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PREDICTION OF HYPERTENSIVE DISORDERS IN PREGNANT WOMEN AT HIGH RISK

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An assessment of the diagnostic value of psychological and biochemical factors was performed with subsequent development of prognostic criteria for hypertensive disorders in pregnancy in a cohort of 32 women identified as high-risk. In 12 participants, the course of pregnancy was complicated by clinically confirmed hypertensive disorders, and they were assigned to the main group. The comparison group included 20 women who did not develop hypertensive disorders during pregnancy. Existing predictors were systematized for both groups (Tables 1 and 2), followed by an analysis of the frequency of each characteristic and the calculation of diagnostic coefficients (DC) and Kullback's measures of informativeness (MI) using the following formulas:

$$DC = 10\,lg\frac{A_1}{A_2}; \qquad (1)$$

$$\mathrm{MI} = 10\,lg\frac{A_1}{A_2} \bullet 0{,}5[A_1 - A_2]; \qquad (2)$$

where DC is the diagnostic coefficient,

MI is Kullback's measure of informativeness, A_1 is the frequency of the characteristic in the main group,

and A_2 is the frequency of the characteristic in the comparison group.

Table 1

Diagnostic Properties of Psychological Factors in High-Risk Pregnant Women

Characteristic (presence)		Frequency in groups				p (χ^2)	DC	MI
		Main group		Comparison group				
		n.	%	n.	%			
State Anxiety Scale	yes	12		5		< 0,01	-6,02	2,26
	no	0		15		< 0,01	-	-
Trait Anxiety Scale (≥ 40 points)	yes	11		4		< 0,01	-6,61	2,37
	no	1		16		< 0,01	9,82	3,52
Perceived Stress Scale (≥ 20 points)	yes	11		3		< 0,01	-7,86	3,01
	no	1		17		< 0,01	10,09	3,87

Table 2

Diagnostic Properties of Biochemical Factors in High-Risk Pregnant Women

Characteristic (presence)		Frequency in groups				p (χ^2)	DC	MI
		Main group		Comparison group				
		n.	%	n.	%			
Aliphatic-protein hydrazones (spontaneous) (≥ 2,2 a.u./g protein)	yes	11		2		< 0,01	-9,62	3,93
	no	1		18		< 0,01	10,33	4,22
Aliphatic-protein hydrazones (stimulated) (≥ 5,0 a.u./g protein)	yes	10		2		< 0,01	-9,21	3,38
	no	12		18		< 0,01	7,32	2,69
Superoxide dismutase (≤ 12,0 a.u./mg protein/min)	yes	4		2		< 0,01	-8,75	2,84
	no	19		50		< 0,01	5,56	1,81

According to the methodology for determining the reliability of diagnostic decisions, the threshold value of the cumulative diagnostic coefficient (Σ_{DC}) required to achieve a probability level of 95% is ±13; for 99% reliability, ±20; and for 99.9% reliability, ±30. In the differential diagnostic table (Table 3), markers are arranged in descending order of total informativeness Σ_{MI}.

Table 3

Diagnostic Table of Risk Factors for Hypertensive Disorders

№	Characteristic (marker)	Range	DC
1	Aliphatic-protein hydrazones (spontaneous) (≥ 2,2 a.u./g protein)	yes	-9,62
		no	10,33
2	Aliphatic-protein hydrazones (stimulated) (≥ 5,0 a.u./g protein)	yes	-9,21
		no	7,32
3	Superoxide dismutase (≤ 12,0 a.u./mg protein/min)	yes	-8,75
		no	5,56
4	Perceived Stress Scale (≥ 20 points)	yes	-7,86
		no	10,09
5	Trait Anxiety Scale (≥ 40 points)	yes	-6,61
		no	9,82
6	State Anxiety Scale	yes	-6,02
		no	-

Note: Σ_{MI} represents the total informativeness of both ranges (presence and absence) of each characteristic.

This order of markers complies with Wald's sequential analysis procedure: evaluating diagnostic variables from the most to the least informative ensures the shortest path toward a diagnostic decision with the required reliability.

The selected characteristics were used to construct the prediction form presented in Table 4.

Table 4

Prediction Form for the Development of Hypertensive Disorders in High-Risk Pregnant Women

№	Characteristic (marker)	Range	$\sum_{DC}$
1	Aliphatic-protein hydrazones (spontaneous) (≥ 2,2 a.u./g protein)		
2	Aliphatic-protein hydrazones (stimulated) (≥ 5,0 a.u./g protein)		
3	Superoxide dismutase (≤ 12,0 a.u./mg protein/min)		
4	Perceived Stress Scale (≥ 20 points)		
5	Trait Anxiety Scale (≥ 40 points)		
6	State Anxiety Scale		

Completion of each row involves summing the corresponding DC values. Once the cumulative Σ_{DC} reaches -13, a preliminary diagnostic conclusion regarding the high probability of hypertensive disorder development can be made with 95% reliability ($p < 0,05$). When Σ_{DC} reaches -20, the probability level increases to 99% ($p < 0,01$). If the cumulative value falls within the interval $-13 < \Sigma_{DC} < +13$, the conclusion cannot be considered reliable ($p > 0,05$).

Thus, based on the DC and MI values for the validated predictors, a clinical scoring system was developed that enables prediction of hypertensive disorders in pregnancy at $\Sigma DC \leq -13$ with a reliability of 95% ($p < 0,05$). When the Σ_{DC} reaches -20 or lower, the probability of hypertensive disorder development reaches 99% ($p < 0,01$).