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ASSESSMENT OF THE PSYCHO-EMOTIONAL STATE IN PREGNANT WOMEN WITH HYPERTENSIVE DISORDERS USING THE STAI AND PSS-10 PSYCHOMETRIC INSTRUMENTS

Abstract. Hypertensive disorders during pregnancy, such as gestational hypertension and preeclampsia, remain among the leading causes of maternal and perinatal complications. In addition to physiological risk factors, the psycho-emotional state of pregnant women plays a critical role in influencing obstetric outcomes. Recent studies have highlighted the association between elevated levels of psychological stress and anxiety and the development or worsening of hypertensive complications. This study aimed to assess perceived stress, state anxiety, and trait anxiety in pregnant women diagnosed with hypertensive disorders using validated psychometric instruments.

A total of 65 pregnant women participated in the study: 35 with hypertensive complications and 30 pregnant women without diagnosed hypertensive disorders. Psychological assessment was performed using the State-Trait Anxiety Inventory (STAI) and the Perceived Stress Scale (PSS-10). Comparative analysis revealed significantly higher levels of state and trait anxiety and perceived stress in the hypertensive group. Median STAI-S and STAI-T scores were 44.00 (IQR: 40.00–48.50) and 51.00 (IQR: 46.00–59.00), respectively, while the perceived stress score reached a median of 28.00 (IQR: 24.00–32.50). In the control group, these values were substantially lower: STAI-S – 31.00 (IQR: 28.25–34.00), STAI-T – 36.00 (IQR: 33.25–39.00), and PSS-10 – 20.50 (IQR: 17.00–24.00) (all $p < 0.05$). High trait anxiety (STAI-T ≥ 45) was identified in 85.71% of the hypertensive group, and elevated perceived stress (PSS-10 ≥ 32) was observed in 28.57% of cases. Statistically significant correlations were found between perceived stress and both state and trait anxiety, reflecting a close interrelationship between different dimensions of emotional distress in this population.

Pregnant women with hypertensive disorders exhibit significantly higher levels of anxiety and stress compared to those with uncomplicated pregnancies. The use of

STAI and PSS-10 provides a reliable and evidence-based method for assessing psycho-emotional well-being during pregnancy. The assessment of anxiety and stress using standardized psychometric instruments Should be considered an essential component of comprehensive clinical evaluation in pregnant women with hypertensive disorders. These findings may serve as a foundation for developing individualized management strategies for this group of pregnant women.

Keywords: pregnancy, hypertensive disorders, gestational hypertension, preeclampsia, perceived stress, trait anxiety, state anxiety, State-Trait Anxiety Inventory, STAI, Perceived Stress Scale, PSS-10, psychometric assessment, psychological evaluation, pregnancy complications, psycho-emotional state, psychological stress, antenatal care, psychodiagnostics.

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ОЦІНЮВАННЯ ПСИХОЕМОЦІЙНОГО СТАНУ ВАГІТНИХ З ГІПЕРТЕНЗИВНИМИ РОЗЛАДАМИ НА ОСНОВІ ПСИХОДІАГНОСТИЧНИХ ІНСТРУМЕНТІВ STAI ТА PSS-10

Анотація. Гіпертензивні розлади під час вагітності, зокрема гестаційна гіпертензія та прееклампсія, залишаються серед провідних причин материнських і перинатальних ускладнень. Окрім фізіологічних факторів ризику, важливу роль у впливі на перебіг вагітності відіграє психоемоційний стан жінки. Останні дослідження підкреслюють зв'язок між підвищеним рівнем психологічного стресу, тривожності та розвитком або погіршенням перебігу гіпертензивних ускладнень. Метою цього дослідження було оцінити рівень сприйнятого стресу, ситуативної та особистісної тривожності у вагітних із гіпертензивними розладами з використанням валідизованих психодіагностичних інструментів.

