Research Journal of Medical Sciences 9 (3): 95-98, 2015
ISSN: 1815-9346

Correction of the State of Cardiovascular System of Undergraduates by Means of Dosed Constitutional Walking and Jogging

Viktor L. Kondakov, Lydmila N. Voloshina, Nataliya V. Balysheva,
Evgeniya N. Kopeikina and Diana A. Skrug
Belgorod State University, Pobedy St. 85, 308015 Belgorod, Russia

Abstract: The study is dedicated to the issue of educational process improving of physical education of undergraduates who has abnormalities in the state of cardiovascular system. Influence of researchers technique of dosed constitutional walking and jogging for functional state of cardiovascular system of undergraduates of special medical groups has been justified and experimentally verified in the study.

Key words: Abnormalities in the state of cardiovascular system, dosed constitutional walking and jogging, experimentally, justified, undergraduates

INTRODUCTION

According to World Health Organization data 16,700,000 people die from cardiovascular disease annually (Weiner, 2009; Butts, 1995; Kavanagh, 1979). Presently in Russia from 2.5 million deceased people >1,200,000 (around 50%) deceased for this reason. Particular concern, according to academician E.I. Chazov, is caused by an increase in mortality among young people due to cardiovascular diseases. Mortality among people up to 25 years in the last 5 years has increased by 82%, among people from 25-30 years by 70% (Ilyinich, 2005).

Data on health state of youth received from the higher educational establishments of Russia also indicates the acuteness of the problem. Annually, an increasingly greater number of students, according to the results of medical examination, move to a special medical health group. The number of such students made up to 40-45% (Bogoyeva, 2011; Weiner, 2009; Kopeikina and Drogomeretskiy, 2012). Up to 50% of young people from them have abnormalities in the state of cardiovascular system (Balysheva *et al*., 2011; Gorelov *et al*., 2008, 2013).

For the persons with abnormalities in the state of cardiovascular system constitutional walking and aerobic exercises of cyclical nature (working pulse 110-150 beats per min) aimed for increasing of total endurance and performance are the most recommended exercises (Weiner, 2009; Dunstheimer *et al*., 2001; Sheffield *et al*., 1978). However in the practice of physical education of students of high schools related to special medical group, this method of health improvement cannot be fully implemented. In the special literature on physical education for high schools students constitutional walking and jogging are considered mainly as the method of background physical culture, i.e., from the point of its incorporating into daily routine (Weiner, 2009; Gorelov *et al*., 2008).

MATERIALS AND METHODS

Received theoretical data became a prerequisite for experimental methodology, dosed constitutional walking and jogging with students of special medical group who have abnormalities in the state of cardiovascular system. The foundation for experimental methodology was dosed constitutional walking outdoors on the pulse 100-130 beats per min with gradual increase of time and walking rhythm. In addition, the following variations of walking were used: walking uphill, up the stairs, combined developing exercises in motion, special running exercises were applied (performed on the recommendation of physician). Exercises for development of strength, agility, flexibility and coordination were included for increase of physical fitness level. Also exercises of remedial gymnastic aimed at improvement of cardiovascular system were used in methodology. Conducting training outdoors regardless of the season, excluding days with unfavourable weather conditions only was an important component of experimental classes. In warm season (September-October, April-May), students took with them ground pads which were used for carrying out breathing exercises and gymnastics of Pilates system. The value of the heart rate was monitored during the whole training session, the load regulation was carried if necessary.

Corresponding Author: Viktor L. Kondakov, Belgorod State University, Pobedy St. 85, 308015 Belgorod, Russia

RESULTS AND DISCUSSION

The effectiveness of the developed experimental methodology was evaluated in the course of pedagogical experiment which was conducted at the Department of Physical Education of National Research University "BSU". However, according to results of final testing, significant improvements in the state of cardiovascular system of tested objects have not been identified. At the same time, significant positive changes in the range of parameters of physical fitness have been detected. Data analysis and compilation of first pedagogical experiment allowed adjusting the experimental methodology: changes to quantity parameters of time and rhythm of dosed walking were made, share of aerobic exercises and working time on stairs were increased, constitutional jogging was included.

