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Research Article

INDICATORS OF THE EXTERNAL RESPIRATORY SYSTEM AND CARDIAC ACTIVITY IN ADOLESCENTS

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ABSTRACT

The purpose of this study was to identify the features of the state of the respiratory system and cardiac activity in children with autonomic dysfunctions, depending on gender. We examined 243 adolescents 12-18 years old with clinically and laboratory-instrumental confirmed dysfunction of the autonomic nervous system - autonomic dystonia syndrome. It was found that signs of cardiac abnormalities are more often observed in adolescents with SVD with a history of perinatal pathology, mostly in males. The risk of developing violations of bronchial patency was identified in adolescents with SVD with a history of perinatal pathology, to a greater extent in females.

KEYWORDS

Adolescents, autonomic disorders, perinatal pathology.

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Introduction

Vegetative disorders in children occur in 25 - 80% of cases, and in 17 - 20% of cases they progress, transforming into diseases such as ischemic heart disease, hypo- and hypertension, bronchial asthma, gastric ulcer and duodenal ulcer [3]. The prevalence of this pathology among noninfectious diseases of childhood and adolescence ranges from 29.1 to 75% of cases [4].

The leading role of the autonomic nervous system the formation of pathology of the cardiovascular system in children has been proven, and dysfunction of the autonomic nervous system is considered as a disease of adaptation, breakdown of neuroendocrine autonomic regulation of the heart and blood vessels [2]. In cases where the active factor exceeds the adaptive capabilities of the cardiovascular system, a pathological process occurs, including both functional and structural disorders. The cardiovascular and respiratory systems, due to their "indicator" advantages, are given a priority role in assessing the adaptive capabilities of the whole organism [1,5].

THE MAIN RESULTS AND FINDINGS

To reveal the peculiarities of the state of the respiratory system and cardiac activity in children with autonomic dysfunctions, depending on gender.

This work is based on the results of clinical and functional studies of the cardiovascular and respiratory systems in adolescents with SVD, depending on the presence of perinatal pathology. We examined 243 adolescents 12-18 years old with clinically and laboratoryinstrumental confirmed dysfunction of the autonomic nervous system - autonomic dystonia syndrome (SVD). The average age of the clinical manifestation of SVD in girls was 12.2 ± 1.8 years, in boys - 13.5 ± 2.1 years.

In the course of the study, groups of adolescents with SVD were formed, depending on gender and a history of perinatal pathology of the nervous system (PPNS), Group 1 consisted of 53 (21.8%) adolescent boys with PPNS, Group 2 - 34 (14.0%) adolescent boys without PPNS, 3 groups accounted for 107 (44.0%) adolescent girls with PPNS and group 4 - 49 (20.2%) adolescent girls without PPNS. (table 1)

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Table 1. Distribution of patients with SVD into groups, depending on the presence of a previous PPNS in the anamnesis.

Groups		n	%
I group	adolescent boys with PPNS	53	21,81%
II group	adolescent boys without PPNS	34	13,99%
III group	teenage girls with PPNS	107	44,03%
IV group	teenage girls without PPNS	49	20,16%
Total		243	100,00%

Note: SVD - autonomic dystonia syndrome.

PPNS-perinatal lesions of the nervous system.

ECG registration was carried out on a 6-TEK-3 apparatus (2003) in 12 conventional leads, at a paper speed of 50 mm / s, the ECG was recorded at rest, in the supine position.

Respiratory function was assessed using the "Valenta" hardware-software complex. The following indicators were investigated:

Vital capacity of the lungs (VC) consisting of the reserve volume of inspiration, reserve volume of expiration, tidal volume, in liters.

- Forced vital capacity of the lungs (FVC) the amount of air that can be exhaled during forced exhalation within 1 s after maximum inhalation, in percentage. - FEV1 - forced expiratory volume in one second - expired air volume in one second of forced expiration.
- The Typhno index is the forced expiratory volume in 1 sec as a percentage of the proper VC.

The statistical data were processed using the STATISTICA 6.0 application package (StatSoft Inc., USA).

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For the studied parameters, the following indicators were determined: mean value (M), standard error of the mean (m); if necessary, the median (Me) and interquartile range (25% percentile and 75% percentile) of the trait are indicated. To compare the quantitative characteristics of two independent groups, a nonparametric method was used - the calculation of the Mann-Whitney U-test, for 3 or more groups - the Kruskal-Wallis ANOVA method. The assessment of qualitative parameters was carried out in absolute and relative values (%), to compare qualitative characteristics in two independent groups, the x2 test was used, for small samples - Fisher's exact test, for multiple comparisons - Cochran's O-test. Differences with a 95% (p <0.05) significance level were considered statistically significant.

In order to study the state of cardiac activity in children with autonomic disorders, electrocardiographic parameters were studied in adolescents with SVD. Of the total number of adolescents studied, 79 (32.5%) had sinus bradycardia, the second most common was an increase in the T wave - in 30.5% of cases (Fig. 1).

