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THE EFFECTIVENESS OF THE EXPERIMENTAL CONTENT OF PHYSICAL EDUCATION IN IMPROVING MORPHOFUNCTIONAL INDEXES OF STUDENTS OF MEDICAL COLLEGE

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Summary. The effectiveness of the content of physical education of students of medical college has been studied for one academic year through their involvement into systematic physical activity. One of the results of resolving this problem was students' improvement in morphofunctional indexes. The developed organizational and methodological principles were the basis of the proposed content through the involvement of students of medical college for physical activity during physical education classes. Each position included a set of rules that were performed in a certain sequence during the formation of the content of physical education and its implementation in classes. Proposed development has provided 21 girls and 19 boys significantly better results in solving problems within a year than 58 girls and 35 boys who used the content of physical education that was formed and implemented without specified experimental factor.

Key words: motivation, physical activity, physical education, students of medical college.

Problem statement. The successful solution of the problem of physical education is not possible without formed a youth-type motivation for physical activity, the basis of which are physical exercises [1; 2; 17].The most recent data [3; 4] show that in solving this scientific problem the most promising areas are educational (the formation of knowledge in matters of physically active lifestyles) and realizable (satisfaction by means of physical activity of basic psychological needs of the individual).

The basis of the educational areas is the concept of public education concerning physically active lifestyle [7; 10] and numerous studies for substantiation

of the author's programs that take into account the provisions of this concept [6]. If teacher does not use other means and methods of influence on appropriate motivation, the results of other studies indicate the lack of effectiveness of these programs in the formation of internal motivation of students for systematic implementation of physical activity [4; 9; 16]. The theory of self-determination is proposed to be considered during the classes of physical education due to the latter and indicated incoordination [11–13; 15]. Thus, the activity during these sessions is aimed at satisfaction of psychological needs of students such as independence, competence, integrity in team activities [8; 14].

At the same time the lack of research on the development content of physical education was established, the realization of which would facilitate the involvement of students of medical college for physical activity. Consequently, data on the dynamics of morphological and functional indicators of physical fitness and efficiency of these students by using the specified content in the physical education classes are important. These factors determined the choice of the research direction.

Objectives, structure and methods. The aim of the study was to determine the effectiveness of the experimental content of physical education in improving the morphological parameters of students of medical college. To achieve this goal a set of the following methods was used: general (analysis, summarizing the literature); teaching (molding experiment); biomedical (spirometry, tonometry, dynamometry, pulsometry); mathematical statistics. The experiment involved 79 girls and 54 boys, who were students of a medical College and were a part of the experimental group (EG) and control groups (CG) : there were 21girls and 19 boys in the EG, 58 girls and 35 boys in the CG. For the study of morphological indicators of students, length and weight, vital capacity of lungs (VC), heart rate (HR) at rest, blood pressure (BP systolic and diastolic) and also indexes of power (PI) Ruff'ye (RI) and Robinson (IR) were studied using appropriate methods at the beginning and at the end of the second year of college studying.

Results. At the beginning of the academic year the values of morphofunctional indixes did not differ in the experimental groups of the **girls** (by Student t-test at $p > 0.05$). The value at the end of the academic year showed a significant ($p < 0.05$ to

<0.001) improvement in most of the studied parameters of EG and was detected at the baseline in all parameters of CG except VC and LI (Table. 1).

In the EG there was a reduction in body mass on average by 2.7 % year (p <0.05), which was positive, considering the tendency to increase this index among the girls due to the lipid component. At the same time, they improved the heart rate at rest by 7.5 %, which together with the improvement of RI in 6.4 % certified the economization of activities in the rest of the cardiovascular system of the girls. Changing of VC to 26.2 % and LI to 29.6 % indicated the improvement of the respiratory system, namely the ability for once to breathe in more oxygen and to provide it the body.

In CG during the school year the change of values in these parameters was so small, that it allowed to speak about their expression on the output level.

Meanwhile the girls of EG showed a significant development in skeletal muscles: augmentation of PI testified opportunity to gain muscle to accumulate more than 19.2% of the structure redundant energy potential in comparison with that possibility at the beginning of the academic year (p <0.001). In CG the change of value only proves the tendency to positive changes (p >0.05), which suggested the expression rate achieved in earlier levels.

