ASSESSMENT OF RISK FACTORS AND ASSOCIATED CONDITIONS BY GENDER IN PATIENTS WITH III STAGE ARTERIAL HYPERTENSION

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ABSTRACT — The work investigates risk factors (RFs) and associated conditions (ACs) by gender in patients with stage III arterial hypertension (HTN). RFs and ACs were compared in men (45, average age 63.58 ± 9.12) and women (53, age 65.19 ± 10.02) with verified HTN. Age correlation of the parameters was carried out. In women, compared to men, HTN is diagnosed earlier, with longer disease duration (DD). Obesity (O), increased body mass index (BMI), left ventricular hypertrophy (LVH), decreased glomerular filtration rate (GFR) are more common. Women more often have acute cerebrovascular accidents (ACVAs) and transient ischemic attacks (TIAs), diabetes mellitus (DM). Men have a higher percentage of smokers, higher pulse pressure, damaged peripheral arteries. At the same time, ischemic heart disease (IHD) and heart failure (HF) are equally common. There is a multidirectional correlation between age and disease duration (DD), weight, lipid profile and blood glucose (BG) levels in both men and women.
Men and women have differences in the presence and severity of RFs, ACs and correlation between age and the studied parameters.

KEYWORDS — arterial hypertension, risk factors, associated conditions.

Arterial hypertension (HTN) is a multifactorial disease in which men and women share identical risk factors (RFs), but their combination may vary [1–4]. HTN is in turn a RF for the development of stroke, myocardial infarction, and renal failure [6]. Moreover, in their early sixties, the patients' organ systems undergo involutional processes with the development of comorbid pathologies. All this affects the course of HTN [5–7] and can lead to the disease progression. The risk of HTN development depends on the blood pressure (BP) values, RFs, damage to the target organs, ACs and comorbid pathologies [8, 9]. Cardiovascular risks are well studied [6], the Framingham, SCORE and PROCAM risk-assessment tools have been developed. It is noted that the presence of several RFs in a patient increases the risk of developing cardiovascular complications [10, 11, 12]. At the same time, qualitative and quantitative assessment of RFs in men and women with HTN in combination with ACs is of interest.

The aim of this study was to assess the RFs and frequency of ACs by gender in patients with stage III HTN.

MATERIAL AND METHODS

This clinical study was approved by the Ethics Committee of Tver State Medical University. The subjects selected according to the inclusion criteria were patients with stage III HTN with ACs. The exclusion criteria were cancer, acute conditions and chronic diseases in the acute stage, chronic stage III HF. The patients gave voluntary informed consent for inclusion in the study. We randomly examined 98 patients (men — 45, women — 53, average age — 64.45 years) with the verified diagnosis of stage III HTN in Tver Regional Clinical Hospital. The participants were divided into two groups according to the gender principle (men — 45, average age — 63.58±9.12; women — 53, age — 65.19±10.02). We studied their RFs: age, DD (years), smoking, burdened family history, BMI (kg/m²), blood lipid profile (total cholesterol (TCh)), low-density lipoproteins (LDLs), high-density lipoproteins (HDLs), triglycerides (TGs), atherogenic index of plasma (AIP)), BG (µmol/L), urea (U, µmol/L), creatinine (µmol/L) and GFR (ml/min/1.73m² according to the formula CKD-EPI and MDRD). The results of electrocardiography and echocardiography (US machine General Electric VIVID), ACs were analyzed. The patients were administered relevant drug therapy, their BP was at an average of 137/82 mm Hg. Statistical data processing was carried out using the program package "Microsoft Excel", "Biostat-2007". The data is presented as M±SD. Significance evaluation of the differences was carried out by the one-factor variance analysis and Fisher criterion, correlation (r) was determined using Spearman's method.

RESULTS

As can be seen from Table 1, the groups of men and women are comparable in age and number. It was found that in the women HTN was diagnosed 4 years earlier than in the men. There was difference in

the frequency of RFs between the two groups: DD (p=0.033), obesity (p=0.014), increased waist size (WS, p=0.03), incidence of DM (DM; p=0.03) and decreased GFR (p=0.01), which were more common in the women. It was revealed that in the women increased pulse pressure is detected 1.36 times less often, but twice more often there is a family history of HTN. Moreover, they are more likely to have dyslipidemia (1.5 times), increased TCh (1.2 times), LDLs (1.4 times), increased AIP (2 times) and increased BG (2 times), while impaired glucose tolerance was observed rarely and did not differ between the groups.

LVH according to ECG was more often detected in the women (1.36 times) and more often by echocardiography. Besides, a larger number of the women had significantly lower GFR (p=0.01) than the men, with GFR lower than 30 ml/min observed in one case and only in 1 man.

Each of the patients with stage III HTN had two or more ACs. The women were 2.83 times more often diagnosed with DM (p=0.03), 2.14 times more often — with cerebro-vascular diseases and 2 times more often — with TIAs. At the same time, the incidence of CAD (angina, myocardial infarction (MI), postin-farction cardiosclerosis, percutaneous intervention (PCI) and coronary artery bypass grafting (CABG)), stage I or II HF and atherosclerosis of the carotid arteries did not differ in both groups, but the women were 2.5 times less likely to have peripheral artery disease. Severe retinopathy (1 woman) and chronic renal failure (1 man) were much less common. BMI (p=0.001) was statistically significantly higher in the women compared to the men, while the lipid profile values, BG and urea parameters did not differ. The women had lower creatinine levels (p=0.03) and GFR according to the CKD-EPI formula (p=0.017) and MDRD formula (p=0.014) than the men. We noted that each of the patients with stage III HTN had two or more ACs. The women were 2.83 times more often diagnosed with DM (p=0.03), 2.14 times more often — with ACVAs and 2 times more often — with TIAs. The frequency of CHD (angina, MI, PCI and CABG), chronic stage I and II HF and atherosclerosis of carotid arteries did not differ in both groups.

