a meeting of the All-Russian Scientific Society of Cardiologists. For a quantitative assessment of the severity of climacteric syndrome, the Kupperman menopausal index (modified by E.V. Uvarova), which is generally accepted in clinical practice, was used. In this case, the identified neurovegetative manifestations of climacteric syndrome were considered mild at 10-20 points, moderate - 21-30 points, severe - more than 30 points. Instrumental examination: General clinical examination was carried out according to generally accepted programs (clinical blood test, urine, ECG, chest X-ray, etc.) . Determination of adrenaline (A), noradrenaline (NA), dopamine (DA) and DOPA in daily urine was performed by trioxyindole fluorimetric method modified by E.Sh. Matlina , Z.M. Kiseleva, I.E. Sofieva. Determination of the content of catecholamine conjugates (CA) in urine was performed using the method described by T.I. Lukicheva, V.V. Menshikov, T.D. Bolshakova. The results of clinical studies were processed using applied statistical processing programs of the Excel program , as well as by the method of variation

statistics using Student's t-criteria tables. Differences between arithmetic means were considered statistically significant at p<0.05.

Results and discussion. The maximum level of total cholesterol, triglycerides, LDL is observed in group III , compared with the control and groups II at t > 2 according to the Student's criterion (P<0.05; P<0.01; P<0.001). Compared with the control, the value of total cholesterol in patients with hypertension increased by 42.2%, and in women with MS - by 51.1%. The content of triglycerides in group III exceeded the control value by 46.6%, in group II by 20%. The level of LDL in group II exceeded the control group by 60.7%, the content of LDL in group III increased by 85.7% compared with the healthy group. HDL in groups II and III is reduced compared with the control. Blood pressure fluctuations were significantly more common in postmenopausal women. 90.3% of individuals, and with preserved ovarian function only in 15.7% of patients. Increased blood pressure in menopausal women was accompanied by the symptom complex "hot flashes" in 81.2% of cases. Also, in all the observed groups there were patients with type II diabetes mellitus (2.6% of women with preserved ovarian function and 20% of postmenopausal women), which may indicate a relationship between carbohydrate and lipid metabolism disorders in women in the climacteric period. The tendency to an increase in the incidence of type II diabetes in the postmenopausal period (20% compared to 2.6% of women in the control group, p < 0.05) indicates the progression of metabolic disorders in the observed category of patients with the development of menopause. When comparing the first and second groups, the difference in blood glucose levels was 7.1%, and in groups I and III - 47.6%.

Table 1 .

Daily urinary excretion of catecholamines in healthy subjects and patients with metabolic syndrome

Groups	Catecholamines									
	A, mcg/ day			NA, mcg/ day			DA, mcg/ day			DOPA mcg/ day
	St.	Con.	Sum.	St.	Con.	Sum.	St.	Con.	Sum.	
I	4.5 ± 0.1	3.7 ± 0.2	8.2 ± 0.2	8.9 ± 0.2	9.2 ± 0.1	18.1 ± 0.2	79.2 ± 6.2	182.6+ 5.8	461.8+ 6.4	47.3 ± 0.8
II	6.0 ± 0.1***	5.8 ± 0.2 ***	11.8 ± 0.2***	11.8 ± 0.1***	12.3 ± 0.1***	24.1 ± 0.2***	159.8 ± 5.1*	168.3 ± 4.6^	328.1 ± 8.6^	50.2 ± 0.6*
III	9.2 ± 0.3***	8.2 ± 0.2***	17.4 ± 0.2***	12.9 ± 0.4***	12.2 ± 0.3***	25.2 ± 0.2***	165.2+ 4.4*	159.4 ± 2.8^	324.6+ 9.4*	58.8 ± 0.8**

Note. A – adrenaline, NA – noradrenaline, DA – dopamine, MAO – monoamine oxidase , Free – free, Con. – conjugated, Sum. – total. * - P<0.05; ** - P<0.01; *** - P<0.001; ^ - unreliable.

