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The Program for Improving Strength Physical Fitness of Male 15–16-Year-Old Students in The Extracurricular Hour Physical Education System

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ABSTRACT: This study is to find and evaluate an experimental approach to developing the strength capacity of 15–16-year-olds during extracurricular physical education and health classes in the gym.Materials and methods. The randomized method is used to select a group of students aged 15-16 years (30 people) to participate in classes using the experimental method in the school physical education system (supplement).Classes are based on circle training form, they are held three times a week, taking into account the age characteristics of students' strength ability development and performing complex strength exercises using Use simulation and workout equipment with local and regional fitness exercises.

Research results. The positive influence of the experimental program on the training and development of strength abilities (dynamic, static) of students (male) aged 15-16 in the context of supplementary physical education at school has is established. By the end of the trial, the number of students with "average" and "above average" physical health increased and the number of young men with "low" strength development levels decreased. The proposed test method increases the student's fitness level, as evidenced by the increased motor test index values. The value of the elasticity index of young males increased by 20%, speed 12.48%, endurance 10.26%, and speed endurance increased by 7.75%. The number of young men with "average" and "high" levels of the value of the motor test indicators increases.

Conclude. Proposed experimental methodology to develop 15- 16-year-old students' physical competencies in supplementary physical education at school has been shown to be highly effective and can be encouraged to improve their fitness and proficiency student's physical fitness.

Keywords: Strength capacity, strength training, gymnastics, physical fitness

I. INTRODUCTION

A certain level of strength development is required in all major sports. In young men, a high degree of strength development is a prerequisite for successful service in the military (Dao Chanh Thuc, 2018; Roman Markovič, 2018). Meanwhile, according to various studies, about 80% of young men and women, after graduating from high school, have low physical characteristics.Improving health and developing healthy lifestyle habits are priorities in the physical education of young people in many different countries (Karol Görner, & Alexa Reineke, 2020). ReductionYouth advocacy activities in recent decades in several countries (Olafsdottir et al., 2016) and physical educational performance (Hortigüela et al., 2015). Therefore, the issue of youth actively participating in physical training and sports is one of the State's policy priorities in many countries. Research on physical culture shows that physical development, one of the main motor qualities of a child's body, has a significant impact on overall physical development.

This fact shows the need to improve the effective educational and referral processtechnology and curriculum for regular and extracurricular activities that develop the strong competencies of high school students. Scientific literature analysis has shown that a lot of material has been accumulated on the choice of media and methods to develop the strengths of high school students.Physical training of students is done in many forms of physical education (regular, extracurricular). In recent years, an increasing number of students in Vietnam,

and some other countries are interested in forms of extracurricular physical activity (D. C. Thuc, 2019; Zorio-Ferreres et al, 2018). This indicates a decrease in motivation for traditional forms of classroom organization and the need to modernize physical education in educational institutions (Andrieieva et al., 2020). One of the forms of organizing advocacy activities according to the student's choice is supplementary physical education (Dugnist, et al., 2020). In this regard, in our opinion, the mission is to develop methods and technologies to develop the strong competencies of high school students in physical education, sports in sports, and sports groups. Physical enhancement is essential. This issue has not been fully addressed in the scientific literature, which reduces the effectiveness of 12th-grade capacity development training sessions.

The research purpose of the topic is to find and evaluate an experimental method to develop physically effective 15-16-year-old students during class time in the practice room.

II. RESEARCH METHODOLOGY

A randomized method was used to form a 15-16-year-old group of 30 people to practice in the school gym using an experimental approach to improving strength. Before and after the pedagogical experiment, the male students' endurance abilities were assessed by dynamic endurance tests: pull-up on a high crossbar, (times); pull-over, (times); dig-up on the bars, (times); lifting the torso from the supine position, (times/min); standing long jump, (cm); throwing a 3 kg stuffed ball with two hands sitting from behind the head, (cm). Static strength tests were performed: exercises needle, (s); bun (Ball), (s).; half-squat, (s); plank, (s); handgrip and deadlift dynamometry tests (kg). Motor tests were used to assess speed, endurance, speed and strength abilities, and flexibility: running 100 m, (s); running 1500 m, (min, s); jumping rope 30 sec, (times); leaning forward from a standing position with straight legs on a gymnastic bench, (cm).

The training sessions are held in 4 phases, three times a week, for 90 minutes, from August 2019 to March 2020. Fitness is selected to suit individual teenagers' possibilities. Classes follow the circular method of training.

In the main part of the unit, students are asked to do groups of local and regional empirical exercises with recommendations Table 1).

Table 1. Contents of the program to develop male strength abilities with the use of exercise equipment.

