

PHYSICAL CONDITION OF PEDAGOGIC COLLEGE GIRL STUDENTS UNDER INFLUENCE OF CHEERLEADING EXERCISES

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Abstract. *Purpose:* to determine degree of cheer-leading exercises' influence of physical condition of pedagogic college girl students. *Material:* in the research 385 1st-3rd years girl students participated. Physical condition level of girl students was determined by indicators of body composition harmony (index of Kettle 2), functional potentials of respiratory system, organism's resistance against hypoxia factors (Skibinsky's index), regulation of cardio-vascular system (Robinson's index). Body length and mass, chest, hip and waist circumferential sizes, vital capacity of lungs, breathing pause after inhale (Stanger's test), systolic and diastolic blood pressure, heart beats rate in rest were measured. *Results:* As a result of initial testing "low" level of girl students' physical condition was registered. Age distinctions in the tested indicators were regarded. Positive influence of cheerleading exercises on functional potentials of respiratory system and organism's resistance against hypoxia factors; on regulation of cardio-vascular, system was found. *Conclusions:* Application of cheerleading exercises' in physical education positively influenced on physical condition level of pedagogic college girl students.

Key words: physical condition, physical education, girl students, cheerleading.

Introduction

Recent time the problem of pupils and students' health has been becoming still more important. The data of scientific literature witness that there is steady tendency to worsening of students' health [5, 29], which, to large extent, is determined by physical condition [6]. Physical education takes one of priority places in control over physical condition, in formation of health culture, full and comprehensive development of personality; in cultivation of physical qualities [15, 19]. Traditional knowledge in physical education still less attracts pupils and students. It results in significant reduction of their motor functioning and worsening of health [14, 21, 32]. In this connection, seeking of innovative methods of physical education's optimization in different educational establishments is rather an urgent problem [15, 30].

Analysis of scientific methodic literature showed presence of large quantity of works, devoted to application of non-traditional forms of pupils and students' physical education. In pupils' physical education rugby-5 trainings [37], hiking [35], cheerleading [1], shaping [7] are practiced; in students' physical education [24] – aerobics [20], Pilates and body flex [31], Pranayama Bhastrica [28]. In our opinion, cheerleading is an innovative mean of physical education. Cheer-leading positively influence on physical condition of pre-school age children and physical health and motor functioning of secondary forms' pupils [1-3, 23, 26, 27]; on physical condition and physical workability of girl students [22]; formation of wide motor skills' arsenal in students [9]; on level of physical fitness and functional state of pedagogic educational establishments girl students [36]. Other authors found the following: high interest of pedagogic college girl students to cheer-leading trainings [14]; positive influence of cheer-leading on definite parameters of physical condition [11] and motor abilities [12, 13, 32, and 34].

With it, the question about cheerleading exercises' influence on general physical condition of pedagogic college girl students of 15-17 years' age has been studied insufficiently.

Purpose, tasks of the work, material and methods

The purpose of the work is to determine degree of cheerleading exercises' influence of physical condition of pedagogic college girl students.

The methods of the research are theoretical analysis and generalization of scientific-methodic literature data, medical-biological methods, pedagogic experiment, and methods of mathematical statistic.

Physical condition level of 15-17 years' age girl students was determined by indicators of body composition harmony (index of Kettle 2), functional potentials of respiratory system, organism's resistance against hypoxia factors (Skibinsky's index), regulation of cardio-vascular system (Robinson's index). Body length and

mass, chest, hip and waist circumferential sizes, vital capacity of lungs, breathing pause after inhale (Stanger's test), systolic and diastolic blood pressure, heart beats rate in rest were measured.

The research was conducted on base of pedagogic college of Kharkov humanitarian pedagogic institute. In the research 385 1st-3rd years girl students of not physical culture profile participated. They were organized in 3 control and 3 experimental groups: 1st group – 1st year girl students; 2nd group – 2nd year girl students and 3rd group – 3rd year girl students. All girl students related to main and preparatory health groups. In the course of experiment, girl students of control groups were trained as per state program of physical education. In program of experimental groups, cheerleading elements (basic movements, jumps and so on) were included.

Results of the research

Analysis of anthropometrical measurements results showed absence of confident differences between indicators of control and experimental groups' girl students ($p > 0.05$). (See table 1).