In the study, we noted a statistically significant increase in the excretion of A and NA in the daily urine of patients with hypertension and MS. Thus, the daily excretion of total A in patients with hypertension compared to healthy individuals increased by 38.2% (P < 0.001), total NA by - 31.8%. Excretion in the daily urine of all fractions of DA and DOPA in patients with hypertension was statistically significantly lower than the control level. Excretion of free, conjugated and total A and NA in patients with MS was statistically significantly higher than the indicator for healthy individuals. The difference in DOPA excretion in MS was 39.1% (P < 0.001). Thus, we found a statistically significant increase in the daily excretion of free and conjugated forms of CA (A, NA, DA) in patients with MS. In the alimentary factor group, patients indicate excessive consumption of carbohydrates and fats. Excess body weight and obesity are considered the main components. The Quetelet index (body weight index) and the degree of abdominal obesity were determined in the examined patients . The waist circumference measurement in the I -group showed 78.8± 1,14 см, in the II -group 80.3±0.46 , and in group III - 102.5+ ± 1,5 см. Neurovegetative disorders were the most pronounced, and their severity significantly increased during the transition to postmenopause both in women with hypertension (from 22 to 29 points) and without hypertension (from 18 to 25 points). Thus, in premenopause, grade 1 hypertension occurred in 48.2% of women, and grade 2 - in 46.5%. During the transition to postmenopause, the number of patients with grade 2 hypertension sharply increased (81.6%) and a three-fold increase in persons with grade 3 hypertension (from 5.1% to 15%). The revealed changes in postmenopause in women with hypertension may be associated with their gradual adaptation to changed physical, psychological and social

conditions. Further growth of the stress of the sympathetic nervous system activity is aimed at mobilizing the internal reserves of the body. However, at one stage of this process, the catabolic direction of the effects of SAS begins to manifest itself, and a further increase in the activity of which becomes one of the main elements in the formation of this pathology and its complications.

Conclusions: Thus, the results of the conducted studies have shown that in MS there is activation of the sympathetic-adrenal system, expressed by an increase in the content of A and NA in the blood and urinary excretion of CA (A, NA, DA, their precursor DOPA). With the onset of menopause in women with hypertension, an increase in the average daily systolic blood pressure is noted, as well as the speed and magnitude of its morning rise, which are more pronounced in the postmenopausal period. A study of patients with metabolic syndrome showed a change in the functional activity of the sympathetic-adrenal system, which is increased excretion of free and conjugated forms of catecholamines with urine, in connection with which early correction is necessary to prevent the development of complications.

LITERATURE

1. Chibisov S.M., Rapoport S.I., Kolesnikov D.B., Metabolic syndrome: more questions than answers. Clinical medicine; No. 6. 2018. 30-35.
2. Smetnik V.P. Systemic changes in women during menopause / V.P. Smetnik //RMZh . -2023. -N6. -P. 16-23.4
3. Esler M.. Rumanier .. Wiesner G. et al. Sympathetic nervous system and insulin resistance. From obesite to diabetes. Am. J. Hypertens . 2021.14: 304-309.
4. Ogonov R.G., Perova N.V., Shcheltsina N.V. et al. Manifestations of metabolic syndrome in combination of arterial hypertension with individual coronary risk factors. Cardiology 2015. №7.27-33.
5. Sokolov E.I., Simonenko V.B., Zykova A.A., Srednyakov A.V. Clinical significance of detection of insulin resistance in women with metabolic syndrome. Cardiology 2016; 4: 24-29.
6. Sing Ch.F. , Boerwinkle E., Turner ST // Clin. and exper . - Theory and practice . - Vol. 8. — P. 623-651.
7. WHO-ISH Hypertension Guidelines Committee — World Health Organization — International society of Hypertension guidelines for the management of hypertension // J. Hypertens. -2023. -Vol. 17. -P. 151-185.
8. Canessa M. Increased sodium-lithium countertransport in red cells of patients with essential hypertension / M. Canessa, N. Adragna, H. Solomon et al. // The New England Journal of Medicine. -2020.- Vol. 302. -P. 772-776.
9. Bogoyavlenskaya O.V. Features of the manifestation of membrane disorders in the development of arterial hypertension in women // Proceedings of the II Russian scientific and practical conference "Human Health in the 21st Century". - Kazan, - V. 1. - P. 2023.
10. Reckelhoff JF. Gender differences in the regulation of blood pressure. Hypertension 2021; 37(5): 1199-1208.
11. Bittner V. Women and coronary heart disease risk factors. J Cardiovascular Risk 2022; 9 (6): 315-322.