

Original Article

Influence of cheerleading classes on functional state of respiratory system of 10-16 year old teenagers

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Abstract:

Purpose: to determine extent of influence of cheerleading classes on functioning of respiratory system of 10-16 year old girls. **Material:** Researches were conducted on the basis of educational institutions of Kharkiv. 640 girls at the age of 10-16 years, of whom 7 main groups and 7 control groups were made, took part in them. **Results:** functional state of respiratory system of 10-16 year old girls is investigated; differences in age aspect of indicators of the vital capacity of lungs (VCL) and inspiratory breath holding are considered (Stange's test); positive influence of cheerleading exercises on functioning of respiratory system is revealed. **Conclusions:** 1) The level "below the average" of functionality of system of breath and resistance of organism to hypoxemic phenomena at 15-16 year old schoolgirls is established as a result of the initial research. The "average" level is at 10-12 and 14 year old girls. The level "above the average" is at 13 year old girls. 2) Use of cheerleading exercises in the course of physical education positively influenced functioning of respiratory system of the studied contingent.

Keywords: physical education, cheerleading, resistance of organism to hypoxemic phenomena, 10-16 year old girls.

Introduction

Modern social and economic living conditions place great demands on state of health of the younger generation. However, researches of a number of authors indicate a sustained tendency to deterioration in indicators of physical development (Pavlenko, 2014; Mameshina, 2016; Š mída, et al., 2017; Pomeshchikova, et al., 2016; Bala, 2012), working capacity (Podrigalo, et al., 2016; Krivoruchko & Maslyak, 2015), functional state of organism (Maslyak et al., 2016; 2018; Pomeshchikova et al., 2016; Azhippo, et al., 2017; Antropova, et al., 2009; Mulyk & Grynova, 2015) and level of physical fitness (Shesterova et al., 2009; 2017; Lutsenko & Bodrenkova, 2013; Bala, 2015; Kryvoruchko, et al., 2013) youth of Ukraine. The important role in solving the problem of health care according to Druz et al., 2017; Keyl et al., 2014; Aghyppo et al., 2016; Quennerstedt, 2008 plays physical education.

At the same time data of a number of the researches of Aghyppo & Krivoruchko, 2016; Maslyak, Krivoruchko et al., 2011; 2014; 2016; Danylevych et al., 2017; Kozina et al., 2014 indicate the need to use innovative approaches to the organization of physical education for the purpose of increase in interest of modern youth in physical exercises and increases in their physical activity.

In our opinion, cheerleading is interesting, effective and nonconventional for our country. According to Bala & Maslyak, 2014; Carrier & McKay, 2006; Chappell, 2005, cheerleading has wide arsenal of various intensive movements which include elements of choreography, acrobatics, gymnastics, sports and national dances. It differs in staginess, divergence of influence on organism, dynamism, opportunity to attract heterosexual and uneven-age contingent, availability in application and so forth. By our previous researches it was proved positive changes in indicators of physical fitness and physical efficiency of 10-17 year old children under the influence of cheerleading exercises (Kryvoruchko, Masliak, Zhuravlyova, 2013; 2015; Bala, 2015).

Along with it, the question of influence of cheerleading exercises on other indicators reflecting state of health, in particular respiratory system remains insufficiently studied. As health of the whole organism and work of its separate bodies in many respects depends on state in which there is respiratory system of the person. It is one of the leading systems of organism which in many respects defines operability of the person. At the same time respiratory system is most strongly subject to influence of negative factors of the external environment that

promotes high percent of diseases of respiratory tracts, bronchial tubes, lungs and leads to decrease in reserve opportunities of breath. All above foregrounds and proves carrying out these researches.

The purpose of the research – to determine extent of influence of cheerleading classes on functioning of respiratory system of 10-16 year old girls.

Material & methods

Researches were conducted on the basis of educational institutions of Kharkiv. 640 girls at the age of 10-16 years, of whom 7 main groups and 7 control groups were made, took part in them. All children, who participated in the research, were belonged to main and preparatory medical groups.

During the experiment cheerleading exercises (basic movements, hopping elements, stunts, pyramids, etc.) were included in the educational process on physical education of girls of the main groups.

Research methods: theoretical analysis and synthesis of data of scientific and methodical literature, pedagogical experiment, medicobiological methods (spirometry, pulsometry, Stange's test), methods of mathematical statistics.

