

Effect of recreational activities on the physical development of girls 11–12 years of the preparatory medical group

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Purpose: conduct research on the impact of recreational activities on changes in the body's systems of girls 11 and 12 years of preparatory medical group.

Material & Methods: 20 girls aged 11 and 12 who participated in the program developed by us during the year participated in the experiment. Assessment of the physical state of the body was carried out with the help of pedagogical and medico-biological methods.

Results: based on the results of the study, the dynamics of morphological and functional indices and the level of physical qualities of girls 11 and 12 years of the preparatory medical group.

Conclusion: results of the conducted study confirm the effectiveness of using recreational exercises with the help of various means that positively influenced the state of the systems of the organism of the girls of the preparatory medical group.

Keywords: adolescence, morphology, physical qualities.

Introduction

According to the researchers, one of the most important tasks of physical education is the conditions for effective physical development and sports improvement of school-age children (7–18 years), taking into account their age and individual morphological and functional indicators [1; 8].

Physical development is a combination of morphological and functional indicators that characterize the development of the organism and allow us to determine the reserves of its physical strength, endurance, efficiency [3].

It is noted that uneven development in the adolescent period is due to various factors that can influence the body and properly treat a wide range of risk factors for the occurrence of violations of their health [4; 5].

The adolescent period is a rapid period of student development, during which certain physical changes occur, morphological data are increasing, which mostly have a weak relationship with the work of various body systems, especially after diseases [2].

These issues acquire special significance at the present time, in connection with a sharp deterioration in the physical development of school-age children, especially in secondary school, which results in various diseases of the cardiovascular, respiratory, digestive and other body systems during the school year [6].

It follows that the main direction of the physical education of adolescents during the school year is to provide and organize recreational activities in view of the state of health (medical group).

At the moment, the provision of adolescents with optimal management and control of recreational activities using elements of innovative methods is very complex, which is an actual problem of physical education.

Relationship of research with scientific programs, plans, themes. The research was carried out in accordance with the plan of the research work of the Department of Winter Sports, Cycling and Tourism of the Kharkov State Academy of Physical Culture and the Consolidated Plan of Research of the Ministry of Education and Science of Ukraine for 2014–2017. On the topic "The basics of sport tourism in the recreational activities of different age groups of the population of Ukraine" (state registration number 0114U000366).

The purpose of the research: conduct research on the impact of recreational activities on changes in the body's systems of girls 11 and 12 years of preparatory medical group.

Material and Methods of the research

According to medical records, girls 11 years old with frequent diseases of the respiratory system (bronchitis, tracheitis, etc.) were selected, they were referred to the preparatory medical group, but according to the data of the school physician, they were admitted to physical education classes. The study, which took place during the four stages of the year, was attended by girls, who at the beginning of the experiment were 11 years old and 12 years old – at the end (n=20).

At the beginning of the school year the program was implemented, according to which there was a process of gradual improvement and development of complex motor skills, especially those related with the request by the teenage body, a more cautious dosing exercise with a heart rate monitor (Polar RX300X) throughout the study.

The program consisted of four blocks (1 – retractor, 2 – securing, 3 – supporting, 4 – developing). The first block was 1 month long (2 weeks – 1 classes at HR to $105 \pm 2,5$ beats·min⁻¹; 2 weeks – 2 classes at HR to $115 \pm 2,5$ beats·min⁻¹; second block – 3 month (1 month: 2 weeks – 2 classes; 1 week – 3 classes; 1 week – 2 classes; 1 month: 2 weeks – 2 classes;

1 week – 3 classes; 1 week – 2 classes; 1 month: 1 week – 3 classes, 1 week – 1 classes; 2 weeks – 2 classes at HR to $120 \pm 2,5$ beats·min⁻¹); third blocks – 4 month (2 month: 8 weeks – 3 classes at HR to $125 \pm 2,5$ beats·min⁻¹; 1 month: 2 weeks – 2 classes; 1 week – 3 classes; 1 month: 2 weeks – 2 classes; 1 week – 3 classes; 1 weeks – 2 classes at HR to $115 \pm 2,5$ beats·min⁻¹); fourth blocks – 4 month (1 month: 2 weeks – 2 classes, 2 weeks – 3 classes; 1 month: 4 weeks – 3 classes; 1 month: 4 weeks – 3 classes; 1 month: 1 week – 2

classes at HR to $125 \pm 2,5$ beats·min⁻¹).