For conducting the pedagogical experiment no. 2 two groups were divided: experimental (20 girls) and control (30 girls) with people who have abnormalities in the state of cardiovascular system in the age of 18-19 years. In the experimental group, training sessions were conducted on the experimental methodology in the control group they were conducted according to program developed by teachers of the Department of Physical Education for all students of special educational department without their division by nosological basis. Sessions were carried out in both groups according to the schedule of academic groups 2 times a week for 90 min. Total volume of practical classes conducted within the pedagogic experiment made up 136 h. At the beginning and at the end of the school year (September, May) testing was performed and the results are shown in Table 1 and 2. Prior to experiment both groups were similar.

Table 1: Physical development and physical fitness of students of the experimental group (n = 20) and the control group (n = 30) before and after the experiment

		Experimental Group (EG)				Control Group (CG)		
Parameters	Testing procedure	$\bar{x}$ ±m	σ^2	p	PƏG-KG	$\bar{x}$ ±m	σ^2	p
Height (cm)	Before	164.65±1.25	31.6			164.38±1.29	50.11	
	After	165.2±1.270	32.48			164.77±1.25	47.15	
Weight (kg)								
Actual	Before	58.53±2.53	129.00			58.35±2.06	128.46	
	After	55.92±1.91	72.96			57.47±1.78	94.55	
Optimal	Before	61.13±1.66	55.65			59.34±1.29	50.16	
	After	59.85±1.35	36.45			59.91±1.24	46.27	
Waistcircumference (cm)	Before	69.52±2.10	88.40			69.5±1.650	81.77	
	After	66.82±1.53	46.92			68.93±9.49	90.13	
Circumference at hip	Before	96.52±1.83	67.30			96.33±1.35	55.19	
level (cm)	After	94.62±1.33	35.86			96.33±7.47	55.81	
Chest excursion (cm)	Before	4.87±0.35	2.57	0.05*		5.6±0.280	2.40	
	After	6.12±0.39	3.04			5.78±0.30	2.70	
Actual lung capacity	Before	2.83±0.11	0.37	0.05*, **	0.05*, **	2.84±0.16	0.49	
	After	2.97±0.12	0.42			2.85±0.10	0.21	
Due lung capacity	Before	3.34±0.07	0.83	0.05*	0.05*	3.64±0.06	0.98	
	After	3.67±0.06	0.71			3.66±0.06	0.90	
Downward tilt from	Before	8.85±1.38	38.55	0.05*	0.05*	9.16±1.05	33.31	
the bench (cm)	After	11.95±1.07	23.31			8.77±1.15	39.90	
Dynamometry (daN)								
Back strength	Before	57.5±5.540	614.47			55.56±3.58	385.77	
	After	56.75±3.57	255.98			58.67±3.27	320.57	
Right hand	Before	18.15±0.77	12.02	0.05*, **	0.05**	18.36±0.85	21.96	
	After	25.40±1.66	55.30			26.97±0.69	14.65	
Left hand	Before	16.60±1.04	21.93	0.05*, **	0.05**	16.6±0.790	19.00	0.05*
	After	21.75±1.68	56.93			20.93±0.61	11.30	
Ratio to body weight (%)	Before	30.62±1.54	48.01	0.05*,**	0.05**	31.15±1.75	91.96	0.05*
	After	42.28±2.66	142.07			42.6±1.350	55.06	
Stoop and stretch of hand	Before	5.25±1.36	37.14			5.8±1.270	48.99	
lying (number of times)	After	6.45±1.28	33.10			6.23±1.22	45.01	
Romberg'stest (c)	Before	12.8±2.070	86.21		0.05**	14.17±1.84	102.46	
	After	12.9±2.380	114.08			12.67±1.32	52.53	
Coordination rate (according	Before	3.9±0.200	0.85		0.05**	4.52±0.28	2.49	0.05**
to Zh. Ye. Firiliova)	After	3.54±0.24	1.19			4.67±0.56	9.45	