Functional capabilities of breathing system and resistance of organism to hypoxemic phenomena were determined by indicators of regulation level of respiratory system (Skibinski's index). Skibinski's index is reflected by a ratio of the work of indicators of vital capacity of lungs and Stange's test to heart rate.

Results

Considering the received results, the absence of authentic differences in indicators of pupils of control and main groups in all researched parameters is revealed ($p > 0,05$).

Researching the received results of functional capabilities of breathing system and resistance of organism to hypoxemic phenomena (Skibinski's index) in age aspect (fig. 1-2), it is revealed that indicators of vital capacity of lungs increase also these distinctions with age, are generally reliable ($p < 0,01 - 0,001$). Results of 11-12 year old girls of both researched groups, 10-11 and 13-14 year old girls of control groups are the exception where differences in indicators are unreliable ($p > 0,05$).

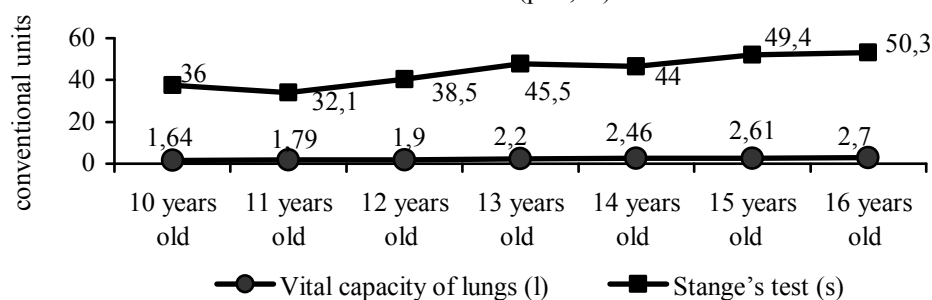


Fig. 1. Age comparisons of average indices of respiratory system of 10-16 year old schoolgirls of the main groups before the experiment

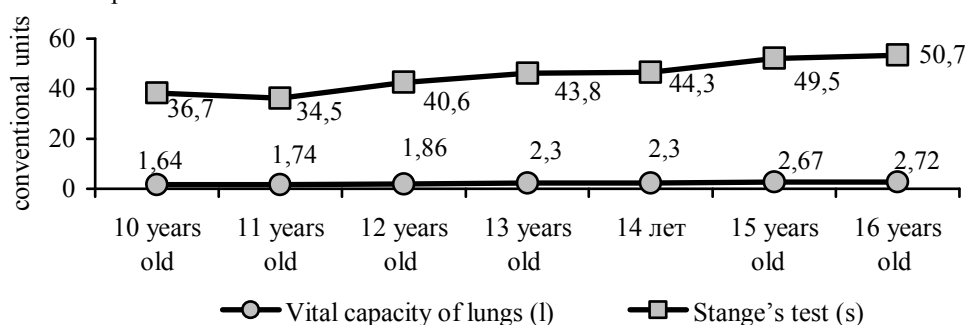


Fig. 2. Age comparisons of average indices of respiratory system of 10-16 year old schoolgirls of the control groups before the experiment

The analysis of the indicators, reflecting resistance of organism to hypoxemic phenomena (Stange's test) in age aspect (fig. 1-2), revealed, generally reliable increase in results with age ($p < 0,05 - 0,001$). Indicators of 11 year old girls are the exception, results of which are lower, than 10 year old girls have and also results of 14 year old girls of the main group which data are lower, than 13 year old schoolgirls have, however these distinctions are unreliable ($p > 0,05$).

When comparing indicators of functionality of breathing system and resistance of organism to hypoxemic phenomena (Skibinski's index) with the rating scale which is presented by Polyakov et al., 2006, it is

revealed that indicators of 15-16 year old girls correspond to assessment 2 points, indicators of 10-12 and 14 year old schoolgirls correspond to assessment 3 points, 13 year old girls – 4 points.

Thus, the level "below the average" of functionality of breathing system and resistance of organism to hypoxemic phenomena is observed at 15-16 year old schoolgirls, the "average" level – at 10-12 and 14 year old girls and 13 year old girls have – the level "above the average".