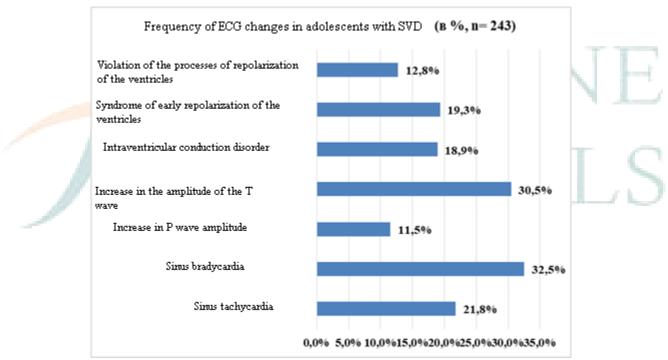


Fig. 1. The frequency of ECG changes in adolescents with SVD.

Sinus bradycardia in adolescents in groups I and III was more common than in groups II and IV (22.6% and 25.2% versus 14.7% and 18.4%, respectively).

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At the same time, an increase in the T wave was observed in 22 (41.5%) adolescents in group I compared with group II - 5 (14.7%); p1 <0.001. Rhythm disturbances in the form of sinus tachycardia were observed in 27 (25.2%) in group III and in 12 (22.6%) patients in group I. A greater percentage of patients with impaired

intraventricular conduction was observed in

was found in 17.0% of cases. In group III, lengthening of the PQ interval (atrioventricular block of I degree), high and pointed T waves were recorded (Table 1)

group III - 28 (26.2%), in group II this symptom

Table 1. The frequency of ECG changes in adolescents with SVD, depending on gender and a history of perinatal pathology.

				N. I	-		A I	
ECG indicators	Group I (n = 53)		Group II (n = 34)		Group III (n = 107)		Group IV (n = 49)	
	n	%	n	%	n	%	n	%
Sinus tachycardia	12	22,6%	5	14,7%	27	25,2%	9	18,4%
Sinus bradycardia	15	28,3%	7	20,6%	48	44,9%	9	18,4%
Increase in the amplitude of the P wave	6	11,3%	8	23,5%	4	3,7%	10	20,4%
Increase in the amplitude of the T wave	22	41,5%	5	14,7%	39	36,4%	8	16,3%
Intraventricular conduction disorder	9	17,0%	3	8,8%	28	26,2%	6	12,2%
Syndrome of early repolarization of the ventricles	8	15,1%	2	5,9%	29	27,1%	8	16,3%
Violation of repolarization processes	7	13,2%	1	2,9%	22	20,6%	1	2,0%

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The syndrome of early repolarization of the ventricles, represented by a scaphoid deformity of a segment with a slight displacement of its relative isoline, was detected in 29 (27.1%) in group III and in 15.1% of cases in group I, which may indicate the peculiarities of metabolic processes in the developing myocardium in this contingent. children. Violation of ventricular repolarization, represented by a shortening of the PQ interval, was detected in 20.6% of patients in group III and in 13.2% of patients in group I.

Respiratory function was assessed bv spirography. So, in group III, violations of bronchial patency were observed, as indicated by such indicators of spirography as VC, FVC, FEV

and Tiffno's index. These indicators were reduced and amounted to 63.7% and 61.4%, respectively. which is 1.2 times lower in comparison with these indicators of group II (73.4% and 71.6%, respectively); p1 < 0.01.

In group I, the VC indicator (68.3%), although it differed from this indicator in group II (73.4%) (p1 <0.01), however, it was lower than in group IV (70.1%) (p <0.01). These violations were reflected in the FEV 1, which was also the smallest in group III, 62.5%; p1 <0.001, compared with group II - 72.7%. (table 2).

Table 2.

Spirography indicators in adolescents with SVD, depending on gender. (Me [25q; 75q])

FVD indicators	Group I (n = 53)	р 1-2	Group II (n = 34)	р 2-3	Group III (n = 107)	р 3-4	Group IV (n = 49)	р 4-1	р 4-2	р 3-1
	1	<u><</u>	2	<u><</u>	3	<u><</u>	4	<u><</u>	<u><</u>	<u><</u>
VC (%)	68,3 [68,0; 69,3]	0,01	73,4 [72,1; 75,3]	0,001	63,7 [61,7; 65,9]	0,001	70,1 [69,0; 71,3]	0,01	0,01	0,001
FVC (%)	64,1 [64,0; 65,1]	0,01	71,6 [70,0; 73,1]	0,001	61,4 [60,8; 63,1]	0,01	65,9 [64,9; 67,1]	0,01	0,01	0,01
FEV 1 (%)	68,9 [67,2; 69,3]	0,01	72,7 [71,7; 73,9]	0,001	62,5 [61,3; 63,6]	0,01	69,1 [68,6; 69,7]	0,01	0,01	0,01
Tiffeneau index (%)	81,8 [80,9; 83,3]	0,01	85,3 [85,8; 87,5]	0,01	70,7 [70,5; 71,5]	0,001	81,2 [80,6; 82,4]	0,01	0,01	0,001

Note: p is the statistical significance of the difference in indicators.

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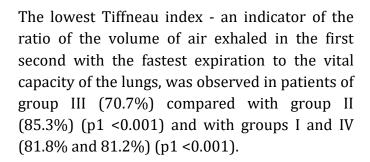






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Conclusion

Signs of cardiac dysfunction are more often observed in adolescents with SVD with a history of perinatal pathology, mostly in males. The risk of developing violations of bronchial patency was identified in adolescents with SVD with a history of perinatal pathology, to a greater extent in females.

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