У дослідженні взяли участь 65 вагітних жінок: 35 з гіпертензивними розладами під час вагітності та 30 з без подібних ускладнень. Психологічне оцінювання проводилося за допомогою шкали тривожності Спілбергера (STAI) та шкали сприйнятого стресу (PSS-10). Порівняльний аналіз виявив достовірно вищі рівні ситуативної та особистісної тривожності, а також сприйнятого стресу в групі вагітних з гіпертензивними розладами. Медіанні значення STAI-S і STAI-T становили відповідно 44,00 (IQR: 40,00–48,50) та 51,00 (IQR: 46,00–59,00), а показник PSS-10 – 28,00 (IQR: 24,00–32,50). У контрольній групі ці показники

були значно нижчими: STAI-S – 31,00 (IQR: 28,25–34,00), STAI-T – 36,00 (IQR: 33,25–39,00), PSS-10 – 20,50 (IQR: 17,00–24,00) (у всіх випадках $p < 0,05$). Високий рівень особистісної тривожності (STAI-T ≥ 45) був виявлений у 85,71% жінок основної групи, а підвищений рівень сприйнятого стресу (PSS-10 ≥ 32) – у 28,57%. Статистично значущі кореляції були виявлені між рівнем сприйнятого стресу та обома типами тривожності, що відображає тісний взаємозв'язок між різними проявами емоційного напруження в цього контингенту жінок.

Вагітні з гіпертензивними розладами демонструють достовірно вищі рівні тривожності та стресу порівняно з жінками з фізіологічним перебігом вагітності. Використання шкал STAI та PSS-10 забезпечує надійний, науково обґрунтований підхід до оцінювання психоемоційного стану під час вагітності. Визначення рівнів тривожності та стресу за допомогою стандартизованих психодіагностичних інструментів має розглядатися як важлива складова комплексної клінічної оцінки вагітних з гіпертензивними розладами. Отримані результати можуть стати основою для розробки індивідуалізованих стратегій ведення цієї групи пацієнток.

Ключові слова: вагітність, гіпертензивні розлади, гестаційна гіпертензія, преєклампсія, сприйнятий стрес, особистісна тривожність, ситуативна тривожність, шкала тривожності Спілбергера, STAI, шкала сприйнятого стресу, PSS-10, психометрична оцінка, психологічне обстеження, ускладнення вагітності, психоемоційний стан, психологічний стрес, антенатальний догляд, психодіагностика.

Problem Statement. According to the World Health Organization, stress is defined as a psycho-emotional state of tension or anxiety that arises in response to challenging life circumstances and activates the body's adaptive mechanisms [1]. Despite its universal nature, individual stress responses vary significantly and can profoundly affect both physical and mental health.

Pregnancy, while a natural physiological process, involves significant hormonal, immunological, and psychological changes that increase a woman's vulnerability to stress [2]. It has been well established that pregnant women tend to exhibit higher levels of anxiety and depressive symptoms than non-pregnant women. This is attributed to hormonal fluctuations, adaptation to changes in social roles, and anticipation of a new life stage [3, 4]. Psycho-emotional disturbances during pregnancy are associated with an increased risk of adverse obstetric and perinatal outcomes, including preterm birth, intrauterine growth restriction, and low birth weight [5, 6].

Chronic stress has a systemic impact, contributing to the development of cardiovascular disorders, suppression of immune function, and elevated risk of pregnancy complications [7, 8]. In recent years, growing attention has been paid to the influence of stress and anxiety on the course of hypertensive disorders during pregnancy.

Hypertensive disorders (HD) affect 5–10% of pregnancies and represent a leading cause of maternal and perinatal morbidity and mortality [9, 10]. Preeclampsia

(PE), one of the most severe forms of HD, develops after 20 weeks of gestation and is characterized by elevated blood pressure and proteinuria [11]. This condition significantly increases the risk of serious complications, including fetal growth restriction, preterm delivery, eclampsia, and maternal or fetal death [12, 13].

Analysis of Recent Studies and Publications. Current evidence suggests that the psycho-emotional state of pregnant women may be an important predictor of preeclampsia. Psychological resilience, anxiety, and depressive symptoms have been shown to influence the likelihood of hypertensive complications [14, 15]. Studies indicate that pregnant women with HD experience higher levels of anxiety and depressive symptoms compared to those without such conditions [6]. Excessive production of stress hormones such as cortisol and adrenaline may contribute to the pathogenesis of preeclampsia through mechanisms involving endothelial dysfunction [16, 17].