Investigating results of functionality of breathing system and resistance of organism to hypoxemic phenomena (Skibinski's index) received after the experiment (tab. 1), it is revealed that indicators of vital capacity of lungs increased at girls of the main groups, in comparison with the initial research and these changes at 11, 13 and 15-16 year old girls have a reliable character ($p < 0,05 - 0,001$).

Considering results of the repeated researches in age aspect, it is revealed that the nature of differences in indicators of vital capacity of lungs didn't practically change, i.e. as well as before the experiment, results authentically improve with age ($p < 0,01 - 0,001$).

Analyzing indicators of vital capacity of lungs of girls of the control groups which were received after the experiment, it is revealed that they also a little improved, however, these changes are less essential and unreliable ($p > 0,05$). When studying these indicators depending on age, it is revealed that the nature of differences in the basic didn't change, in comparison with basic data ($p < 0,01 - 0,001$). Comparing the repeated results of the studied control groups to indicators of the main groups, the considerable prevalence of results of girls of the main groups is established. It should be noted that this advantage is reliable at 11 and 13 year old girls ($p < 0,05$).

Table 1. Comparison of average indices of state of respiratory system of girls of the main groups before and after the experiment

Age	Research period	Indicators $\bar{X} \pm m$			
		n	Vital capacity of lungs (ml)	Stange's test (s)	Heart rate per l' (bpm ^l)
10 years	Before the experiment	15	1643,33 ± 50,47	36,0 ± 2,25	77,5 ± 1,29
	After the experiment		1753,33 ± 43,00	36,7 ± 1,77	75,9 ± 0,88
	t		1,66	0,26	1,02
	p		>0,05	>0,05	>0,05
11 years	Before the experiment	14	1789,29 ± 23,82	32,1 ± 2,09	74,4 ± 1,20
	After the experiment		1910,71 ± 45,24	38,7 ± 1,51	75,4 ± 0,97
	t		2,37	2,55	0,65
	p		<0,01	<0,01	>0,05
12 years	Before the experiment	6	1908,33 ± 76,70	38,5 ± 1,87	74,2 ± 1,68
	After the experiment		2033,33 ± 79,58	43,5 ± 0,84	75,2 ± 0,91
	t		1,13	2,44	0,52
	p		>0,05	<0,01	>0,05
13 years	Before the experiment	14	2203,57 ± 32,39	45,5 ± 2,95	74,9 ± 0,75
	After the experiment		2478,57 ± 36,37	49,6 ± 2,44	74,7 ± 0,63
	t		5,65	1,06	0,22
	p		<0,001	>0,05	>0,05
14 years	Before the experiment	16	2456,25 ± 92,84	44,0 ± 1,11	73,3 ± 1,33
	After the experiment		2590,63 ± 77,35	49,5 ± 1,27	73,2 ± 1,10
	t		1,11	3,26	0,07
	p		>0,05	<0,001	>0,05
15 years	Before the experiment	75	2610,12 ± 0,05	49,40 ± 0,59	80,28 ± 1,21
	After the experiment		2780,04 ± 0,04	52,05 ± 0,54	77,27 ± 1,01
	t		2,58	3,31	1,91
	p		<0,01	<0,001	>0,05
16 years	Before the experiment	108	2700,05 ± 0,04	50,32 ± 0,75	82,06 ± 0,94
	After the experiment		2860,13 ± 0,03	52,51 ± 0,70	77,72 ± 0,80
	t		3,31	2,13	3,51
	p		<0,001	<0,05	<0,001

In the analysis of the data reflecting resistance of organism to the hypoxemic phenomena (Stange's test), which were received after the experiment (tab. 1), it is revealed that indicators of girls of the main groups, generally authentically increased ($p < 0,01; 0,001$). Indicators of 10 and 13 year old schoolgirls are the exception where results have unreliable character ($p > 0,05$). When studying the repeated indicators of girls of the main groups in age aspect, it is revealed that the nature of distinctions changed a little in comparison with basic data. So, data of girls of 6 and 9 classes were lower than indicators of schoolgirls of 5 and 8 classes respectively before the experiment, and uniform increase in indicators is observed with age after the experiment. It should be noted that these distinctions are also generally reliable as well as before the experiment ($p < 0,01 - 0,001$).

