

THE REGULATION OF HEART RATE ACCORDING TO THE DAILY MONITORING IN ADOLESCENTS WITH SCOLIOSIS

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Heart rate variability study involves the allocation and quantitative determination of the effect on the heart rate of each link in its management - the central, autonomic, humoral and reflex [1, 2].

The aim of the study was to determine the characteristics of heart rate variability (HRV) in healthy adolescents with 1-2 group health compared to their peers who are diagnosed with scoliosis 1-2 degrees.

Material and methods.

The study included 73 young people aged 12 to 17 years. Study group consisted of 32 teenagers, aged $14,5 \pm 0,48$ years, 1-2 health groups (according to the Order № 621 of 30.12.2003 «On the integrated assessment of the health of children»). Control group consisted of 41 teen with a mean age $13,049 \pm 0,29$ years old, with a history of violations of scoliosis posture type.

Daily heart rate variability was studied using the apparatus «Kardiotekhnika-3.4» (INKART, St. Petersburg) as recommended [2]. Subjected to analysis performance temporal and spectral analysis of heart rate.

Results.

Indicators of temporal analysis of heart rate in adolescents incorrect posture scoliosis type and the control group are shown in Table 1.

Table 1

Indicators of temporal analysis of heart rate in adolescents with scoliosis and the control group ($M \pm m$).

INDICATOR	The control group (n=41)	Comparative group (n=32)	$\Delta X, \%$
VAR , msec-day	1293,951 \pm 214,675	1310.310 \pm 148,520	1,249
Wake	1156,244 \pm 220,607	1206,310 \pm 168,069	4,151
Sleep	980,195 \pm 88,601	1003,340 \pm 62,670	2,307
aVNN , msec-day	738,782 \pm 25,540	800,687 \pm 28,720	7,731*
Wake	651,391 \pm 21,051	685,906 \pm 25,456	5,031*

Sleep	879,415±32,684	979,971±40,110	10,262*
SDNN , msec-day	154,878±11,101	195,752±14,091	20,882*
Wake	99,707±8,276	118,161±9,351	15,614*
Sleep	115,683±11,290	151,511±12,833	23,640*
pNN50% -day	18,171±3,303	29,191±3,741	37,745*
Wake	12,021±2,930	17,562±3,342	31,534*
Sleep	28,830±4,690	47,125±4,682	38,820*
rMSSD , msec-day	46,170±5,652	65,662±6,892	29,678*
Wake	36,800±5,210	45,842±5,153	19,717*
Sleep	57,950±7,171	87,161±9,442	33,509*
SDNN ind , msec-day	71,488±6,680	93,625±6,373	23,644*
Wake	66,901±6,890	82,280±6,065	18,690*
Sleep	77,415±7,350	106,121±8,079	26,970*
SDANN , msec-day	136,051±10,621	170,501±14,061	20,206*
Wake	71,170±5,633	82,250±8,670	13,470*
Sleep	75,878±8,993	95,375±11,590	20,440*
CBBP , day	1897,293±165,421	2321,375±170,990	18,270*
Wake	1886,390±185,024	2192,810±169,960	13,970*
Sleep	1938,560±175,120	2503,810±203,702	22,570*

Table 2 presents the spectral analysis of heart rate in adolescents in the study groups.

Table 2

Indicators of spectral analysis of heart rate

INDICATOR	The control group (n=41)	Comparative group (n=32)	ΔX, %
VLF, mc²-day	3805,171±593,490	5673,401±696,380	32,930*
Wake	3351,630±595,703	4512,801±569,820	25,720*
Sleep	4234,240±627,601	6998,840±1001,795	39,501*
LF, mc²-day	2293,976±386,720	3500,470±475,971	34,470*
Wake	2130,270±401,401	2969,125±442,771	28,250*
Sleep	2507,190±460,051	4079,219±675,352	38,540*
HF, mc²-day	1008,540±202,860	1766,625±306,350	42,901*
Wake	701,585±179,410	945,090±192,320	25,770
Sleep	1384,700±288,880	2613,690±472,280	47,020*
nHF, day	29,440±2,301	33,156±3,430	11,210
Wake	23,290±2,060	23,340±2,180	0,220
Sleep	34,512±2,820	38,906±4,141	11,290

Note: * p <0.05

Discussion.

In the analysis of HRV in adolescents diagnosed with scoliosis, a significant decrease of almost all temporal parameters: SDANN decreased by 20,206% ($p < 0.05$) compared with the control group. The magnitude rMSSD decreased by 29,678% ($p < 0.05$), rNN50 - by 37,745% ($p < 0.05$), indicating a predominance of sympathetic influences on the activity of the heart, and the indicator of variations in the scope of the study group and the control group were not significantly changed.

At the same time, there is a reduction in low frequency spectral parameters as well as the high-frequency component HF to 42,9%, LF at 34,47%, VLF by 32.93% ($p < 0.05$) compared with the control group. When analyzing the ratio LF / HF statistically significant difference compared with the control group were found.

Thus, in adolescents diagnosed with scoliosis observed a significant reduction in the total power spectrum without the express imbalance between the parasympathetic and sympathetic autonomic nervous system, which shows a decline in adaptive abilities of the body and is a poor prognostic sign. [2].

Conclusions.

Based on the results of the study it can be concluded that adolescents with scoliosis observed a significant reduction in both temporal and spectral parameters of circadian variability of heart rate without significant imbalance of the sympathetic and parasympathetic divisions of the ANS.

Literature.

1 Makarov L.M. Russian Bulletin of Perinatology and Pediatrics 2003-№ 6.- p. 34-37.

2: Guide to rhythm disturbances of the heart / red. E.I. Chazov, S.P. Golitsyn // GEOTAR Media, 432 p.