The women compared to the men had statistically significantly higher BMIs (p=0.001), while the lipid profile values, BG and urea parameters did not differ. Creatinine levels in the women were lower (p=0.03), as well as the GFR according to the formula CKD-EPI (p=0.017) and the formula MDRD (p=0.014).

It was found that in the men, the age was directly correlated with the DD (r=0.41), BG level (r=0.35) and inversely correlated with weight (r=-0.30) and HDL (r=-0.35), TGs (r=-0.56), GFR according to the formula CKD-EPI (r=0.30). LDL correlated with GFR according to the formula CKD-EPI (r=-0.42) and the formula MDRD (r=-0.41). In the women, there was a direct correlation between age and weight (r=0.26), an inverse correlation with GFR according to the SKD–EPI formula (r=-35) and the diastolic pressure value (r=-0.25).

DISCUSSION

It has been established that women are earlier diagnosed with HTN and therefore they have longer DD. It can be assumed that women are better informed about HTN and its complications than men. During their initial office visit with elevated BP, they are more commonly diagnosed with stage I-II HTN, while men are diagnosed with stage II-III HTN. Comparing the RFs, it can be noted that 37.78% of men are tobacco smokers, women smoke much less often, they are better aware of their family history, which confirms their interest in their own health issues and the health of their families. Attention can be drawn to the fact that more women in relation to men are obese, have increased BMIs, dyslipidemia, increased BG levels and type II DM. All this indicates metabolic disorders associated probably with endocrine disorders due to pregnancy and childbirth, physical inactivity, cooking, eating patterns, etc. Women's BMIs correspond to Class 1 obesity, men can be classified as overweight. In women, chronic kidney disease with a moderate decrease in GFR is more common and myocardial hypertrophy is detected. It is possible that these processes are associated with hypervolemia (chronic HF), vascular wall changes, dyslipidemia, inactivity, and effects of drug therapy. Patients with stage III HTN are diagnosed with 2 or more ACs, among which CHD is detected with the same frequency in men and women, while cerebro-vascular diseases, TIAs and type 2 DM are more common in women. Stage I and II HF was detected in 96.0% of all patients and only in 4% it was compensated by systemic and pulmonary circulation.

The multidirectional correlation observed between age, DD, weight, lipid profile and BG parameters most likely reflects the influence of involutional processes on the corresponding organ systems. All this can indirectly indicate ongoing changes in the endocrine and renal systems and lipid metabolism associated with aging.

CONCLUSION

Men and women with stage III HTN demonstrate different combinations and severity of RFs, ACs and correlation between age, DD, weight, lipid profile and BG values.

Table 1. Risk factors, target organ damage and associated conditions in men and women with stage III arterial hypertension (abs., %)

Indicator	Patients with arterial hypertension (n=98)		
	men M (n=45)	women (n=53)	p
Risk factors			
Average age (years)	63.5±9.12	65.19±10.02	0.38
Duration of disease (years)	12.21±8.4	16.1±9.27	0.033
Tobacco smoking	19 (42.22%)	6 (11.32%)	0.001
Burdened family history	17 (37.78%)	24 (45.28%)	0.67
Obesity	15 (33.33%)	32 (60.38%)	0.015
Increased waist size	15 (33.33%)	30 (56.6%)	0.03
Pulse pressure >60	15 (33.33%)	11 (20.75%)	0.17
Dyslipidemia	24 (53.33%)	35 (66.04%)	0.22
Total cholesterol >4.9 µmol/L	37 (82.22%)	45 (84.91%)	0. 789
Low density lipoproteins >3.0 µmol/L	27 (60%)	38 (71.7%)	0.7
High density lipoproteins <1.2 µmol/L in women and <1.0 in men	0 (0%)	3 (5.66%)	0.24
Triglycerides >1.7 µmol/L	3 (6.67%)	2 (3.77%)	0.65
Atherogenic index of plasma >3	3 (6.67%)	6 (11.32%)	0.7
Glucose >5.6 µmol/L	13 (28.89%)	26 (49.06%)	0.62
Impaired glucose tolerance	1 (2.22%)	2 (3.77%)	0.9
Target organ damage			
Left ventricular hypertrophy (by ECG)	19 (42.22%)	26 (49.06%)	0.066
Left ventricular hypertrophy (by echocardiography)	38 (84.44%)	46 (86.79%)	0.2
GFR less than 60 ml/min according to either of the formulas	10 (22.22%)	25 (47.17%)	0.01
GFR less than 30 ml / min according to either of the formulas	1 (2.22%)	0	0.45
Associated Conditions			
Type 2 diabetes	6 (13.33%)	17 (32.08%)	0.03
Cerebro-vascular diseases	7 (15.56%)	15 (28.30%)	0.2
Ischemic heart disease (angina/myocardial infarction/post-Infarction cardiosclerosis/percutaneous intervention / coronary artery bypass grafting)	35 (77.78%)	38 (71.7%)	0.37
Heart failure stage I, II	44 (97.78%)	50 (94.34%)	0.6
Atherosclerosis of the carotid arteries	8 (17.78%)	10 (18.87%)	0.9
Peripheral artery disease	5 (11.11%)	2 (3.77%)	0.24
Severe retinopathy	0	1 (1.89)	0.49
Chronic renal failure	1	0	-

Note: p refers to a statistically significant difference between men and women

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