Considering results of the repeated researches of pupils of control groups, it should be noted that they a little increased, however they are unreliable ($p > 0,05$). Analyzing age distinctions in the studied parameters, the

lack of essential changes in comparison with the initial research is revealed. When comparing indicators of functionality of breathing system and resistance of organism to hypoxemic phenomena (Skibinski's index) after the experiment with the rating scale, which is presented by Polyakov et al., 2006, it is revealed that results increased by 1 point and began to correspond to 3 points at 15-16 year old schoolgirls, results increased by 1 point and began to correspond to 4 points at 10 and 12 year old girls; results also increased by 1 point and began to correspond to 5 points at 13 year old girls; results of 14 year old girls increased by 2 points and began to correspond to 5 points. It should be noted that results also increased at 11 year old schoolgirls, however it wasn't reflected in a rating scale also they also correspond to 3 points as well as before the experiment. Thus, the "high" level of functioning of respiratory system is fixed at the 13–14 year old studied after the experiment, "above the average" – at 10 and 12 year old schoolgirls, "average" – at 11 and 15-16 year old girls. On the basis of the above it is possible to note that indicators of functionality of breathing system and resistance of organism to hypoxemic phenomena considerably improved at the studied main groups after use of cheerleading exercises, that demonstrates positive influence of cheerleading exercises on functioning of respiratory system of 10-16 year old girls. The most considerable improvement of results is noted at 14 year old schoolgirls.

Discussion

The analysis and generalization of scientific and methodical literature showed the existence of insignificant number of the works, which are devoted to studying of influence of cheerleading on functioning of various systems of organism of youth. So, influence of cheerleading on physical health of pupils of middle school (Bala, Masliak, 2011, 2012, 2015), physical fitness, working capacity and physical development of girls of teacher training college (Kryvoruchko, Masliak, Zhuravlyova, 2013, 2015, 2016), physical fitness of students-cheerleaders of higher educational institutions was investigated (Lutsenko & Bodrenkova, 2013; Pyatnickaya, 2015). The analysis and generalization of the results, which are received in the course of the researches, showed that inclusion of cheerleading in the process of physical education of 10-16 year old schoolgirls exerts beneficial effect on respiratory system of the studied contingent.

Investigating the indicators of vital capacity of lungs, received later use of cheerleading exercises, it is revealed that, generally they increased at schoolgirls of the main groups, and these changes have a reliable character ($p < 0,05 - 0,001$). It will be coordinated with results of the researches of Blinkov et al., 2008 according to which endurance exercises and high-speed and power character positively influence indicators of vital capacity of lung of teenagers. In our opinion, this is because that functionality of respiratory system increases at systematic physical exercises classes owing to what increase in indicators of vital capacity of lungs is noted.

Considering the data reflecting resistance of organism to hypoxemic phenomena (Stange's test), received after uses of specially selected cheerleading exercises, the reliable improvement of indicators is revealed at the studied main groups ($p < 0,01; 0,001$). The received results will be coordinated with the researches of Kukis, 2008 as a result of which positive influence of sports on indicators of anaerobic opportunities of respiratory system of teenagers is revealed. This is because that the level of consumption of oxygen considerably increases, blood circulations improves, metabolism becomes more active and mediated resistance of organism to hypoxemic phenomena increases as a result of systematic physical exercises.

The analysis of data of schoolgirls of the control groups, which are received after the experiment, showed insignificant changes of results ($p > 0,05$). In the course of the research data of Pyatnickaya, 2015; Zinchenko, 2013, Lutsenko & Bodrenkova, 2016 about influence of cheerleading on various manifestations of the motive sphere of engaged are expanded. Data of Bala, Maslyak & Krivoruchko, 2011-2016 about positive impact of cheerleading on parameters of physical development of engaged are added. Influence of cheerleading exercises on functional state of respiratory system of 10-16 year old girls is defined for the first time. The optimum age periods of increase in level of activity of respiratory system are also revealed by means of cheerleading.

Conclusions

Results of the initial research testify about the level "below the average" of functional capabilities of breathing system and resistance of organism to hypoxemic phenomena at 15-16 year old schoolgirls, the "average" level - at 10–12, 14 year old girls and the level "above the average" - at 13 year old girls.

Use of cheerleading exercises in the course of physical education positively influenced functioning of respiratory system of the researched contingent.

Further researches in this direction can be conducted by determination of influence of cheerleading exercises on physical health of 10-16 year old girls.

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Conflict of interests. The authors note that there is no conflict of interests.

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