Criteria of the load dosing during physical culture and health improving lesson, organized by means of “Historical Terrainkur”

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Abstract: Observing modern tendencies in motor activity among students we came to the conclusion that boys and girls deny traditional forms of physical culture lessons and choose the directions. They mainly correspond with students' style of life, social and psychological status, morpho-functional abilities. It conditions pedagogical objective to modernize physical upbringing system at a higher educational establishment and create new forms of lessons organization with students. **Materials.** The research work presents the results of physical culture and health improving lessons (organized by means of “Historical Terrainkur”) influence on medical department students' functional state and health. We held 4 experimental lessons. They were differentiated according to the parameters of the load, in order to create the criteria of the load dosing on the routes of “Historical Terrainkur”. 132 students took part in the experiment. They all belonged to a special group of health. **Research methods.** Pedagogical experiment, a survey according to complains of health state among students, testing students' health state according to points, sociological survey, statistical data handling, research results analysis and summarizing. **Results.** It is necessary to dose the load on “Historical Terrainkur” routes according to the following: speed of movement – the quantity of steps within one minute, the duration of the route – general time of terrainkur. **Conclusion.** Physical culture and health improving lessons, organized by means of “Historical Terrainkur”, were highly appreciated by students of a special medical department. They can be recommended as a new form of physical culture lessons organization for students.

Keywords: students, physical culture special medical group, dosed walking.

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According to a thorough medical check-up among students from Tver State Medical University 2016-2018, 33,6% of students belong to a special medical group. We divided students, who have chronic diseases, according to the main diagnosis: cardiovascular system pathology (CVS) – 32%, locomotor apparatus pathology – 28,6%, eyesight pathology – 15,6%, endocrine system pathology – 7,5%, respiratory system pathology – 6,1%, digestive apparatus pathology – 2,7%, psychoneuropathic diseases – 2,7%, hematopathy – 2,7%, gynaecological diseases – 1,4%, skin pathology – 0,7%. Low functional abilities of a cardiac muscle were stated among 60,8% of junior students, 1-2 degree scoliosis among 77,9% of students, varicose veins of lower extremities among 70,4%, vegetative-vascular dystonia among 55,4% of students.

As a rule, during physical culture lessons special group included students with different chronic diseases. It demands physical culture and health improving lesson optimization, taking into consideration contra-indicated kinds of loads in case of all pathologies. Such kind of situation causes the necessity to choose adequate means and methods of physical upbringing. They have maximum health improving effects. They prevent negative influence on an organism of a person, who has chronic diseases. Some research workers offer to use dosed walking during the lessons with poor health state students [1,2,3]. Dosed walking normalizes peripheral circulation [4], provides correct posture formation [5], optimizes the state of central and vegetative nervous system and inner organs [6], provides fat burning [3]. It is recommended to organize the

routes during dosed walking in picturesque places. It provides relaxing effect on psycho-emotional sphere [7,8,9,10]. During the attempt to realize the offered way of physical culture health improving lessons organization with students of special group we had two main difficulties: the 1st – higher educational establishment is situated in the center of the town, far away from picturesque places. The 2nd – the increasing negative attitude of young people to the formed physical culture traditions at higher educational establishments and their desire to form new stereotypes of motor activity. In this case we improved the methodology of dosed walking. We created “Historical Terrainkur” system. We laid the routes in a historical part of the town (Tver) concentrating them on the territory of former Tver Kremlin. Before the beginning of the terrainkur students are told about the influence of dosed walking on the functional state of an organism different systems. We explain the technique of correct walking. We give recommendations concerning movement along the stages. Students start from the building of a higher educational establishment following the teacher according to the definite route in a stated tempo. After the definite number of steps there was a stop near a historical object. During the stop students fulfill respiratory exercises and also listen to information about the history of the object within 1-2 minutes. The narration is illustrated by ancient images in the pictures, lithographies. One and the same route students overcome twice a week during two and more months. It depends on the training influence. At every lesson information about a historical object is added by new historical details. Students master the information about the history of an object, situated on the route. They move to a new historical route with new historical objects. There are no methodologies of dosed walking organization by means of “Historical Terrainkur”. At the initial stage we had to create the criteria of the load dosing at such routes.

Table 1 – The parameters of dosed walking routes

Load parameters	Routes (RT)			
	RT-1	RT-2	RT-3	RT-4
Length of the route (steps)	1600	1800	2250	3000
Duration of the route (min)	35	35	40	45

The aim of the research: to create the criteria of the load dosing during physical culture and health improving lesson. It is organized by means of “Historical Terrainkur”.