A similar result was obtained in the study of changes in physical health of the girls, except for this: in the EG, the value of RI decreased by 49 %, but this change

Table 1 - **Changes in the morphological parameters of girls during the academic year**

Index	Group	At the beginning		At the end		Change ($\bar{x}_1 - \bar{x}_2$)			EG – CG (t_2)
		$\bar{x}_1$	m	$\bar{x}_2$	m	a bs. rate	%	t_1	
Weight of body, kg	EG	55,6	0,33	54,1	0,42	–1,5	2,7	2,81*	2,57 *
	CG	56,0	0,6	55,8	0,51	–0,2	0,4	0,25	
Body length см	EG	166,1	0,41	167,6	0,33	1,5	0,18	2,85*	0,47
	CG	167,8	0,62	167,9	0,54	0,1	0,1	0,12	
Heart rate at rest, сх. хв-1	EG	82,3	0,85	76,1	0,72	–6,2	7,5	5,57***	3,74 **
	CG	80,6	0,59	79,8	0,68	–0,8	1,0	0,89	
Systolic BP, mmHg	EG	115,4	0,83	116,7	0,65	1,3	1,1	1,23	1,75
	CG	113,2	0,8	114,8	0,87	1,6	1,4	1,35	
Diastolic BP, ст mmHg	EG	76,2	0,77	77,4	0,62	1,2	1,6	1,21	2,74 *
	CG	74,3	0,67	75,2	0,51	0,9	1,2	1,07	
Vital capacity of lungs (VC), L	EG	2,1	0,03	2,65	0,04	0,55	26,2	11,0***	9,84 ***
	CG	2,1	0,04	2,21	0,02	0,01	5,2	2,46*	

Life index (LI) ml·kg^{-1}	EG	37,8	0,78	49,0	0,92	11,2	29,6	9,29***	7,42 ***
	CG	37,0	0,84	39,6	0,87	2,6	7,0	2,15*	
Power index (PI), %	EG	33,8	0,89	40,3	1,03	6,5	19,2	4,78***	4,18 ***
	CG	32,7	0,78	34,8	0,82	2,1	6,4	1,86	
Ruff'ye (RI) , y. o.	EG	9,8	0,12	5,0	0,11	–4,8	49,0	29,5***	27,9 ***
	CG	10,0	0,14	10,2	0,15	0,2	–2,0	0,97	
Robinson (IR), y. o.	EG	94,9	0,94	88,8	0,99	–6,1	6,4	4,47***	2,08 *
	CG	91,2	0,83	91,6	0,91	0,4	–0,4	0,32	

Note. Hereinafter marked difference between the two averages at: «» – p <0.05; «**» – p <0.01; «***» – p <0.001*

was an indicative of a positive result (p <0.001); in CG, the values increased to 0.97 %, that reflected a negative trend in the change of physical health of the girls in that study group.

When comparing the values achieved by the girls at the end of the school year revealed the following: the EG certified a higher level of expression of studied parameters than in KG in all values except the body length and systolic blood pressure, body length and systolic blood pressure in these groups were almost identical. At the same time it noted that regardless of the presence or absence of differences in systolic and diastolic blood pressure the values obtained in the CG and the EG were within the age norm.

Boys. At the beginning of the academic year value of morphological parameters in experimental groups were almost identical (p> 0.05) at the end - essentially (at the level of p <0.05 to <0.001) different. The indicator values showed the latter, which boys reached at the end of the academic year, such as heart rate at rest, PI, RI and IR(tab. 2).