To objectively assess the psycho-emotional state of pregnant women, validated psychometric tools are widely used – most notably, the Perceived Stress Scale (PSS) and the State-Trait Anxiety Inventory (STAI).

The level of perceived stress is measured using a questionnaire developed by Cohen and colleagues [18]. The most common versions – PSS-10 and PSS-14 – comprise 10 and 14 items, respectively. The scale is designed to quantify the extent to which individuals perceive life situations as stressful over the past month. The PSS-10 has demonstrated high reliability and validity in various populations, including pregnant women [19]. PSS scores can be used to assess psychological well-being in pregnant women with HD and may carry prognostic value for both physical and mental health.

The STAI consists of two subscales: the State Anxiety Scale (STAI-S) and the Trait Anxiety Scale (STAI-T) [20]. The STAI-S evaluates the respondent's current level of anxiety as a response to specific situational factors, reflecting emotional state at the time of assessment. In contrast, the STAI-T measures a stable predisposition to perceive a broad range of situations as threatening and to experience anxiety more frequently. Both subscales contain 20 statements, rated on a four-point Likert scale. The STAI is among the most widely validated and frequently used instruments for assessing anxiety in clinical practice, including during pregnancy [21].

The use of the PSS and STAI allows not only for the quantification of stress and anxiety levels but also for the differentiation of their dimensions – namely, situational and dispositional components of anxiety. This is of particular importance when studying high-risk pregnant populations, such as those with HD. Given the above, assessing stress and anxiety in pregnant women remains a critical objective in contemporary obstetric science and clinical practice.

Objective: To assess the levels of perceived stress as well as state and trait anxiety in pregnant women with hypertensive disorders.

Materials and Methods

This study included 65 pregnant women who were under observation at the Consultative and Diagnostic Department and subsequently delivered at the Communal

Non-Profit Enterprise “Regional Perinatal Center” of the Zaporizhzhia Regional Council.

The main group consisted of 35 women with singleton pregnancies complicated by gestational hypertension (GH) without significant proteinuria, moderate or severe preeclampsia (PE). Diagnoses were made according to the current unified clinical guidelines of the Ministry of Health of Ukraine [22]. The diagnostic criteria were as follows:

- GH: blood pressure (BP) $\geq 140/90$ mmHg arising after 20 weeks of gestation in the absence of pathological proteinuria or other organ dysfunction. BP returns to normal within six weeks postpartum. GH may progress to PE.
- Moderate PE: a multisystem disorder characterized by BP of 140–159 mmHg systolic and/or 90–109 mmHg diastolic, accompanied by proteinuria, occurring after 20 weeks of gestation.
- Severe PE: defined as BP $\geq 160/110$ mmHg and proteinuria, or elevated BP of any degree accompanied by one or more of the following: severe headache; visual disturbances; optic disc edema; epigastric pain, nausea, or vomiting; right upper quadrant pain or hepatic tenderness; hyperreflexia; generalized edema; oliguria (<0.5 mL/kg/h); platelet count $<100 \times 10^9/L$; elevated liver enzymes (AST and/or ALT >70 IU/L); or fetal growth restriction.

Exclusion criteria for the main group included: multiple pregnancy; chronic hypertension; type 1 or type 2 diabetes mellitus; acute or chronic kidney disease; autoimmune disorders (e.g., systemic lupus erythematosus, antiphospholipid syndrome); pregnancy achieved via assisted reproductive technologies; severe gynecological pathology; and significant extragenital comorbidities.

The control group consisted of 30 women with singleton pregnancies without HD, whose pregnancies and deliveries were physiologically normal.

The mean gestational age at the time of assessment was 29.94 ± 0.24 weeks ($\sigma = 1.39$) in the main group and 29.40 ± 0.23 weeks ($\sigma = 1.25$) in the control group. The mean maternal age was 30.31 ± 0.96 years in the main group and 28.53 ± 0.80 years in the control group. These differences were not statistically significant ($p > 0.05$). Based on anamnestic data, there were also no significant differences between the groups in terms of social or occupational status ($p > 0.05$).