*, ** According to student and Fisher

Table 2: Functional fitness of students from the experimental (n = 20) and control (n = 30) groups before and after experiment

		Experimental Group (EG)				Control Group (CG)		
Parameters	Testing procedure	$\bar{x}$ ±m	σ^2	p	PƏG-KG	$\bar{x}$ ±m	σ^2	p
Heart rate at rest (beats min^{-1})	Before	94.63±3.83	294.36	0.05*		94.07±2.15	138.89	0.05*
	After	81.56±3.45	239.41			83.07±2.37	167.81	
Bloodpressure (mmHg)								
Systolic	Before	110.9±2.510	126.51			112.4±1.990	119.55	

Table 2: Continue

Parameters	Testing procedure	Experimental Group (EG) $\bar{x}$ ±m	σ^2	p	PƏG-KG	Control Group (CG) $\bar{x}$ ±m	σ^2	p
	After	112.53±2.05	125.63			115.05±2.88	166.26	
Diastolic	Before	73.9±1.990	79.25			73.00±1.43	61.37	
	After	75.33±1.44	61.88			72.95±2.01	81.10	
Pulse pressure (mmHg)	Before	40.35±2.13	91.39	0.05**	0.05*	39.40±1.40	59.55	
	After	37.2±1.570	73.95			42.15±1.42	40.62	
Systolic volume of blood (mL)	Before	59.04±2.00	80.59	0.05**	0.05*	59.04±1.12	37.73	0.05**
	After	60.53±1.10	24.48			56.52±1.22	44.81	
Minute volume of blood	Before	5.5±269.7	1.45			5.6±179.1	0.96	0.05*
(l min^{-1})	After	5.0±0.250	1.32			4.70±0.18	0.99	
Schtange test (sec)	Before	41.12±3.15	297.85	0.05*		42.92±3.65	267.65	0.05*
	After	53.56±2.99	268.3			49.92±3.96	315.18	
Hench test (sec)	Before	27.54±2.09	88.11			28.96±1.69	86.28	
	After	30.02±2.22	98.87			28.98±2.01	121.36	
Orthostatic test (difference	Before	29.34±3.89	303.67	0.05**	0.05**	23.78±3.37	341.01	
beats min^{-1})	After	22.69±2.25	101.54			24.18±3.81	436.07	
Ruffier test (cu)	Before	15.13±1.21	29.45	0.05*		14.48±0.67	13.69	0.05*
	After	11.0±1.190	28.61			11.42±0.71	14.96	
Modified step-test (cu)	Before	17.69±0.55	66.19			18.45±0.49	7.45	
	After	18.14±0.48	4.67			17.75±0.43	5.60	
Kerdoindex (cu)	Before	19.51±3.98	317.75	0.05*,**		21.25±2.36	167.10	0.05*
	After	7.45±4.90	481.54			7.35±2.90	253.22	
Skibinskayaindex (cu)	Before	8.6±0.760	11.72	0.05*		9.60±0.69	14.45	
	After	11.45±1.08	23.62			10.76±0.91	25.08	

*, ** According to student and Fisher

Obtained data shows that after the experimental sessions performance of chest excursion, lung capacity (though actual lung capacity remained smaller than due lung capacity), carpal dynamometry significantly improved with students of the experimental group. Performance of carpal dynamometry improved significantly and coordination rate worsened with students of control group. Significant changes between groups were indicated in the following parameters: performance of lung capacity, flexibility, dynamometry of left hand, Romberg's tests, coordination rate were betterin the experimental group after the experiment in the control group dynamometry of right hand were better. All this allow noting a positive effect on the experimental technique of physical development and physical fitness of the objects.

However, final conclusion on the efficiency can be done only on the basis of analysis of changes in the functional state of cardiovascular system of the objects. Testing results of functional fitness of students from the experimental and control groups are presented in Table 2.

