

**STRUCTURAL AND FUNCTIONAL CHANGES IN CENTRAL
HEMODYNAMICS AND ASSESSMENT OF THE EFFECTIVENESS
OF ANTIHYPERTENSIVE THERAPY IN PREGNANT WOMEN
WITH HYPERTENSION**

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Abstract: This study examines the changes in central hemodynamics in pregnant women with hypertension and evaluates the effectiveness of antihypertensive therapy. The research was conducted at the clinic of Samara State Medical University, where an echocardiographic analysis of the cardiovascular system was performed on 88 pregnant women. The data obtained allow for the identification of structural and functional changes in central hemodynamics in patients with hypertension and provide recommendations for optimizing antihypertensive therapy.

Keywords: Hypertension, pregnancy, central hemodynamics, echocardiography, antihypertensive therapy, cardiovascular changes, therapy effectiveness assessment, echocardiogram.

Research Objective: Assessment of structural-functional changes in central geodynamics and investigation of the effectiveness of antihypertensive therapy in pregnant women with hypertension.

• **Materials and Methods:** The study was conducted at the SamSMU clinic based in the obstetrics and gynecology department. A total of 88 pregnant women with diagnosed hypertension were included in the study. All patients underwent echocardiographic examination to assess central geodynamics parameters. The evaluation of antihypertensive therapy was performed before and after the course of treatment using standard medications.

The research methods included:

- Echocardiography to analyze central hemodynamics parameters, including systolic and diastolic pressure, cardiac output, and vascular resistance indices.
- Clinical observation of changes in blood pressure dynamics during therapy.
- Statistical analysis of the obtained data to identify significant changes in the parameters before and after treatment.

Research Results:

The obtained results showed that hypertension in pregnant women leads to significant changes in central hemodynamics, including an increase in systemic vascular resistance and a deterioration in diastolic heart function.

1. **Hemodynamic Changes:**

In pregnant women with hypertension, before the treatment began, both systolic and diastolic blood pressure were elevated. The average systolic pressure was 160 ± 10 mm Hg, and diastolic pressure was 100 ± 8 mm Hg. Heart rate was 85 ± 7 beats per minute, indicating compensatory mechanisms attempting to maintain circulation.

2. **Systemic Vascular Resistance Index (SVRI):**

The average SVRI was 1500 ± 200 mm Hg•ml, confirming an increase in peripheral resistance observed in hypertension.

3. **Echocardiographic Changes:**

Echocardiography revealed an increase in the left ventricular diastolic volume (140 ± 15 ml) and a significant increase in myocardial mass (115 ± 8 g/m²), indicating myocardial hypertrophy due to elevated blood pressure.

4. **Response to Antihypertensive Therapy:**

After antihypertensive therapy (including standard medications), an improvement in most indicators was observed. Systolic and diastolic blood pressures significantly decreased to 130 ± 8 mm Hg and 85 ± 5 mm Hg, respectively ($p < 0.05$). Heart rate also decreased to 75 ± 6 beats per minute.

5. **Systemic Vascular Resistance Index (SVRI) after Treatment:**

After treatment, the systemic vascular resistance index decreased to 1200 ± 150 mm Hg•ml, indicating a reduction in the load on the cardiovascular system and an improvement in circulation.

6. **Echocardiographic Improvements after Therapy:**

Significant improvements in echocardiographic indicators were observed after antihypertensive therapy:

Ejection fraction increased from $55 \pm 4\%$ to $60 \pm 3\%$ ($p < 0.05$). Left ventricular diastolic volume decreased by 10 ml ($p < 0.05$), indicating a reduction in the circulating blood volume in the ventricle and a decrease in the load on the heart. Myocardial mass index decreased from 115 ± 8 g/m² to 105 ± 7 g/m² ($p < 0.05$), reflecting a reduction in myocardial hypertrophy.

7. **Improvement in Clinical Condition of Patients:**

The dynamics of the clinical condition of the patients also showed a positive result. The average self-assessment before therapy was 3.5 ± 0.8 points (on a scale from 1 to 5), indicating pronounced hypertension symptoms. After antihypertensive therapy, the condition improved, and the average self-assessment score was 2.0 ± 0.6 points.

Additionally, the quality of life improved from 4.0 ± 1.0 points to 2.5 ± 0.7 points, confirming the effectiveness of the therapy and the improvement in the overall condition of the patients.

Table 1:
Main Parameters of Central Hemodynamics Before and After Antihypertensive Therapy.

Parameter	Before Therapy (Mean Value)	After Therapy (Mean Value)
Systolic Blood Pressure (mm Hg)	160 ± 10	130 ± 8
Diastolic Blood Pressure (mm Hg)	100 ± 8	85 ± 5
Heart Rate (HR, beats per minute)	85 ± 7	75 ± 6

Table 2:
Echocardiographic Parameters Before and After Antihypertensive Therapy.

Parameter	Before Therapy (Mean Value)	After Therapy (Mean Value)
Ejection Fraction (%)	55 ± 4	60 ± 3
Left Ventricular Diastolic Volume (ml)	140 ± 15	130 ± 12
Myocardial Mass Index (g/m ²)	115 ± 8	105 ± 7

Table 3:
Assessment of Clinical Condition Dynamics of Patients.

Parameter	Before Therapy (Mean Value)	After Therapy (Mean Value)
Overall Well-being (assessment on a scale from 1 to 5)	3.5 ± 0.8	2.0 ± 0.6
Quality of Life (assessment on a scale from 1 to 5)	4.0 ± 1.0	2.5 ± 0.7

Obtained Results:

- Systolic blood pressure decreased by 30 mm Hg ($p < 0.05$), indicating a good response to antihypertensive therapy.
- Diastolic blood pressure decreased by 15 mm Hg ($p < 0.05$).
- Heart rate decreased by 10 beats per minute ($p < 0.05$).

• The systemic vascular resistance index decreased by 300 units ($p < 0.05$), indicating improved circulation and reduced load on the cardiovascular system.

Conclusion:

The effectiveness of antihypertensive therapy in pregnant women with hypertension was confirmed by the improvement in central hemodynamics parameters, highlighting the importance of timely and appropriate treatment to minimize risks to the health of both the mother and the fetus. The improvement in patients' condition during therapy reduces the likelihood of complications such as preeclampsia and eclampsia, and also contributes to the normalization of cardiovascular function.

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