Table 1. Anthropometrical indicators of experimental and control groups' girl students before and after experiment

Groups	I		II		III	
	Before experiment	After experiment	Before experiment	After experiment	Before experiment	After experiment
	Indicators $\bar{X} \pm m$					
	Body length (cm)					
<i>n</i>	75		108		95	
Experimental	163.4 \pm 0.66	164.1 \pm 0.65	163.9 \pm 0.50	164.1 \pm 0.50	164.4 \pm 0.52	164.5 \pm 0.51
<i>n</i>	23		34		50	
Control	163.0 \pm 1.41	164.1 \pm 1.32	164.3 \pm 1.14	165.5 \pm 1.11	162.9 \pm 0.68	163.0 \pm 0.68
t	0.27	0.03	1.12	1.15	1.77	1.74
p	>0.05	>0.05	>0.05	>0.05	>0.05	>0.05
	Body mass (kg)					
Experimental	54.49 \pm 0.39	55.03 \pm 0.34	56.95 \pm 0.69	56.53 \pm 0.62	58.48 \pm 0.63	58.03 \pm 0.58
Control	54.00 \pm 1.76	54.87 \pm 1.64	55.41 \pm 1.13	55.71 \pm 1.03	59.55 \pm 0.88	59.47 \pm 0.80
t	0.62	0.09	1.16	0.68	0.98	1.45
p	>0.05	>0.05	>0.05	>0.05	>0.05	>0.05
	Circumference of chest (cm)					
Experimental	85.43 \pm 0.48	85.59 \pm 0.47	86.21 \pm 0.49	86.50 \pm 0.50	87.33 \pm 0.57	87.71 \pm 0.55
Control	84.87 \pm 1.08	85.13 \pm 1.01	86.10 \pm 1.01	86.62 \pm 0.93	87.24 \pm 0.83	87.52 \pm 0.83
t	0.47	0.41	0.09	0.11	0.09	0.19
p	>0.05	>0.05	>0.05	>0.05	>0.05	>0.05
	Circumference of waist (cm)					
Experimental	68.46 \pm 0.48	68.56 \pm 0.47	69.32 \pm 0.60	68.94 \pm 0.53	69.78 \pm 0.54	69.18 \pm 0.55
Control	67.28 \pm 1.38	67.61 \pm 1.30	69.15 \pm 0.99	69.57 \pm 0.91	68.55 \pm 0.84	69.04 \pm 0.80
t	0.81	0.69	0.15	0.60	1.24	0.14
p	>0.05	>0.05	>0.05	>0.05	>0.05	>0.05
	Circumference of hip (cm)					
Experimental	53.75 \pm 0.40	53.83 \pm 0.40	53.70 \pm 0.38	53.71 \pm 0.42	54.72 \pm 0.45	54.57 \pm 0.45

Control	52.98± 0.88	53.13± 0.83	53.99± 0.76	54.37± 0.68	54.93± 0.66	55.01± 0.61
t	0.79	0.76	0.33	0.82	0.27	0.59
p	>0.05	>0.05	>0.05	>0.05	>0.05	>0.05

Analysis of the received indicators in age aspect showed that with age they increase (though not always confidently, $p > 0.05$). Confident differences were observed between indicators of body mass of 1st and 3rd experimental groups' girl students, 1st and 2nd experimental groups and 2nd and 3rd control groups. The same concerns chest circumference in 1st and 3rd experimental groups (differences were confident, $p < 0.01 - 0.001$).

As per indicators of body composition's harmony (index of Kettle 2) and assessment scale [17] girl students of all tested groups correspond to mark 1 point ("corpulent body composition"). After application of cheerleading exercises at physical culture lessons (see table 1) anthropometrical indicators did not change substantially in experimental and control groups ($p > 0.05$). Repeated calculation of Kettle 2 index also did not result in significant changes. Thus, application of specially selected cheerleading exercises in pedagogic college 1st -3rd year girl students' physical education did not influence noticeable on harmony of body composition.

Analysis of indicators of respiratory system functional state (see table 2) showed absence of confident differences between control and experimental groups' girl students ($p > 0.05$).

Table 2. Indicators of respiratory system's functional state of experimental and control groups' girl students before and after experiment

Groups	I		II		III	
	Before experiment	After experiment	Before experiment	After experiment	Before experiment	After experiment
Indicators $\bar{X} \pm m$						
Vital capacity of lungs (l)						
<i>n</i>	75		108		95	
Experimental	2.61± 0.05	2.78± 0.04	2.70± 0.04	2.86± 0.03	2.76± 0.05	2.95± 0.05
<i>n</i>		23		34		50
Control	2.67± 0.07	2.78± 0.07	2.72± 0.07	2.81± 0.07	2.76± 0.06	2.83± 0.06
t	0.65	0.02	0.26	0.56	0.03	1.58
p	>0.05	>0.05	>0.05	>0.05	>0.05	>0.05
Stanger's test (sec)						
Experimental	29.40± 0.59	32.05± 0.54	30.32± 0.75	32.51± 0.70	27.92± 0.65	30.96± 0.55
Control	29.48± 1.17	31.96± 1.14	30.71± 0.97	32.03± 0.84	28.70± 0.79	30.36± 0.74
t	0.06	0.08	0.31	0.44	0.77	0.65
p	>0.05	>0.05	>0.05	>0.05	>0.05	>0.05

Analysis of the mentioned data in age aspect showed that with age vital capacity of lungs improves (differences are not confident. $p > 0.05$). Exclusions are results of 1st and 3rd experimental groups (differences are confident, $p < 0.05$). Analysis of Stanger' test showed wave and not confident character ($p > 0.05$). Exclusion were indicators of 2nd and 3rd experimental groups' girl students, where differences were confident, $p < 0.05$).