All participants underwent detailed clinical and biochemical evaluations. Obstetric history, comorbidities, and the course of the current and previous pregnancies were considered.

Levels of state anxiety and trait anxiety were measured using the STAI, developed by Spielberger. Perceived stress was assessed using the 10-item version of the Perceived Stress Scale (PSS-10) [23].

Ultrasound examinations were performed using the MyLab50 scanner (Esaote, Italy) with Doppler imaging to assess fetal condition and fetoplacental hemodynamics.

The study adhered to international ethical standards, including the ICH-GCP guidelines, the Declaration of Helsinki (1964), the Council of Europe Convention on

Human Rights and Biomedicine, and applicable national legislation. All participants provided written informed consent.

Statistical analysis was performed using licensed software packages: Microsoft Excel and STATISTICA 13. Normality of data distribution was tested using the Shapiro–Wilk test. Group comparisons were performed using Student's t-test for independent samples or the Mann–Whitney U test for nonparametric data. Pearson's chi-squared test was used for categorical variables. Correlation analysis was conducted using Spearman's rank correlation coefficient.

Results and Discussion

Based on anamnestic data, 31.43% of participants in the main group were primigravida, compared to 56.67% in the control group. First-time delivery was anticipated in 60.00% of women in the main group and 66.67% in the control group. These differences were not statistically significant ($p > 0.05$).

All women in the main group exhibited elevated BP. The mean gestational age at the onset of hypertension was 30.71 ± 0.82 weeks ($\sigma = 4.84$). No cases of hypertension were observed in the control group.

Among women in the main group, 31.43% were diagnosed with GH, 42.86% with moderate PE, and 25.71% with severe PE. The mean systolic BP in the main group was 155.14 ± 2.47 mmHg ($\sigma = 14.63$), compared to 111.67 ± 1.50 mmHg ($\sigma = 8.24$) in the control group ($p < 0.05$). The mean diastolic BP was 101.71 ± 1.04 mmHg ($\sigma = 6.18$) in the main group and 70.17 ± 1.60 mmHg ($\sigma = 8.76$) in the control group, also a statistically significant difference ($p < 0.05$). The mean level of proteinuria in the main group was 1.71 ± 0.33 g/L ($\sigma = 1.94$), compared to 0.0093 ± 0.0108 g/L ($\sigma = 0.01$) in the control group ($p < 0.05$).

Extragenital pathology (EGP) was identified in all women in the main group and in 43.33% of women in the control group, a statistically significant difference ($p < 0.05$). A moderate positive correlation was observed between the presence of EGP and the severity of HD ($\rho = 0.591$, $p < 0.05$). A history of HD in previous pregnancies was reported by 34.29% of participants in the main group.

Regarding the course of pregnancy, threatened miscarriage (before 22 completed weeks) was reported in 17.14% of women in the main group and in 3.33% in the control group, although this difference was not statistically significant ($p > 0.05$). Cervical insufficiency was noted in 5.71% of the main group and 3.33% of the control group ($p > 0.05$). Threatened preterm labor (before 37 weeks) occurred 2.89 times more frequently in the main group (77.14%) than in the control group (26.67%), which was statistically significant ($p < 0.05$).

Fetoplacental circulation disorders were detected in 80.00% of cases in the main group and only in 3.33% of cases in the control group ($p < 0.05$). Fetal growth restriction (FGR), based on ultrasound findings, was observed in 37.14% of participants in the main group and in 3.33% of the control group ($p < 0.05$).

Psychometric assessment revealed significantly higher STAI-S, STAI-T, and PSS-10 scores in the main group compared to the control group. The median STAI-S

score was 44.00 (IQR: 40.00–48.50) in the main group, versus 31.00 (IQR: 28.25–34.00) in the control group. STAI-T was also significantly elevated in the main group (median: 51.00, IQR: 46.00–59.00), compared to the control group (median: 36.00, IQR: 33.25–39.00). Perceived stress as measured by the PSS-10 was higher in the main group (median: 28.0, IQR: 24.00–32.50) than in the control group (median: 20.50, IQR: 17.00–24.00) (Table 1).