Each class consisted of three parts: dynamic, static and relaxation. The dynamic part provided increase physical capacity and aerobic productivity of an organism, housed static exercises breathing exercises with prolonged expiratory phase and the relaxation – the reduction of the psychophysical stress, increase stress resistance, reduced anxiety levels.

Table 1
Status of morphological and functional indicators of girls 11–12 years old (n=20)

Indicators	I stage (September)	II stage (January)	III stage (May)	IV stage (September)	Evaluation of static differences	
	11 years		12 years		t	p
	$\bar{X}_1 \pm m_1$	$\bar{X}_2 \pm m_2$	$\bar{X}_3 \pm m_3$	$\bar{X}_4 \pm m_4$		
Body length, cm	138,4±1,62	140,4±1,39	141,9±1,09	144,2±2,17	t _{1,2} =0,94; t _{1,3} =1,79; t_{1,4}=2,14 ; t _{2,3} =0,85; t _{2,4} =1,47; t _{3,4} =0,95	p _{1,2} >0,05; p _{1,3} >0,05; p_{1,4}<0,05 ; p _{2,3} >0,05; p _{2,4} >0,05; p _{3,4} >0,05
Body weight, kg	38,8±6,63	39,7±1,27	41,5±0,95	42,6±1,29	t _{1,2} =0,53; t _{1,3} =1,83; t_{1,4}=2,22 ; t _{2,3} =1,13; t _{2,4} =1,60; t _{3,4} =0,69	p _{1,2} >0,05; p _{1,3} >0,05; p_{1,4}<0,05 ; p _{2,3} >0,05; p _{2,4} >0,05; p _{3,4} >0,05
Chest circumference, cm	61,6±1,14	62,5±1,13	62,8±0,89	64,3±0,83	t _{1,2} =0,56; t _{1,3} =0,83; t _{1,4} =1,91; t _{2,3} =0,21; t _{2,4} =1,28; t _{3,4} =1,23	p _{1,2} >0,05; p _{1,3} >0,05; p _{1,4} >0,05; p _{2,3} >0,05; p _{2,4} >0,05; p _{3,4} >0,05
Heart rate (HR) in rest, beats min ⁻¹	81,8±4,20	80,9±4,11	77,3±3,06	75,9±1,91	t _{1,2} =0,15; t _{1,3} =0,87; t _{1,4} =1,28; t _{2,3} =0,70; t _{2,4} =1,10; t _{3,4} =0,39	p _{1,2} >0,05; p _{1,3} >0,05; p _{1,4} >0,05; p _{2,3} >0,05; p _{2,4} >0,05; p _{3,4} >0,05
Systolic blood pressure (SBP), MmHg	109,5±7,53	114,3±7,18	115,3±6,12	119,0±5,37	t _{1,2} =0,46; t _{1,3} =0,60; t _{1,4} =1,03; t _{2,3} =0,11; t _{2,4} =0,52; t _{3,4} =0,45	p _{1,2} >0,05; p _{1,3} >0,05; p _{1,4} >0,05; p _{2,3} >0,05; p _{2,4} >0,05; p _{3,4} >0,05
Diastolic blood pressure (DBP), MmHg	66,3±4,76	67,3±4,52	70,3±3,52	72,5±2,63	t _{1,2} =0,15; t _{1,3} =0,68; t _{1,4} =1,14; t _{2,3} =0,52; t _{2,4} =0,99; t _{3,4} =0,50	p _{1,2} >0,05; p _{1,3} >0,05; p _{1,4} >0,05; p _{2,3} >0,05; p _{2,4} >0,05; p _{3,4} >0,05
Vital capacity of the lungs (VC), ml	1670,3±58,78	1743,5±22,89	1753,5±20,21	1797,0±35,37	t _{1,2} =1,16; t _{1,3} =1,34; t _{1,4} =1,85; t _{2,3} =0,33; t _{2,4} =1,27; t _{3,4} =1,07	p _{1,2} >0,05; p _{1,3} >0,05; p _{1,4} >0,05; p _{2,3} >0,05; p _{2,4} >0,05; p _{3,4} >0,05
Respiratory rate, br·min ⁻¹	22,5±1,05	21,5±1,05	21,3±0,79	19,4±0,80	t _{1,2} =0,67; t _{1,3} =0,91; t_{1,4}=2,35 ; t _{2,3} =0,15; t _{2,4} =1,59; t _{3,4} =1,69	p _{1,2} >0,05; p _{1,3} >0,05; p_{1,4}<0,05 ; p _{2,3} >0,05; p _{2,4} >0,05; p _{3,4} >0,05
Volume of inhalation/exhalation, ml	228,3±7,62	239,5±10,11	257,1±7,19	261,4±5,13	t _{1,2} =0,88; t_{1,3}=2,75 ; t_{1,4}=3,60 ; t _{2,3} =1,42; t _{2,4} =1,93; t _{3,4} =0,49	p _{1,2} >0,05; p _{1,3} >0,05; p_{1,4}<0,01 ; p _{2,3} >0,05; p _{2,4} >0,05; p _{3,4} >0,05
Respiratory minute volume, ml	4029,4±80,57	4132,7±66,12	4215,7±79,42	4274,3±52,64	t _{1,2} =0,99; t _{1,3} =1,65; t_{1,4}=2,54 ; t _{2,3} =0,80; t _{2,4} =1,68; t _{3,4} =0,62	p _{1,2} >0,05; p _{1,3} >0,05; p_{1,4}<0,05 ; p _{2,3} >0,05; p _{2,4} >0,05; p _{3,4} >0,05