	Basic exercises	**Sets per exercise**	**Amount of repetition**	**Loading (kg)**
1st day (Monday; from 15-00 till 16-30.)	Alternate standing dumbbell curl with hand supination	2	20	8
	Standing row	3	10-12	35
	Alternate standing dumbbell curl with the neutral position of hand «hammer»	2	20	8
	Abdominal raise from the support position on elbows on bars	3	10	Sole weight
	Walk (6 min.) on a treadmill 1	1	-	Sole weight
	Lat pulldown	4	8	50
2nd day (Wednesday; from 15-00 till 16-30)	Dig-up on the bars	3-4	4-5	Sole weight
	Lying triceps extension on a horizontal bench	4	12	25
	Lifting the torso from	3	15-20	Sole weight

	the supine position			
	Pec deck in «Butterfly» training simulator	2-3	12-15	30
	Standing lateral raise with dumbbells	4	10-12	8
	Walk (6 min) on a treadmill	1	-	Sole weight
3rd day (Friday; from 15-00 till 16-30)	Push-ups	3	20	Sole weight
	Leg extension in a training device	3	10-12	50
	Super extension (hyperextension)	3	12-15	Sole weight
	Walk on a treadmill	1	-	Sole weight
	Squats (front squat, overhead squat, back squat)	4	10-12	20
	Leg curl in a training device	3	12-15	30

In the early stage (first 2 months), circular exercise is used to strengthen the musculoskeletal system and increase the functioning of the male body, as well as to provide a basis for increased load. The impact intensity is 40-45% of the maximum, the number of repetitions in the approach - 15-25 for the basic development of endurance, number of stations - 6-12, number of rounds - 1- 3. The work phases are arranged as follows: 15 seconds. - work, 45 seconds. - rested; 15 seconds - work, 30 seconds. -rested; 30 seconds. - work, 30 seconds. - rested.

For the next 2 months (phase II), we used intensive alternate training methods to develop strength with local exercises. At this stage, the load intensity is 50-65% is the maximum, the working time in each exercise is 15-30 seconds, the number of repetitions in the approach is 8-12 reps. The interval between approaches is 50-90 seconds, the station number is 4-10, and the lap number is 1-2.

In the third stage, to increase the load intensity and the differential effect on the lagging muscle groups, the successive series method is used. When doing exercises with local weights, we use weights 50-70% maximum, increasing the number of approaches and repeating with a 40-60 second resting interval. When doing area exercises, you should do 2-4 repetitions 12-15 repetitions with a pause between sets of 60-120 seconds.

In the final stage IV, a combination of circular and repetitive exercise methods was used to produce distinct effects on muscle groups. The young men perform 2-3 series of exercises at stations 4-6. (World Medical Association Declaration on Helsinki, 2013). Consent from the boy's parents to conduct the survey.

To statistically analyze the obtained results, the application software Microsoft Excel and SPSS 20.0.

III. RESULTS

After the experiment, the boys showed statistically significant increases in all indicators of dynamic and static strength, handgrip, and deadlift dynamometry (Table 2).

Table 2. Young men's strength indicators values before and after the experiment (M±SD)

Tests	**Indicators**		**t**	**P**	**(W%)**
	Before the experiment (M±SD)	**After the experiment (M±SD)**			

Dynamic strength	Pull-over (times)	1.6	1.39	2.82	1.73	2.26	<0.05	55.20
	Dig-up on the bars (times)	7.94	3.42	10.9	4.25	2.31	<0.05	31.42
	Lifting the torso from the supine position (times/min)	42.2	4.96	49.5	5.21	2.28	<0.05	15.92
	Pull-up on a high crossbar (times)	8.2	3.52	11.43	4.22	2.49	<0.05	32.91
	Standing long jump (cm)	184.5	7.22	217.4	6.52	3.06	<0.05	16.37
	Throwing a 3 kg stuffed ball with two hands sitting from behind the head (cm)	258.2	3.75	286.9	4.45	2.82	<0.05	10.53
Static strength	Half-squat, (s)	52.3	4.12	73.5	4.38	2.45	<0.05	33.70
	Plank (s)	29.78	2.46	45.7	2.98	2.31	<0.05	42.18
	Bun (Ball) (s)	38.6	2.87	55.4	2.95	2.01	<0.05	35.74
	Needle (s)	40.4	3.56	59.06	4.23	2.45	<0.05	37.52
Dynamometry	Right hand (kg)	38.89	2.86	41.93	3.59	2.44	<0.05	7.52
	Left hand (kg)	34.38	4.68	38.69	4.97	2.28	<0.05	11.80
	Deadlift (kg)	156.45	4.31	172.28	4.98	2.56	<0.05	9.63

The highest value (55.20%) of the increase in the young men's dynamic strength was set in the test *Pull-over* (time). The lowest value (10.53%) of the increase was in the test *Throwing a 3 kg stuffed ball with two hands sitting from behind the head* (cm). The values of the static force indicators increase exceeded 35% of the initial level.The values of the increase in handgrip and deadlift dynamometry indicators were about 9%.

At the end of the trial, the number of young adults with a growth rate is shown in (Fig 1).