Tab. 1

Descriptive statistics				
	Group	Median	Q1 (25%)	Q3 (75%)
STAI-S	Main	44.00	40.00	48.50
	Control	31.00	28.25	34.00
STAI-T	Main	51.00	46.00	59.00
	Control	36.00	33.25	39.00
PSS-10	Main	28.00	24.00	32.50
	Control	20.50	17.00	24.00

The Mann–Whitney U test confirmed statistically significant differences between the groups for all psychometric indicators. STAI-S scores were significantly higher in the main group ($U = 825.0$; $p < 0.05$), as were STAI-T scores ($U = 851.0$; $p < 0.05$) and PSS-10 scores ($U = 851.5$; $p < 0.05$) (Figures 1–3).

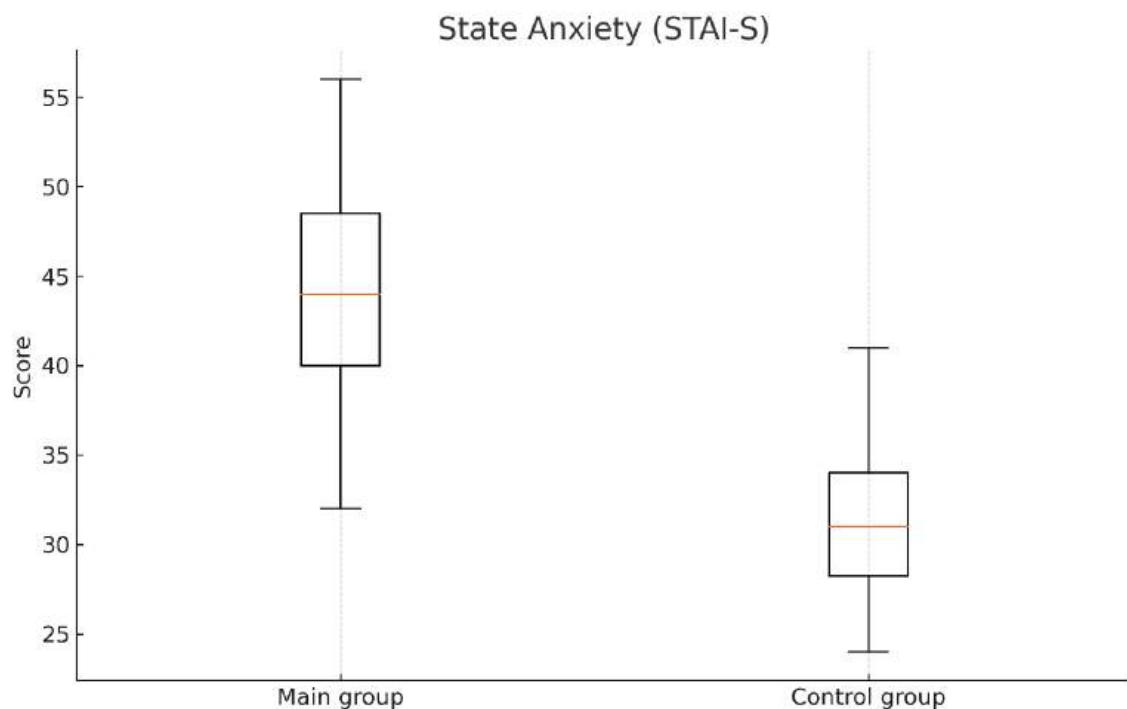


Figure 1 State Anxiety (STAI-S)