Research methods: theoretical analysis and generalization of literary sources; pedagogical observation; testing; medical and biological methods, methods of mathematical statistics.

Results of the research and their discussion

During our research, the implementation of intersubject communications of cognitive, educational, recreational activities, formed and reinforced the skills and skills for independent classes of physical exercises; various organizational forms, means, methods and methods of training were used, where for comparative analysis a comparative analysis of all four stages was carried out during the year of the study.

When using medical-biological methods of research, we obtained the following indicators: thus, between the first and second stages, the difference was in: body length (BL) 2,0 cm ($t=0,94$; $p>0,05$), body weight (BW) 0,9 kg ($t=0,53$; $p>0,05$), chest circumference (CC) 0,9 cm ($t=0,56$; $p>0,05$), heart rate (HR) 0,9 beats.min⁻¹ ($t=0,15$; $p>0,05$), systolic blood pressure (SBP) 4,8 MmHg ($t=0,46$; $p>0,05$), diastolic blood pressure (DBP) 1,0 MmHg ($t=0,15$; $p>0,05$), vital capacity of the lungs (VC) 73,2 ml ($t=1,16$; $p>0,05$), respiratory rate (RR) 1,0 br. · min⁻¹ ($t=0,67$; $p>0,05$), volume of inhalation/exhalation (VIE) 11,2 ml ($t=0,88$; $p>0,05$), minute volume (MV) 103,3 ml (Table 1).

Whereas between the second and third stages, the indicators increased BL on 1,5 cm ($t=0,85$; $p>0,05$), in BW on 1,8 kg

($t=1,13$; $p>0,05$), in CC on 0,3 cm ($t=0,21$; $p>0,05$), in SBP on 1,0 MmHg ($t=0,11$; $p>0,05$), in DBP on 3,0 MmHg ($t=0,52$; $p>0,05$), in VC on 43,5 ml ($t=0,46$; $p>0,05$), in VIE on 17,6 ml ($t=1,42$; $p>0,05$), in MV on 103,3 ml ($t=0,80$; $p>0,05$) and decreased in the HR at 3,6 beats · min⁻¹ ($t=0,70$; $p>0,05$), in RR on 1,0 br · min⁻¹ (Table 1).

