REMODELING OF THE HEART, DEPENDING ON LENGTH OF SERVICE MANAGEMENT

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ABSTRACT — Structural and functional parameters of cardiovascular system of the civil servants sick with AH depending on seniority are studied. It was found that at the experience of work up to 11 years the hyperkinetic type of blood circulation is formed, and at the further increase in the seniority — hypokinetic type of blood circulation. Starting with the seniority of more than 5 years structural and functional changes of cardiovascular system gradually accrue, with development of hypertrophy of interventricular wall and with the pronounced increase in mass of a myocardium of left ventricle at seniority of more than 10 years. With the increase in the experience of work the adaptation capacity of cardiovascular system decreases.

KEYWORDS — structural and functional indicators of the cardiovascular system, arterial hypertension, civil servants

INTRODUCTION

Management activities associated with exposure associated complex of factors of production, the priority of which is the intense emotional and intellectual load irrational mode of work organization. Associated with increased psycho-emotional stress constant adrenergic mobilization of the central and peripheral parts of the cardiovascular system is disintegrating regulatory adaptive mechanisms and leads to exclusion and the development of various diseases, such as hypertension (AH) [1]. It is known that of left ventricular hypertrophy with AH is an independent risk factor for cardiovascular disease and death, as well as major preclinical was stolen of the cardiovascular system, which increases the risk of coronary heart disease and myocardial infarction, stroke, congestive heart failure, sudden death [3].

The purpose of research the study of cardiac remodeling in arterial hypertension in the management of employees, patients with hypertension, according to their seniority.

MATERIAL AND METHODS OF RESEARCH

The structural and functional parameters of the cardiovascular system (CVS) 84 administrative workers (52 men, 32 women) with hypertension aged 30–63 years (mean age 49,12±0,98 years). The control group consisted of apparently healthy persons comparable to patients by age, not working in the field. Echocardiography was carried out on the unit «Tochiba-350» (Japan). The structural parameters were studied: end-systolic and end-diastolic volume and the size of the left ventricle (ESV, EDV, ESS, EDS) ejection fraction (EF), shock and minute volume (SV, MV), the thickness of the back wall of the left ventricle (Tbwlv) and interventricular partitions (Tip), the size of the left atrium (LAS) and aorta (Ao), the degree of shortening of the diameter of the left ventricle in systole (ΔS). Mass index of left ventricular (ILVM) as the ratio of left ventricular mass (LVM) to body surface area [4]. Calculated in the following functional parameters CVS: medium dynamic pressure (MDP), and total peripheral vascular resistance (TPVR), stroke index (SI), cardiac index (CI). Statistical analysis of the results of studies carried out with the help of the program Statistica 6.0.

RESULTS

In the analysis of structural and functional cardiac parameters found that increasing the length of service has not led to significant changes in parameters such as the size of the aorta and the left atrium, ESS, EDV, ESV, EF, ΔS (Table 1). EDS of the left ventricle was significantly greater than the parameters of previous groups, starting with the experience of more than 10 years. So, EDS in the group 11–15 years was 4,92 ± 0,06 cm, which is 4.5% more than in the previous group ($p < 0.01$) and 8.9% more than in the control group ($p < 0.001$). EDS in a group of 16 or

more years is also 8.9% higher than the parameters in the control group and 4.0% above parameters experience group 5–10 years. According to research by Hermann M. et al. [5] with a length of 0–5, 6–10, 11–15 years, the development of hypertrophy of the walls of the left ventricle is no increase in myocardial mass, increase LVM is only after having worked for over 20 years. A.V.Sorokin et al. [2] increased rates of LVM, identified in individuals with normal blood pressure in than in the group of 0–5 years. LVM and ILVM compared with previous experience begins to grow in groups of workers with experience of more than 10 years. Experience in groups 11–15 and over 15 years of LVM was 219,93 ± 9,42, and 245,69 ± 8,19 g, ILVM 114,60 ± 4,52 g/m^2 and 135,68 ± 4,33 g/m^2, respectively. TTW at the experience of 11–15 years and over 15 years has increased to 0,43 ± 0,01 and 0,44 ± 0,01. It should be noted, is an increase in LVM

Table 1. *Echocardiographic parameters of the heart in the management of employees, patients with hypertension, according to the employment experience*

Parameters	0–5 years (n=17)	6–10 years (n=30)	11–15 years (n=24)	≥ 16 years (n=13)	Control (n=18)
Ao, cm	2,99±0,09	3,01±0,06	3,23±0,09	3,17±0,18	3,02±0,05
LA, cm	3,41±0,12	3,27±0,08	3,32±0,09	3,49±0,11	3,29±0,08
EDS, cm	4,72±0,11	4,70±0,06	4,92±0,06*°°°	4,95±0,05*	4,51±0,06
ESS, cm	3,02±0,08	2,94±0,05	3,02±0,06	3,01±0,05	2,88±0,05
EDV, ml	123,16±2,88*	117,11±2,45**	115,44±2,76	111,93±4,59	109,11±2,02
ESV, ml	38,37±2,33	34,08±1,75	38,81±2,41	39,93±1,82	34,61±1,55
EF, %	68,95±1,66	69,00±1,29	68,20±1,61	63,69±2,05	68,38±1,14
ΔS, %	35,27±0,88	36,38±0,88	36,96±1,78	36,64±1,88	40,06±2,92
Tbwlv, cm	0,88±0,02	0,90±0,02	0,99±0,02*°°	1,05±0,03*	0,86±0,02
Tip, cm	0,92±0,02	0,97±0,02	1,10±0,03*°	1,14±0,02*	0,94±0,01
LVM, g	188,56±8,27	191,25±6,82***	219,93±9,42*°°	245,69±8,19*	168,98±6,46
ILVM, g/м2	94,32±3,13	98,11±3,06**	114,60±4,52*°°°	135,68±4,33*	91,04±2,97
TTW	0,38±0,01	0,39±0,01	0,43±0,01*°°	0,44±0,01*	0,38±0,01