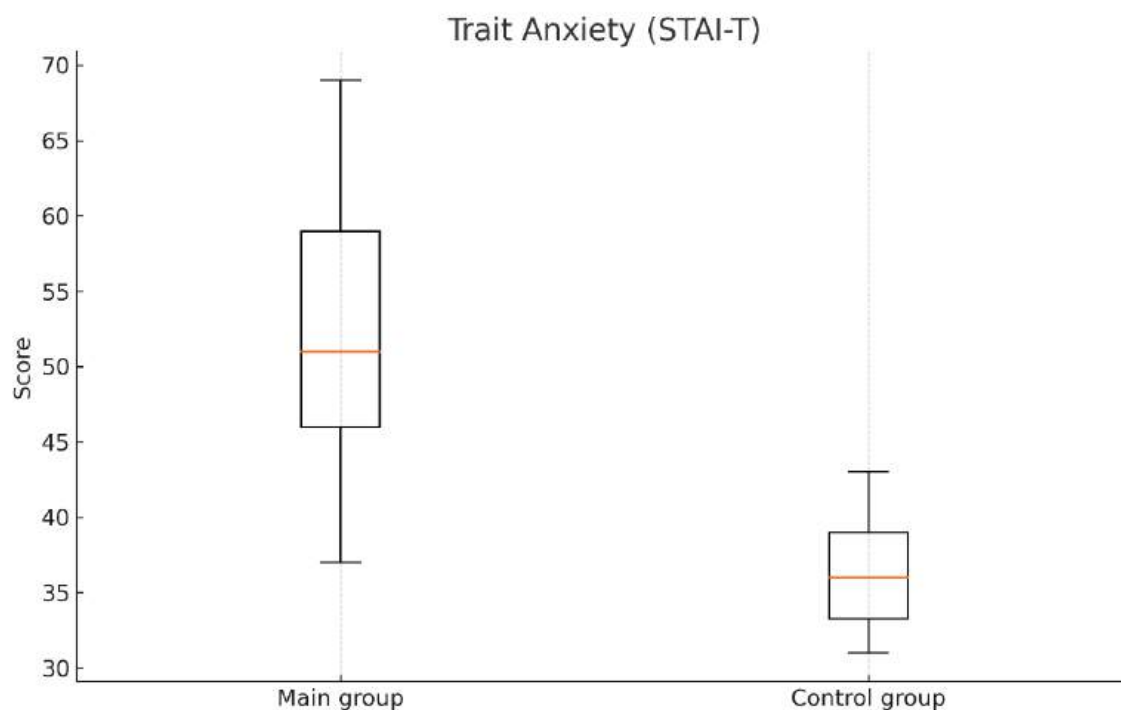


Fig.2 Trait Anxiety (STAI-T)