During the fourth stage of the study, the indicators of girls aged 12 years had the following result: BL – 144,2 cm ($t_{3,4}=0,95$; $p>0,05$), BW – 42,6 kg ($t_{3,4}=0,69$; $p>0,05$), CC – 64,3 cm ($t_{3,4}=1,23$; $p>0,05$), HR – 75,9 beats · min⁻¹ ($t_{3,4}=0,39$; $p>0,05$), SBP – 119,0 MmHg ($t_{3,4}=0,45$; $p>0,05$), DBP – 72,5 MmHg ($t_{3,4}=0,50$; $p>0,05$), VC – 1797,0 ml ($t_{3,4}=1,07$; $p>0,05$) (Table 1).

The systematic classes on the program we developed positively influenced the improvement of physical qualities, they changed during the second, third, fourth stages in stamina on 122,6 m ($t=2,55$; $p<0,01$), on 152,6 m ($t=3,90$; $p<0,01$), on 182,1 m ($t=4,58$; $p<0,01$), in flexibility 0,5 cm ($t=2,37$; $p<0,05$), on 1,3 cm ($t=3,81$; $p<0,01$), on 2,1 cm ($t=8,48$; $p<0,001$), in strength 2,3 times ($t=1,90$; $p>0,05$), on 2,6 times ($t=2,16$; $p<0,05$), on 5,4 times ($t=3,13$; $p<0,01$), in the speed-strength qualities on 3,8 cm ($t=0,57$; $p>0,05$), on 8,4 cm ($t=1,38$; $p>0,05$), on 16,8 cm ($t=2,70$; $p<0,05$) regarding the performance of the first stage (Table 2).

Also during our study, the physical development of 11 and 12-year-old girls was determined using centile intervals at each

Table 2
Status of motor qualities of girls 11–12 years old (n=20)

Indicators	11 years old		12 years old		Evaluation of static differences	
	September	January	May	September	t	p
	$\bar{X}_1 \pm m_1$	$\bar{X}_2 \pm m_2$	$\bar{X}_1 \pm m_1$	$\bar{X}_2 \pm m_2$		
Endurance: Uniform walking 10 min with taking into account HR, m	339,1±36,82	461,7±32,41	491,8±13,27	521,2±15,11	$t_{1,2}=-2,50$; $t_{1,3}=-3,90$; $t_{1,4}=-4,58$; $t_{2,3}=0,86$; $t_{2,4}=1,66$; $t_{3,4}=1,46$	$p_{1,2}<0,05$; $p_{1,3}<0,05$; $p_{1,4}<0,001$; $p_{2,3}>0,05$; $p_{2,4}>0,05$; $p_{3,4}>0,05$
Flexibility: Angle body from sad position, cm	2,1±0,18	2,6±0,11	3,4±0,29	4,2±0,17	$t_{1,2}=-2,37$; $t_{1,3}=-3,81$; $t_{1,4}=-8,48$; $t_{2,3}=2,58$; $t_{2,4}=-7,90$; $t_{3,4}=2,38$	$p_{1,2}<0,05$; $p_{1,3}<0,01$; $p_{1,4}<0,001$; $p_{2,3}<0,05$; $p_{2,4}<0,001$; $p_{3,4}<0,05$
Strength: Modified pull-up for 1 min, number of times	4,2±1,09	6,5±0,53	6,8±0,51	9,6±1,34	$t_{1,2}=1,90$; $t_{1,3}=-2,16$; $t_{1,4}=-3,13$; $t_{2,3}=0,41$; $t_{2,4}=2,15$; $t_{3,4}=1,95$	$p_{1,2}>0,05$; $p_{1,3}<0,05$; $p_{1,4}<0,01$; $p_{2,3}>0,05$; $p_{2,4}<0,05$; $p_{3,4}>0,05$
Speed-strength: Standing long jump, cm	145,2±5,69	149,0±3,37	153,6±2,19	162,0±2,53	$t_{1,2}=0,57$; $t_{1,3}=1,38$; $t_{1,4}=-2,70$; $t_{2,3}=1,14$; $t_{2,4}=-3,08$; $t_{3,4}=-2,51$	$p_{1,2}>0,05$; $p_{1,3}>0,05$; $p_{1,4}<0,05$; $p_{2,3}>0,05$; $p_{2,4}<0,01$; $p_{3,4}<0,05$
Lifting of the trunk in the sad position for 30 s, number of times	3,5±0,84	4,6±0,57	4,7±0,52	5,6±0,51	$t_{1,2}=1,08$; $t_{1,3}=1,21$; $t_{1,4}=-2,14$; $t_{2,3}=0,13$; $t_{2,4}=1,31$; $t_{3,4}=1,24$	$p_{1,2}>0,05$; $p_{1,3}>0,05$; $p_{1,4}<0,05$; $p_{2,3}>0,05$; $p_{2,4}>0,05$; $p_{3,4}>0,05$