However, the experimental results showed that during the academic year in EG and CG happened identical changes in the studied parameters. Thus, the EG improved heart rate at rest to 8.9%, which together with improved IR to 7% indicated the economization in the cardiovascular system of this experimental group. The increase of PI in EG testified about the development of skeletal muscle of boys of the group, namely the opportunity to earn 7.5% more structure redundant energy potential than at the beginning of the academic year (p <0.05). In CG the value change was negative, but it only proves the appropriate trend (p> 0.05) and allows to

Table 2 - **Changes in the morphological parameters of boys during the academic year**

Index	Group	At the beginning		At the end		Change ($\bar{x}_1 - \bar{x}_2$)			EG – CG \(t_2)
		$\bar{x}_1$	m	$\bar{x}_2$	m	a bs. rate	%	t_1	
Weight of body, kg	EG	73,7	1,12	75,9	0,9	2,2	3,0	1,53	0,28
	CG	74,9	1,68	76,3	1,1	1,4	1,9	0,7	
Body length см	EG	173,9	0,72	174,3	0,62	0,4	0,2	0,42	1,15
	CG	175,6	0,9	175,6	0,95	0	0	0	
Heart rate at rest, сх. хв-1	EG	80,8	0,82	73,6	0,44	–7,2	8,9	7,74***	5,16 ***
	CG	80,2	0,9	78,4	0,82	–1,8	2,2	1,48	
Systolic BP, mmHg	EG	121,6	0,68	124,2	0,54	2,6	2,1	2,99**	1,67
	CG	120,4	0,87	122,6	0,79	2,2	1,8	1,87	
Diastolic BP, ст mmHg	EG	84,1	1,15	85,1	0,84	1,0	1,2	0,7	1,12
	CG	80,3	1,03	83,9	0,67	3,6	4,5	2,93*	
Vital capacity of lungs (VC), L	EG	3,79	0,11	3,91	0,05	0,12	3,2	0,99	0,19
	CG	3,95	0,07	3,89	0,09	–0,06	–1,5	0,53	
Life index (LI) $ml \cdot kg^{-1}$	EG	51,4	1,01	51,5	0,98	0,1	0,2	0,07	0,34
	CG	53,6	1,35	51,0	1,12	–2,6	–4,9	1,48	
Power index (PI), %	EG	56,7	1,24	61,0	1,07	4,3	7,5	2,61*	3,2 **
	CG	57,9	1,66	56,5	0,92	–1,4	–2,4	0,74	
Ruff'ye (RI) , y. o.	EG	9,1	0,31	5,0	0,21	–4,1	45,1	11,0***	9,5 ***
	CG	8,4	0,16	8,4	0,29	0	0	0	
Robinson (IR), y. o.	EG	98,3	1,29	91,4	0,95	–6,9	7,0	4,31***	3,61 **
	CG	96,7	1,44	96,1	0,89	–0,6	0,6	0,35	

display RI on the output level.

There was a similar change in physical health, except for: in the EG boys RI decreased to 45.1 %, but it was an indication of a positive result ($p < 0.001$); in CG the value remained at the previously achieved level, because it was the same at the beginning and at the end of the academic year.

As can be seen from the above, the use of experimental content of physical education (takes into account the specific organizational and methodical bases) and the content that does not take into account such factors led to different results in the improvement of morphological parameters of students of medical college during the experimental year.

One of the reasons for the obtained result, namely, the advantages of the EG girls and boys over KG in the level of manifestation of morphological and functional indicators associated with the use of the developed content. This contributed to a successful solution of the main task - to attract students to physical activity. This fact

was associated with the obtained result, because only the systematic use of motor activity parameters can ensure the improvement of morphofunctional parameters of young girls and boys of 16-17 years, which were provided by our proposed methodological framework. Two classes per week of physical education under the current program [5] according to CG do not achieve the desired result. The information of other researchers also confirms this fact [6; 14; 16], including the necessity of additional classes per week. In the case of students, including a medical college, indicated is possible only if they use extracurricular time for physical activity. It is real only in case of involvement of students in this type of activity, as defined by psychologists - formed type of inner motivation for such activities.

Conclusions: 1. The use of girls and boys' groups of experimental content of physical education helped to improve significantly larger number of morphofunctional indexes in them than in the control groups, in which the content did not take into account the experimental factor. 2. Students of experimental groups also achieved a higher level of expression of morphological parameters than control groups of students. The results demonstrate the effectiveness of the experimental content in solving its appointed task, and associated with the involvement of students of medical college for physical activity.

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