The objectives of the research:

1. To create the routes for dosed walking.
2. To organize physical culture lessons by means of “Historical Terrainkur” among the students of a special medical department.
3. To estimate the dynamics of students’ functional state and health during terrainkur.
4. To state correlation dependence between students’ functional state and the load parameters.
5. To compare the dynamics of students’ health state at different routes.

MATERIALS AND METHODS

132 students of the Tver State Medical University 1st and the 2nd course took part in the research. All students belonged to a special health medical group (the average age 18±1). We offered students to overcome 4 routes:

RT-1 – low intensity route – moderate speed of movement, short distance and duration of terrainkur, low density of the lesson;

RT-2 – the average intensity route – longer duration of the route and higher speed of walking than RT-1;

RT-3 – high intensity route- the average speed of movement, the average duration and length of the route, the average density of the lesson;

RT-4 – maximum intensity route – high speed of walking, length and duration of the route in comparison with RT-3, the average density of the lesson (table 1).

At all routes the density of the lesson corresponded with the demands of physical culture lesson organization with students of special medical group.

Duration of the load (min)	20	20	25	30
Density of the lesson (%)	57	57	63	67
Orientative speed at the route (steps/min)	85	90	90	100
The presence of climbing parts (abs.)	1	1	3	3

We offered students to move in quick tempo (“high tempo walking”) following the teacher.

The object of the research: functional indices (pulse, pulse increase owing to the load, speed of moving at the stages of routes), students’ health state, routes parameters of dosed walking.

At the beginning of the route, during the stop and at the end of the route we registered pulse (Ps) and the complaints. Students had complaints concerning their health state (HS), health state estimation (HE) and pulse estimation (PsE) according to 5-point scale [8], registered the time of movement between the stops (Tn), time of rest at stops (Tr), general time of the route (T). While moving students counted independently the number of steps between the stops (NSS), calculated the volume of movement speed ($V = NSS/Tn$). We calculated the density of a lesson ($DL = Tn/T \cdot 100$).

Correlation connection between the load parameters (speed of movement, time of the load, number of the fulfilled steps), pulse reaction to the load and the dynamics of health state were determined according to Pearson coefficient (r), the validity was estimated according to confidence coefficient ($t \geq 3$). The validity of differences between the average values of parameters was stated according to Student coefficient, confidence interval was $p < 0,05$.

Table 2 – Students’ functional state dynamics during the routes (M±m)

Index		Route (RT)			
		1	2	3	4
The time of day		11.00	13.00	15.00	16.00
HE (points)	initial	3,6±0,2	3,8±0,1	3,1±0,3 #	3,5±0,1 #
	control	3,8±0,2	4,12±0,08	3,3±0,3 ##	3,6±0,1###
Health state dynamics (% of people)	improved	31,3	40	23,5	17,9
	became worse	6,2	11,7	11,8	10,3
	didn’t change	62,5	43,3	64,7	71,8
HS (% of people)	initial	12,5	10	46,7 *##	15,4
	control	6,2	6,7	17,6	10,3 §
Ps initial (beats/min)		98,1±4,4	88,9±1,8*	93,2±3,8	84,6±2,0**§
Δ Ps in the middle of RT		31,7±2,2	39,6±2,7*	48,1±5,4	49,3±3,2***#

RESULTS AND DISCUSSION

The received results are presented in tables 2, 3, 4. We stated the influence on the initial health state of students and its dynamics during terrainkur, when dosed walking was held. We stated the volume of the theoretical load, which was before it. Students complained of headache, hunger, stomachache, throat irritation, psycho-emotional tension. During “Historical Terrainkur” at all routes we revealed positive dynamics of students’ health state. However we revealed its correlation with the load duration, time of the day and speed of movement at the stages. The lowest positive dynamics of students’ health state was stated at maximum intensity route (RT-4). We stated the fact that 17,9% of students had health state improvement at the end of the route, 10,3% of the respondents started to complain of tiredness, body pain. By the end of high intensity route (RT-3) students were only very hungry (17,6%). This route has the highest positive dynamics of complaints. However, according to health state estimation in points the dynamics is insignificant. Statistically valid dynamics of health state was registered at the average intensity route (RT-2). Considerable, but statistically not significant health state dynamics was stated at low intensity route (RT-1).