stage, the results are shown in Figure 1.

In the first and second stages, according to the centile intervals, the physical development of girls of 11 years was distributed as follows: 3–10% – 1 girl; 10–25% – 11 and 6 girls; 25–50% – 4 and 8 girls, 50–75% – 3 and 2 girls; 75–90% – 1 girl. At the third stage, changes occurred. So, in the interval 3–10% – 6; in 10–25% – 4; 25–50% – 4; 50–75% – 6; 75–90% – do not have, whereas in the fourth stage 3–10% – 2; 10–25% – 6; 25–50% – 4; 50–75% – 8; 75–90% – none (Figure 1).

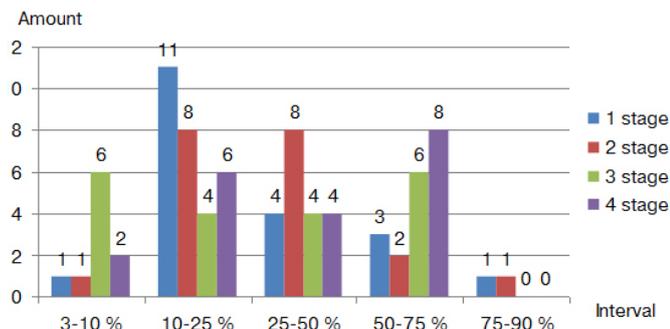


Fig. 1. Physical development of girls 11 and 12 years old according to the centile intervals during the study (n=20)

Conclusions

1. An experimental program of recreational activities with the help of various means for girls of 11–12 years of the preparatory medical group has been made possible to effectively influence their physical development during the year of training.

2. During the year of the study, the girls received an increase on 5,8 cm ($t=2,14$; $p<0,05$) in body length, on 3,8 kg ($t=2,22$; $p<0,05$) in body weight, on 2,7 cm ($t=1,91$; $p>0,05$) chest circumference, on 9,5 MmHg ($t=1,03$; $p>0,05$) in systolic blood pressure, on 6,2 MmHg ($t=1,14$; $p>0,05$) in diastolic blood pressure, on 126,7 ml ($t=3,52$; $p<0,01$) in vital capacity of the lungs, in volume of inhalation/exhalation on 33,1 ml ($t=3,60$; $p<0,01$), in minute volume on 244,9 ml ($t=2,54$; $p<0,05$) and decrease on 5,9 beats·min⁻¹ ($t=0,15$; $p>0,05$) in heart rate, in respiratory rate on 3,4 br·min⁻¹ ($t=2,35$; $p<0,05$).

3. The influence of systematic recreational activities had positive changes in the development of the physical qualities of girls 11 and 12 years old in uniform walking ($t_{1,4}=4,58$; $p<0,01$), in angle body from sitting position ($t_{1,4}=8,48$; $p<0,001$), in modified pull-up ($t_{1,4}=3,13$; $p<0,01$), in lifting of the trunk in the sad position from 30 s ($t_{1,4}=2,14$; $p<0,05$).

Prospects for further research. In the future it is planned to continue research of girls aged 13–14 taking into account their state of health.

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