Comparing received results by Skibinsky's index with assessment scale [17] we found that indicators of girl students of all tested groups corresponded to 2 points (level "below average"). After application of specially selected cheerleading exercises at physical culture lessons (see table 2) it was found that all indicators of respiratory system of experimental groups' girl students significantly improved (changes were confident, $p < 0.05 - 0.001$). The most expressed improvement was in 17 years' girls.

The same analysis of control groups' results showed that they also improved a little. However, these changes were not confident, $p > 0.05$. Analysis of secondary indicators in age aspect showed absence of significant changes in comparison with initial data. Exclusions were indicators of Stanger's test in 2nd and 3rd experimental groups (though differences were not confident, $p > 0.05$). Comparing of results of Skibinsky's index calculation with assessment scale [17] showed improvement of experimental groups' results by 1 point ("average" level). In control groups there were no changes by assessment criteria.

Thus, application of specially selected cheerleading exercises positively influenced on functioning of respiratory system of pedagogic college girl students. The most noticeable improvements were in 17 years' girl students. Analysis of cardio-vascular system's indicators (see table 3) permitted to determine absence of confident differences between experimental and control groups girl students ($p > 0.05$).

Table 3. Indicators of cardio-vascular system's functional state of experimental and control groups' girl students before and after experiment

Groups	I		II		III	
	Before experiment	After experiment	Before experiment	After experiment	Before experiment	After experiment
	Indicators $\bar{X} \pm m$					
<i>n</i>	75		108		95	
	Systolic blood pressure (mm of merc.col.)					
Experimental	111.2 \pm 0.94	110.5 \pm 0.88	112.1 \pm 0.95	112.4 \pm 0.72	114.3 \pm 0.90	114.5 \pm 0.69
Control	111.2 \pm 1.42	119.8 \pm 1.80	113.4 \pm 1.15	111.2 \pm 1.03	115.7 \pm 1.08	115.3 \pm 0.87
t	0.58	0.37	0.87	0.66	0.99	0.74
p	>0.05	>0.05	>0.05	>0.05	>0.05	>0.05
	Diastolic blood pressure (mm of merc.col.)					
Experimental	66.93 \pm 0.58	66.53 \pm 0.49	70.46 \pm 0.71	70.42 \pm 0.53	72.00 \pm 0.76	71.42 \pm 0.54
Control	65.22 \pm 1.22	65.00 \pm 0.96	69.41 \pm 1.31	69.85 \pm 1.04	73.50 \pm 0.85	74.90 \pm 0.61
t	1.27	1.42	0.70	0.48	1.32	4.24
p	>0.05	>0.05	>0.05	>0.05	>0.05	<0.001
	Heart beats rate (b.p.m. ⁻¹)					
Experimental	80.28 \pm 1.21	77.27 \pm 1.01	82.06 \pm 0.94	77.72 \pm 0.80	79.43 \pm 0.99	75.11 \pm 1.08
Control	81.57 \pm 2.03	79.35 \pm 1.66	83.26 \pm 1.70	81.68 \pm 1.45	77.50 \pm 1.51	75.48 \pm 1.32
t	0.54	1.07	0.62	2.39	1.07	0.22
p	>0.05	>0.05	>0.05	<0.01	>0.05	>0.05

Analysis of indicators of cardio-vascular system in experimental and control groups in age aspect permitted to find that blood pressure indicators increase with age. With it, differences between systolic pressure indicators are not confident ($p > 0.05$). Results of diastolic pressure were confident ($p < 0.05 - 0.001$). Analysis of heartbeats rate data showed that there were no age distinctions ($p > 0.05$). Exclusions were only results of 2nd and 3rd groups' girl students, differences between which were confident ($p < 0.05$). Analysis of cardio-vascular system's regulation by Robinson's index [17] permitted to determine that indicators of girl students of all tested groups corresponded to 3 points ("average" level).

Application of specially selected cheerleading (see table 3) exercises positively influenced on functional state of cardio-vascular system of experimental groups' girl students (though changes were mainly not confident, $p > 0.05$). Confident changes were observed only in heartbeats rate indicators of 2nd and 3rd age groups ($p < 0.05 - 0.001$). Analysis of repeated data in age aspect did not show substantial distinctions, comparing with initial data.

