



## Analysis of Ecg and Echo Results in Hypertensive Patients Depending on Bmi Degrees

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**Abstract:** The risk of developing obesity-related diseases is largely determined by the characteristics of adipose tissue deposition in the body. A constant increase in blood pressure is accompanied by a decrease in peripheral blood flow and endothelial dysfunction. The risk of developing diseases associated with overweight is largely determined by the characteristics of adipose tissue deposition in the body.

**Keywords:** Arterial hypertension, overweight, hypertrophic changes, endothelial dysfunction, insulin resistance.

Overweight (BMI) is a serious medical, social and economic problem of modern society and, according to the World Health Organization (WHO), its prevalence reaches epidemic proportions. BMI and obesity are the main risk factors for hypertension and type 2 diabetes. About 3.4 million adults worldwide die each year from diseases caused by diseases BMI or obesity. A persistent increase in blood pressure is accompanied by a decrease in peripheral blood flow and endothelial dysfunction, which can lead to a decrease in skeletal muscle sensitivity to insulin and the development of IR. The assumption that IR is the result of AH seems unlikely. In particular, it has been shown that symptomatic hypertension is not accompanied by IR, and BP correction does not always lead to a decrease in IR. The term "arterial hypertension" refers to the syndrome of increased systolic blood pressure (SBP) of 140 mm Hg. and/or diastolic BP (DBP) 90 mmHg. It occurs as a result of irreversible changes in the arterioles either for an unknown reason (essential) or as a secondary condition.

The term "hypertension" corresponds to the term "essential hypertension" accepted in other countries and can be used along with it in medical records and literature. The pathogenesis of essential hypertension is based on changes in the arteriole wall – muscle hypertrophy, arteriolosclerosis, loss of contractile function of both the muscular and endothelial layer of the vessel membrane.

Currently, about 1 billion people on the planet suffer from arterial hypertension (AH). According to experts, the increasing prevalence of obesity and the conditions associated with it, along with rising life expectancy, will lead to an increase in the number of hypertensive patients by 2025 to 1.5 billion. According to scientific studies, the prevalence of obesity in Uzbekistan in the general population was 20.4%. In the female population it is 22.1%, in the male population it is 11.5%, i.e. it is two times lower.

Arterial hypertension and lipid metabolism disorders are one of the most pressing problems of modern medicine, associated with age, and hence an increase in body weight in most cases, the development of coronary artery disease, irregular and age-appropriate physical activity, alcohol consumption and smoking, and a burdened heredity.

**Objective:** To analyze the results of ECG and echocardiography in patients with arterial hypertension depending on the degree of overweight.

**Materials and methods:** A total of 70 patients with arterial hypertension with varying degrees of obesity depending on the body mass index were examined Thirst, frequent urination, headache, night sweats, outbursts of rage that disappear after eating, weakness, drowsiness, etc. Information about the disease (AnamnesisMorbis), which included data about the disease, the first symptoms, the first visits to specialists, the drugs taken, etc. Further, the inquiry about the life of the patients (AnamnesisVitae) was carried out according to the scheme biography of the patient, working and living conditions, other diseases and surgeries, bad habits, sex and family life, heredity, tolerance to drugs and other substances, taking into account allergic reactions.

The age of the selected patients with arterial hypertension with normal and overweight, the main and comparison groups ranged from 55-70 years. In the study group of patients with arterial hypertension with varying degrees of obesity, depending on the body mass index, there were 25 women (48.07%), whose average age was  $59.2 \pm 5.1$  years, and 27 men (51.93%) had an average age of  $57.1 \pm 4.1$  years. There were 10 women in the control group (55.5%), average age  $61.4 \pm 4.2$  years; 8 males (44.5%), average age  $59.8 \pm 5.1$ . The diagnosis of the underlying disease was made on the basis of a comprehensive clinical and instrumental study, which included: measurement of a/d using the Korotkov method, measurement of weight, height, calculation of BMI, electrocardiographic examination, echocardiographic study.

