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**INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES**<http://doi.org/10.5281/zenodo.3228716>Available online at: <http://www.iajps.com>**Research Article****ESTIMATION OF THE CONDITION OF THE AUTONOMOUS
NERVOUS SYSTEM IN PATIENTS WITH CONNECTIVE-
TISSUE DISEASES OF THE HEART ON THE BASIS OF
MATHEMATICAL MODELING.****Sudakov Oleg Valerievich, Vorontsova Zoya Afanasyevna, Gladskikh Natalya
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Article Received: March 2019**Accepted:** April 2019**Published:** May 2019**Abstract:**

Primary mitral valve prolapses (PMK) refers to the clinic of connective tissue dysplasia. Identification of primary prolapse in clinical studies is up to 15%. The leading clinical symptom is heart rhythm disorder. Currently, a link has been established between the autonomic nervous system and the sudden death of patients. The cause of cardiac arrhythmias in this category of patients remains not fully understood, one of their causes is considered to be changes in autonomic regulatory influences, including an increase in the tone of the sympathetic autonomic nervous system. Thus, the relevance of our research is beyond doubt.

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INTRODUCTION:

The study included 60 patients with mitral valve prolapse: 30 men and 30 women. The average age is 34.7 ± 3.54 years. The control group consisted of 30 healthy individuals with an average age of 29.9 ± 4.14 years. All patients underwent a general clinical examination which included an ECG, an echocardiogram (with an indication of the nature and extent of mitral valve prolapse, as well as degeneration of valve leaflets and subvalvular structures), and a study of heart rate variability.

The vegetative status was assessed on the Varicard complex; the recording duration was 5 minutes, with the evaluation of the time data and spectral analysis data. When analyzing the data, we identified the following clinical variants of primary mitral valve prolapse. In 65% of cases, an arrhythmic variant of the course of the disease was established, in 25%, a cardialgic variant was detected, and asymptomatic course and heart failure of FC I-II (NYHA classification) fell by 5%.

In 90% of cases prolapse of the anterior mitral valve was observed. Grade I prolapse was observed in 50% of patients, Grade II in 45%, Grade III in 5%. Myxomatous degeneration of valves and false chords were observed in 50% of patients. Changes in the valve leaflets, in the form of thickening and lengthening, were noted in every fifth patient.

The structure of the rhythm disturbances was as follows: in the first place sinus tachycardia (50% of patients), the pacemaker migration and sinus bradycardia in every fifth patient. Supraventricular premature beats occurred in 2/3 of the patients included in the study.

Blockade of all types accounted for 8% of the number of patients participating in the study. WPW syndrome was detected in 10%.

The ECG analysis confirmed the presence of impaired ventricular repolarization.

Analysis of heart rate variability revealed a decrease in all parameters. In particular, SDNN decreased by 35% compared with a group of healthy individuals,

and by 20% compared with patients who did not have ventricular arrhythmias. The rMSSD and pNN 50 values were also reduced. The ratio of sympathetic and parasympathetic regulation of the autonomic nervous system tended to increase compared with a group of practically healthy individuals. A 60% increase was observed in the group of patients with ventricular arrhythmias and by 30% in the group without ventricular arrhythmias. These changes suggest the predominance of sympathetic symptoms in patients with mitral valve prolapse, which is more pronounced in patients with conduction disorders.

Patients with mitral valve prolapse were able to reliably higher HR values after an exercise test compared with the control group. The change in the studied parameters indicates a high lability of the autonomic nervous system, and a significant predominance of the sympathetic level of regulation in patients with primary mitral valve prolapse, as well as an imbalance in the adaptive capacity of the organism.

MATERIAL AND METHODS:

To build a mathematical model for assessing the state of the autonomic nervous system (ANS) in patients with connective tissue dysplasia of the heart, a method was chosen based on expert assessment. All possible values of indicators selected for building a model (being the most informative) are ranked by degree of importance. For the ranking of each value, an a priori ranking method is used, which uses expert information and does not require, in contrast to analysis of variance, to set up an experiment on the object. The method of prior ranking allows an objective assessment of the subjective opinion of specialists (experts).

RESULT AND DISCUSSION:

In this study, heart rate variability (HRV) - X1, the results of ECHO_KG - X2, the results of ECG analysis - X3 were selected as factors affecting the ANS.

Estimates of experts and the results of the calculation of weights are presented in table 1.

Table 1. Expert estimates and weights.

Variables	Indicators	EXPERT EVALUATION								Σ	w_i
		1	2	1	2	1	1	3	2		
X1	HRV	1	2	1	2	1	1	3	2	13	0,9166
X2	ECHO-KG	2	1	2	1	2	2	1	1	12	1
X3	ECG	3	3	3	3	3	3	2	3	23	0,0833

Get

$$w_1 = 0.9166;$$

$$w_2 = 1.0000;$$

$$w_3 = 0.0833$$

Normalizing the values, we obtain that the mathematical model for estimating the state of the ANS (YBHTS) will be:

$$Y = 0.4583 * x_1 + 0.500 * x_2 + 0.04165 * x_3$$

Where X1 – indicator of HRV, X2 - indicator of ECHO_KG, X3 - indicator of ECG.

CONCLUSION:

The values of the model belong to the interval 0..1. Thus, if the model value varies from 0 to 0.35, then the state of the autonomic nervous system in patients with connective tissue dysplasia of the heart is assessed as unsatisfactory. When the model value is from 0.36 to 0.75, the ANS state is assessed as satisfactory. For values of the model between 0.75 and 1, the condition is rated as good.

The model developed by us was tested in practice and showed its efficiency. Thus, this model can be applied in a clinical setting.

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