It can be clearly concluded from this data that corrected method of dosed walking and jogging had a positive impact on the range of parameters of the state of cardiovascular system. During conducted experiment results of heart rate at rest, pulse pressure, systolic volume of blood, Schtange tests, Orthostatic tests, Ruffier tests significantly improved with students of the experimental group and also the value of the vegetative Kerdo index stabilized within normal limits and the value of the Skubinskaya index increased. Heart rate at rest, Schtange tests, Ruffier tests, Kerdo index significantly improved, systolic and minute volumes of blood significantly worsened in the control group. Significant differences in final testing between groups were identified in the parameters of pulse pressure, systolic volume of blood, Orthostatic test. All three parameters proved to be better in the experimental group.

Summary: Thus, conducted research showed the expediency of incorporating of dosed constitutional walking and jogging according to author's technique in the training sessions on Physical Education for students with abnormalities in the state of cardiovascular system. Such sessions have a positive effect on the functional state of cardiovascular system and also contribute to the improvement of students' physical development and physical fitness. Received experimental data shows that a lack of aerobic load in the sessions of dosed constitutional walking leads to substantial reduction of their therapeutic effect.

CONCLUSION

The results allowed to determine that physical load in the intensity zone of heart beat 100-130 beats per min is insufficient for emergence of significant positive changes in the functional state of cardiovascular system. At the same time, increase of intensity of walking exercises and

incorporating of constitutional jogging ensure escalation of physical load up to aerobic intensity zone (heart beat 130-150 min) that contributes to significant positive changes in the functional state of cardiovascular system and increase of physical health of objects. Presented author's technique can be used not only on the session of Physical Education in different educational establishments but be included to programs of sanatorium and health resort treatment.

REFERENCES

Balysheva, N.V., A.A. Gorelov and O.G. Rumba, 2011. Regulation of kinetic loads for students of special medical group with abnormalities in cardiovascular system during sessions of constitutional Physical Education. Physical Education and Health: methodological journal. Voronezh: Publishing house VGPU, 4 (34): 3-6.

Bogoyeva, M.D., 2011. Construction The construction physical education process of students of special medical group with disabilities in cardiovascular system: author's abstract. Candidate of Pedagogic Sciences. Saint-Petersburg.

Butts, N.K., 1995. Energy costs of walking on a dual action treadmill in men and women. Medicine and Science in Sports and Exercise, 1: 121-126.

Dunstheimer, D. *et al*., 2001. Bilateral deficit during sport-term, high-intensity cycle ergometry in girls and boys. Eur. Appl. Physiol., 84: 557-561.

Gorelov, A.A., O.G. Rumba and N.V. Peremyshlennikova, 2008. Dosed constitutional walking as the efficient means of strengthening of students' health with abnormalities in cardiovascular system. Physical Education and Health: methodological journal.Voronezh: Publishing house VGPU, 5: 46-49.

Gorelov, A.A., V.L. Kondakov and A.N. Usatov, 2013. To the question about the use of independent physical training in educational space of modern higher institute. Physical Education of Students, 1: 17-26.

Ilyinich, V.I., 2005. Physical Education of Student: textbook. Gardariki, Moscow.

Kopeikina, E.N. and V.V. Drogomeretskiy, 2012. Adapted tests to assess the state of the cardiovascular system of students of special educational department. Economic and humanitarian research of regions, Rostov-on-Don, 6: 26-28.

Kavanagh, T., 1979. Physical training by hearts ill hesses. Amer. S. Physical, 44: 1230-1240.

Sheffield, J., X. Shapiro, Y. Droky and J. Sheffield, 1978. Rehabilitation of patients with NCA (Neurocirculatory Astenik) through a shot Term Training Program. Am. Soc. Physical Med., 57 (1): 1-8.

Weiner, E.N., 2009. Therapeutic physical education: textbook, Flinta. Science, Moscow.