**Table. Distribution of patients with arterial hypertension with normal and elevated BMI by sex and age:**

Group	M (age)	QTY	F (age)	QTY	Avg.age	Total
Main	$57,1 \pm 4.1$	27	$59,2 \pm 5,1$	25	$58,15 \pm 5,7$	52
Comparison	$59,8 \pm 5.1$	8	$61,4 \pm 4.2$	10	$60,6 \pm 6,1$	18

**Results:** In the study group of patients with arterial hypertension with varying degrees of obesity, depending on the body mass index, there were 23 women (65.7%), whose average age was  $59.2 \pm 5.1$  years, 12 men (34.2%) had an average age of  $57.1 \pm 4.1$  years. The control group consisted of 18 women (51.4%), with an average age of  $61.4 \pm 4.2$  years; 17 males (48.5%), average age  $59.8 \pm 5.1$

Parameters		1 group (35)	2 group (35)
Gender	M	12 (34,2 %)	17 (48,5%)
	F	23 (65,7%)	18 (51,4%)
Age		$58,2 \pm 5,1$	$60,6 \pm 4,2$
Entire period of obesity (years)		13,5	10
Heart rate (bpm)		72,8	71,4
AH (mmHg)	SBP	160	155
	DBP	95	90
Degree AH	1 degree	11	23
	2 degree	17	14
	3 degree	13	15

As can be seen from the data in the table, women somewhat predominate in the two groups. In terms of average age, average duration of obesity and arterial hypertension, and the degree of hypertension, the analyzed groups did not differ significantly, although in group 2, hypertension of the 2nd degree was slightly more often detected.

**ECG data in patients with hypertension depending on the degree of BMI:**

According to the standard ECG data, normal heart rate values, the duration of PQ, QT intervals, and the width of the QRS complex were observed in both groups

	1 group (35)	2 group (35)
HR (bpm)	70,9	68,05
PQ (sec)	0,16	0,16
QRS(sec)	0,08	0,08
QT (ms)	411,6	409,7
S V1+R V5 (mm)	21,2	21,5
R V6 (mm)	12,7	12,4
R aVL +S V3 (mm)	16,6	15,3
R aVL(mm)	8,6	5,2

ECG criteria for LV hypertrophy were found in 11.8% of patients with hypertension, ECG criteria for LV hypertrophy were present in 4 (7.6%) patients with grade 1 obesity, and in 7 patients (17.01%) with grade 2-3 obesity.

**Echocardiography data in patients with hypertension depending on the degree of BMI:**

Indicators		Rate	1 group (35)	2 group (35)
Diameter LP (cm)	M	3,0-4,0	4,2	4,0
	F	2,7-3,8	3,9	3,7
Volume LP(ml)	M	18-58	70,1	68,1
	F	22-52	59,2	52,6
MVP (cm)	M	0,6-1,0	1,5	1,4
	F	0,6-0,9	1,2	1,1
LVPV (cm)	M	0,6-1,0	1,3	1,2
	F	0,6-0,9	1,2	1,0
EDD (cm)	M	4,2-5,9	4,8	4,8
	F	3,9-5,3	4,6	4,6
EDV (ml)	M	67-155	121,3	108,1
	F	56-104	93,2	89,9
ESV (ml)	M	22-58	43,3	39,5
	F	19-49	32,6	33,5
EFLV (%)		≥55%	64,8	63,7

**Conclusions:** The obtained data indicate that in obesity of the 2nd and 3rd degrees, there is an additional increase in the load on the right ventricle, which is manifested by a significant increase in the diameter of the outflow tract of the right ventricle and a decrease in the amplitude of movement of the fibrous ring of the lateral wall, compared with patients of group 2 of the right ventricle, an indicator characterizing the systolic function of the right ventricle.

Thus, in hypertension, obesity of 2-3 degrees contributes to a more pronounced structural and geometric restructuring of the LV, which is manifested by a significant increase in myocardial mass, mainly due to concentric LV hypertrophy. At the same time, there was no clear correlation between the state of LV diastolic function and the degree of obesity, in both groups the existing disorders of the LV diastolic function were mainly associated with the severity of hypertension.

In patients with hypertension in the presence of obesity, the possibilities of ECG to detect LV hypertrophy are extremely limited, so the wider use of echocardiography is justified. Echocardiography also provides an idea of the nature of LV remodeling, which largely determines the prognosis of patients with hypertension.

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