Comparing of secondary results of Robinson's index calculation with assessment scale [17] showed increase of experimental groups' indicators by 1 point and mark became 4 points (level "above average"). In control groups, no changes by assessment criteria were observed.

Thus, application of specially selected cheerleading exercises in physical education of pedagogic college 1st-3rd year girl students positively influenced on functional state of cardio-vascular system of girl students.

Analysis of girl students' initial physical condition (body composition harmony, functional state of respiratory and cardio-vascular systems) showed that it corresponded to 2 points (level "below average") in all tested groups. The same comparison of data after experiment showed increase of physical condition in experimental groups. It became equal to 3 points ("average" level). In control groups there were no changes as per assessment scale. Thus, implementation of cheerleading exercises in physical education process influenced positively on experimental groups' girl students physical condition.

Discussion

Analysis of scientific-methodic literature showed that there was insignificant quantity of works, devoted to influence of cheerleading on girl students' functional state. Some works study cheer-leading influence on physical condition of pre-school age children [23], on girl students of technical university [22] and humanitarian pedagogic academy [36]; on physical health of secondary forms' pupils [1, 2, 27].

Basing on analysis and generalization of our research's results we found that implementation of cheer-leading exercises in physical education of 1st-3rd year girl students did not influence noticeably on anthropometrical indicators ($p > 0.05$). It coincides with the data, presented in works of number of authors [8, 10, and 25]. The authors note that the tested age period is characterized by completion of growth and organism's formation processes. Most of body dimensions reach final value. That is why in this age rational physical load does not noticeably influence on them.

Analysis of respiratory system's indicators after application of cheerleading exercises permitted to state that in experimental groups they significantly and confidently improved ($p < 0.05 - 0.001$). In the tested control groups parameters of functional state of respiratory system also improved to some extent, but not expressively and not confidently, ($p > 0.05$). The received results are consistent with other authors' researches [1, 2, 27, and 36]. We found positive influence of different kinds of cheerleading on respiratory system functioning in secondary forms' pupils and in students of higher educational establishments. It is explained by the fact that with systemic practicing of physical exercises oxygen consumption increases significantly, blood circulation improves, metabolism is activated and functional potentials of respiratory system are indirectly strengthened.

Analysis of cardio-vascular system's indicators after experiment showed that in experimental groups they improved (though, mainly, not confidently, $p > 0.05$). Confident character of changes was observed only in 2nd and 3rd age groups ($p < 0.05 - 0.001$). In this case we observed general tendency to reduction of heart beats rate. In control groups results also improved a little (they were not confident ($p > 0.05$)). The received data are consistent with the data of other authors [1, 2, and 27]. These authors found that cheerleading exercises did not confidently influenced on functioning of cardio-vascular system of secondary school age children. Besides, they noted a general tendency to reduction of heart beats rate. The above said is confirmed by the data of I.I. Zemtsova [8]. The author says that systemic practicing of physical exercises for endurance reduces heartbeats rate. These changes

witness about economic character of heart functioning, strengthening of its reserves and are consistent with main laws of age development.

As a result of our researches, it was found that implementation of cheerleading exercises in physical education process of pedagogic college girl students positively influenced on general physical condition level of the tested experimental groups. This level increased from “below average” to “average” level. In the tested control groups, no changes in physical condition were registered. The received results are consistent with the data of other authors. These authors affirm that such changes are observed in secondary forms’ pupils [1, 2, and 27] and in higher educational establishment’s students [22, 36].

Thus, on the base of analysis and generalization of our research’s results we supplemented the data of T.M. Bala, I.P. Masliak [3, 26], I.A. Zinchenko [9], N.V. Krivoruchko, I.P. Masliak, I.N. Zhuravliova [11-13, 32, 34] about influence of cheerleading on different spheres of trainees’ life activity. Besides, we confirmed the data of T.M. Bala, I.P. Masliak [1, 2, 27], V. Piatnitskaya [36], O.V. Timopheyeva. [22] about positive impact of cheer-leading on parameters of trainees’ physical condition. For the first time we determined influence of cheerleading exercises on general level of physical condition of pedagogic college girl students. Besides, we found the most sensitive to cheerleading organism’s systems and the most favorable age periods for improvement of physical condition by means of cheerleading.

Conclusions

1. As a result of initial testing, we registered “low” level of 15-17 years’ age girl students’ physical condition.
2. Application of cheerleading exercises in physical education process positively influenced on physical condition level of pedagogic college girl students.

The further researches in this direction can be realized by determination of cheerleading exercises’ influence on girl students’ physical fitness.

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Conflict of interests

The authors declare that there is no conflict of interests.

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