* – p<0,001, ** – p<0,05; *** – p<0,01 compared with the control group;
° – p<0,001, °° – p<0,05; °°° – p<0,01 compared with the previous group

occupational stress associated with the neurotrophic effects of stress hormones.

According to our data remodeling processes begin to appear with the experience of more than 10 years and are characterized by a significant increase in left ventricular mass. The average values of the surveyed persons Tbwlv significantly increase with work experience of 11–15 years to 0,99 ± 0,02 cm, after having worked for 16 or more years to 1,05 ± 0,03 cm with increasing length of service increases gradually Tip and have worked for over 10 years exceed the allowable value. Tip in the group 11–15 years was 1,10 ± 0,03 cm, with a length of more than 15 years —1,14 ± 0,02 cm According to Pickering TG [6] the presence psychomental factor at work is closely associated with the degree of target organ damage, in particular — with a thickness of the left ventricular myocardium. LVM and ILVM have workers with 6–10 years significantly exceeds the benchmark of 11.6% and 7.2% (p <0.01, p <0.05), but not higher and TTW have examined patients is due to hypertrophy of the walls in the left ventricular cavity intact. In our study, changes in EF has been established. EF in a group of 0–5 years was 68,95 ± 1,66%, 6–10 years – 69,00 ± 1,29%, 11–15 years — 68,20±1,61%, over 15 years — 63,69 ± 2,05%. With increasing experience of work has been a gradual, but not significant increase in the MDP (Table 2). Only with experience of 16 years and more MDP experience is significantly higher than (P <0.05) rates in smaller groups experience.

Experience in groups 0–5, 6–10 years MDP is improved by increasing the cardiac output. Starting from the experience of 6–10 years in workers was significantly higher TPVR (p <0.001) and reduced MV (p <0.01) compared to the experience 0–5 years. In general, the experience of more than 10 years formed hypokinetic circulation with a significant increase in TPVR to 2009,35 ± 65,88 and 2275,61 ± 126,65 din.s.sm experience in groups 11–15 and over 15 years (p <0.001). MV in the experience group 11–15 years

Table 2. *Central hemodynamics in managerial employees, patients with hypertension, according to the working*

Parameters	0–5 years (n=17)	6–10 years (n=30)	11–15 years (n=24)	≥ 16 years (n=13)	Control (n=18)
MDP, mm Hg	116,92±1,54*	120,35±1,35*	124,24±1,95*	131,82±2,58*°°	87,91±1,66
HR, beats in minutes	75,82±2,58**	69,43±1,52°	68,87±2,11	68,07±3,03	66,94±1,18
MV, ml/min	6,35±0,16*	5,69±0,11*°°°	5,07±0,19°°	4,79±0,26	4,98±0,14
CI, ml/min/m^2	3,21±0,09*	2,95±0,08**	2,68±0,14	2,66±0,16	2,70±0,08
SV, ml	84,78±2,58*	83,03±2,27***	73,74±2,06°°°	72,00±4,79	74,50±1,59
SI, ml/m^2	43,12±2,04	43,00±1,43	39,07±1,82	39,96±2,91	40,38±1,03
TPVR, din.c.cm	1486,24±42,06	1703,39±32,32*°	2009,35±65,88*°	2275,61±126,65*	1419,33±32,14

* – p<0,001, ** – p<0,05; *** – p<0,01 compared with the control group;
° – p<0,001, °° – p<0,05; °°° – p<0,01 compared with the previous group

was significantly reduced (p <0.05) compared with the volume in the group 6–10 years and was comparable to the rate in the control group. Formation hypokinetic type of circulation in experience groups 11 or more years can be attributed to age-related changes in myocardial and peripheral vascular disease (age experience in these groups was significantly (p <0.05) than the age of the control group and the experience of 0–5 years), and more severe vasoconstriction, coupled with the α-adrenergic activation and the weakening of β-adrener-logical response infarction in long-term psycho-emotional stress.

In addition, at later stages of adaptation to a decline AH activity of the sympathetic nervous system in response to an increase in blood pressure. [3] The average age of employees with managerial experience of 0–5 years was 36,47 ± 1,18 years, with experience 6–10 years — 47,28 ± 3,38 years, with experience 11–15 years — 51,26 ± 1,49, with the experience of 16 or more years — 53,28 ± 1,44 years.

CONCLUSIONS

Thus, the development of hypertension in the management of employees whose work is concerned with the impact of increased psycho-emotional stress, is characterized by the formation of the type of hyperkinetic circulation in experience and 11 years, with a further increase in the experience of work — hypokinetic type of circulation. Starting from the experience of more than 5 years, gradually increase the structural and functional changes in the CVS, with the development of left ventricular hypertrophy with marked increase in left ventricular mass with experience of more than 10 years.

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