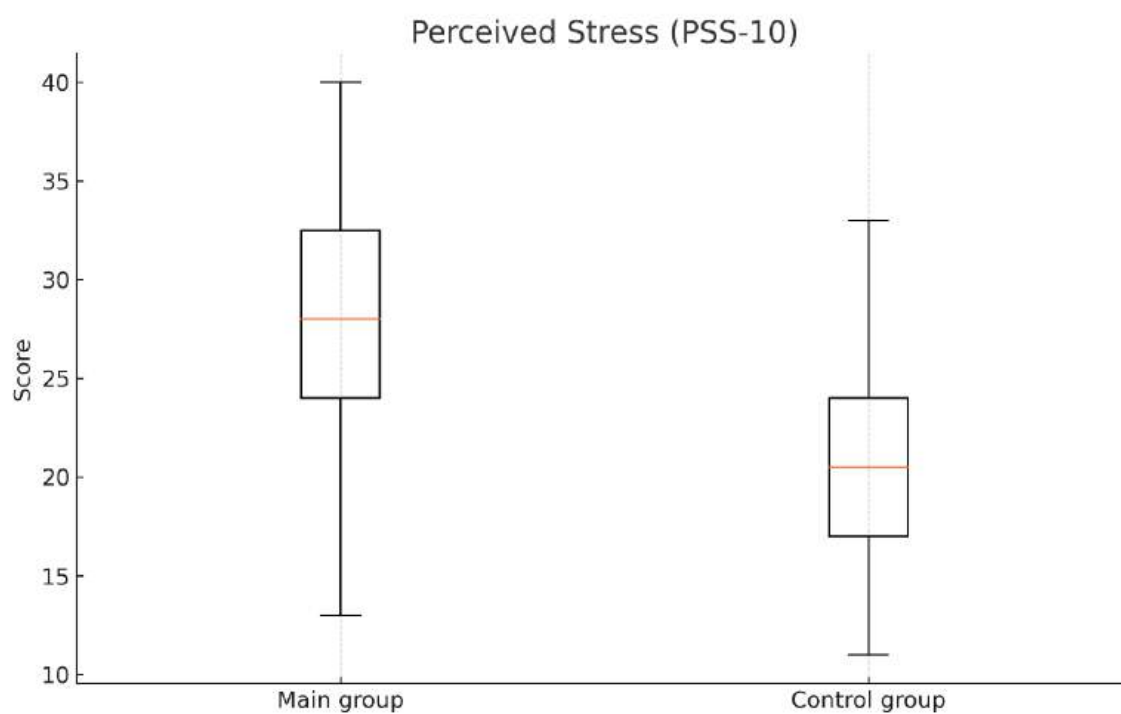


Fig. 3 Perceived Stress (PSS-10)

A high level of state anxiety ($\text{STAI-S} \geq 45$) was identified in 40.00% of women with HD. High trait anxiety ($\text{STAI-T} \geq 45$) was observed in 85.71% of the main group, with no such cases recorded in the control group. Elevated perceived stress ($\text{PSS-10} \geq 32$) was found in 28.57% of the main group and in only 3.33% of the control group (Table 2).

Tab. 2

Proportion of Pregnant Women with High Anxiety and Stress Levels

	Main Group (%)	Control Group (%)
$\text{STAI-S} \geq 45$	40.00	0.00
$\text{STAI-T} \geq 45$	85.71	0.00
$\text{PSS-10} \geq 32$	28.57	3.33

Spearman's rank correlation coefficients were calculated to assess the relationships between anxiety and perceived stress levels in both groups. In the main group, moderate positive correlations were observed between STAI-S and PSS-10 ($\rho = 0.52$, $p < 0.05$) and between STAI-T and PSS-10 ($\rho = 0.64$, $p < 0.05$). A moderate correlation was also found between STAI-S and STAI-T ($\rho = 0.47$, $p < 0.05$), indicating a consistent association between state and trait anxiety in pregnancies complicated by HD. In the control group, all correlations were weak and not statistically significant: STAI-S vs. STAI-T ($\rho = 0.001$), STAI-S vs. PSS-10 ($\rho = 0.03$), and STAI-T vs. PSS-10 ($\rho = 0.10$); all $p > 0.05$ (Table 3).

Tab. 3 Correlations Between Anxiety and Stress Scales

	Main Group (ρ)	Control Group (ρ)
STAI-S vs. STAI-T	0.47	0.001
STAI-S vs. PSS-10	0.52	0.03
STAI-T vs. PSS-10	0.64	0.10

Conclusions

1. Pregnant women with hypertensive disorders exhibited significantly higher levels ($p < 0.05$) of perceived stress, state anxiety, and trait anxiety compared to women in the control group. In the main group, the median STAI-S score was 44.00 (IQR: 40.00–48.50), STAI-T – 51.00 (IQR: 46.00–59.00), and perceived stress (PSS-10) – 28.00 (IQR: 24.00–32.50). In the control group, the corresponding values were 31.00 (IQR: 28.25–34.00) for STAI-S, 36.00 (IQR: 33.25–39.00) for STAI-T, and 20.50 (IQR: 17.00–24.00) for PSS-10.

2. High levels of state anxiety and trait anxiety were observed exclusively among pregnant women with hypertensive disorders – 40.00% and 85.71%, respectively. Elevated perceived stress was detected in 28.57% of participants in the main group versus only 3.33% in the control group.

3. Correlation analysis revealed statistically significant associations in the main group: between STAI-S and STAI-T ($\rho = 0.47$), between STAI-T and PSS-10 ($\rho =$

0.64), and between STAI-S and PSS-10 ($\rho = 0.52$), all with $p < 0.05$. These findings indicate a consistent positive correlation between anxiety and stress, reflecting the interdependence of psycho-emotional disturbances in pregnant women with hypertensive disorders. No statistically significant correlations were found in the control group.

4. The assessment of anxiety and stress using standardized psychometric instruments – the Perceived Stress Scale and the State-Trait Anxiety Inventory – should be considered an essential component of comprehensive clinical evaluation in pregnant women with hypertensive disorders. These findings may serve as a foundation for developing individualized management strategies for this group of pregnant women.

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