Δ Ps at the top of the load	41,5 $\pm$ 5,3	52,2 $\pm$ 2,5***	59,8 $\pm$ 6,0 **	55,8 $\pm$ 4,7*§§§
Δ Ps at the end of RT	15,1 $\pm$ 4,4	26,7 $\pm$ 1,5*	24,9 $\pm$ 5,0	38,3 $\pm$ 3,7 ***##§
Time of RT (TRT) (min)	30,4 $\pm$ 0,15	30,8 $\pm$ 0,14	42,4 $\pm$ 0,14 ***###	44,3 $\pm$ 0,4 ***###§§§
Time of the load (TL) (min)	19,1 $\pm$ 0,5	20,1 $\pm$ 0,3	27,6 $\pm$ 0,6 ***###	29,7 $\pm$ 0,6 ***###§§
Time of rest (min)	11,3 $\pm$ 0,4	10,7 $\pm$ 0,3	14,8 $\pm$ 0,5 ***###	14,6 $\pm$ 0,5 ***###
Density of the lesson (DL) (%)	62,8 $\pm$ 1,4	65,4 $\pm$ 1,0	65,1 $\pm$ 1,2	67,0 $\pm$ 1,1*
NSS general (abs.)	1685 $\pm$ 26,6	1859 $\pm$ 10,9 ***	2693 $\pm$ 23,1 ***###	2883 $\pm$ 40,5 ***###§§§
NSS average (abs.)	337,0 $\pm$ 5,3	309,0 $\pm$ 2,2 ***	385,0 $\pm$ 3,3 ***###	360,0 $\pm$ 5,1 **###§§§
Vav (steps/min)	87,8 $\pm$ 2,5	98,0 $\pm$ 2,1 **	99,9 $\pm$ 1,9 ***	106,0 $\pm$ 3,3 ***#
Vav (steps/hours)	5318 $\pm$ 160	5641 $\pm$ 114	5902 $\pm$ 130**	5922 $\pm$ 174*

Note: * – The difference according to this index in terms of RT-1 is statistically valid ($p < 0,05$) (** - $p < 0,01$, *** - $p < 0,001$); # - difference in terms of RT-2; § - difference in terms of RT-3

We revealed the following kinds of correlation:

strong direct – between speed and pulse increase by the end of the lesson, between the duration of the route and pulse increase because of the load, between the initial pulse and the dynamics of students' health state during dosed walking, between terrainkur duration and the number of complaints of poor health state at the end of the route, between the load intensity and pulse dynamics;

the average direct – between speed and pulse dynamics during the walking;

strong inverse – between the lesson duration and health state by the end of the route, between the lesson duration and the dynamics of health state, between the load duration and health state by the end of the route, between the load duration and the dynamics of health state;

the average inverse – between the initial pulse and speed of movement, between the route length and health state by the end of the route.

Table 3 – Indices correlation at the beginning and the end of the route (r)

Index		Ps init.	PsE init.	Δ Ps by the end of RT	V	The time of day	T	Tn	DL	NSS
HE	init.	- 0,24	0,5	0,25	0,039	-0,6				
	contr.	0,04	0,15	- 0,05	- 0,2	-0,55	- 0,8"	- 0,8"	0,31	- 0,68"
	Δ	0,66"	0,71"	- 0,71"	- 0,62	-0,06	- 0,8"	- 0,74"	0,51	- 0,24
HS	init.	0,26	- 0,47	- 0,2	0,01	0,58				
	contr.	- 0,05	0,26	- 0,01	0,35	0,75*	0,72"	0,71*	- 0,25	0,65
	Δ	0,4	- 0,55	- 0,3	0,0007	0,48	0,41	0,46	0,13	0,35

During walking the dynamics of pulse depended on speed of movement (the average direct correlation) and on time of movement between the stages (weak inverse correlation).

Table 4 – Indices correlation during the route (r)

Index	Load (walking at a given pace)			
	intensity	V	Tn (min)	NSS
Pulse increase during the load	0,97"	0,63"	- 0,33	- 0,07

During movement the indices dynamics of cardiovascular system functioning depended on speed of movement, pulse dynamics wasn't influenced by the time of movement and the number of the fulfilled steps.

CONCLUSION

The created routs for dosed walking have different influence on students' functional state (students with poor health state).

The load intensity on the route has a direct influence on pulse dynamics; positive dynamics of health state was registered during low and the average intensity loads.

We revealed the dependence of pulse dynamics on speed of movement and students' health state on the load duration and on speed of movement, on preceding theoretical load, on route length.

The greatest positive dynamics of students' functional state was stated on RT-2 (the average intensity route).

All students gave a positive estimation of physical culture lessons, organized by means of "Historical Terrainkur".

Thus, the load on the routes of "Historical Terrainkur" should be dosed according to the speed of movement, to general duration of the route. During the route selection we should take into consideration the level of the load at theoretical lessons. It preceded dosed walking.

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