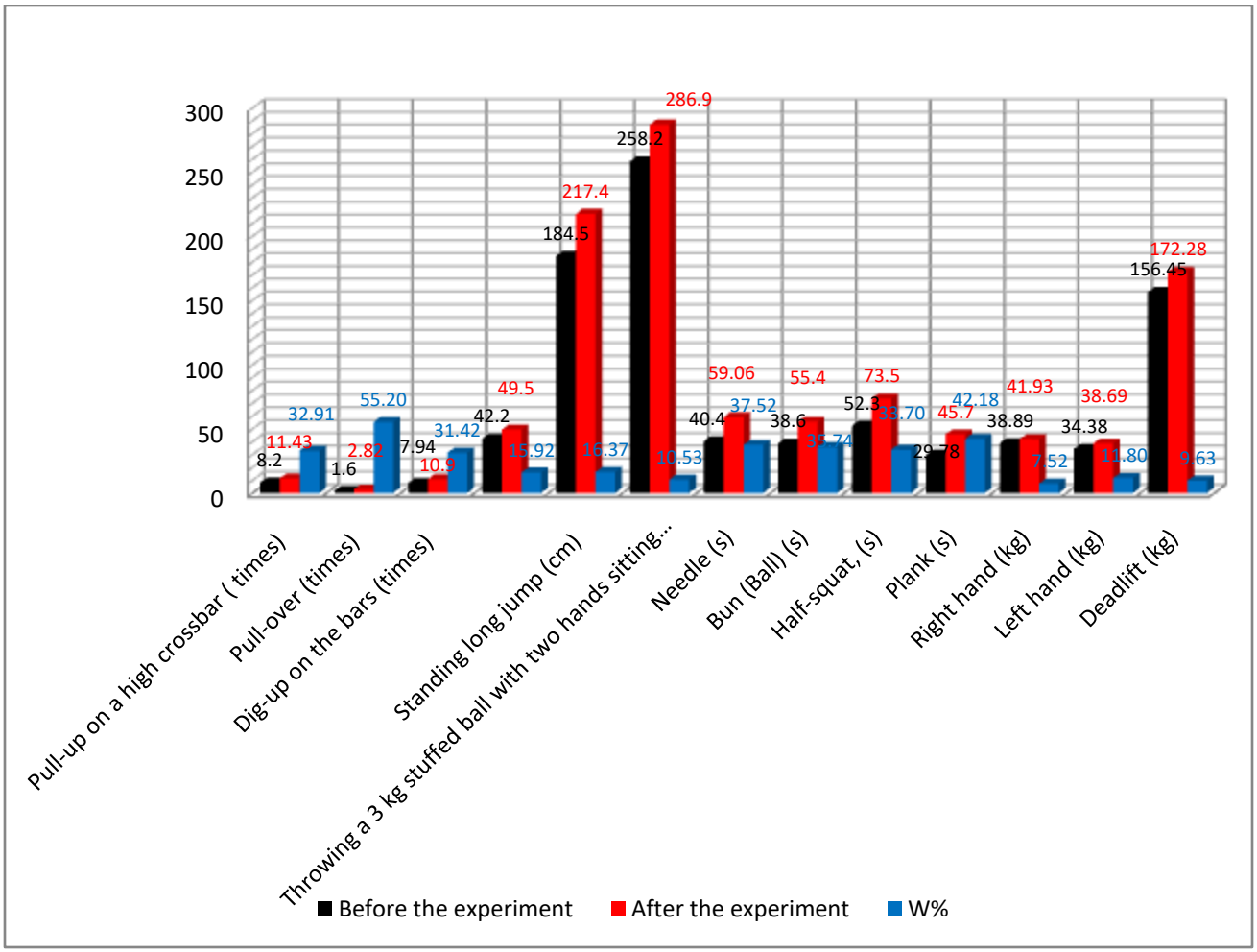

Fig. 1. *The number of young men with different levels of dynamic and static strength development before and after the experiment (%)*

The experimental method of training strength abilities had a positive impact on the students' physical fitness (Table.3), as evidenced by significant changes in the indicators values in all motor tests.

Table 3. Students' physical condition tests indicators' values before and after the experiment (M±SD)

Physical condition tests	**Before the experiment (M±SD)**		**After the experiment (M±SD)**		**t**	**P**	**W%**
Running 100 m (s)	14.98	3.22	13.22	3.19	2.28	<0.05	-12.48
Running *1500 m (min, s)*	7.58	4.36	6.84	3.89	2.39	<0.05	-10.26
Jumping rope 30 sec. (times)	62	3.75	67	3.65	3.15	<0.05	7.75
Leaning forward from a standing position with straight legs on a gymnastic bench (cm)	9	6.23	11	7.09	3.26	<0.05	20.00

The indicators of youth mobility increased by 20%, speed by 12.48%, endurance increased by 10.26%, and speed and strength increased by 7.75%.

The number of young men with "medium" and "high" mobility test scores has increased.

The number of young men with a 'low' degree of the 'speed' index decreased from 17 (56.67%) to 5 (16.67%), the number of young men with a 'moderate' degree increased from 13 (43.33%) to 19 (63.33%) and the "high" rate was from 0 (0%) to 6 (20%).

The number of students with "low" levels of endurance development decreased twice (from 9 to 4), and three young people with "high" levels of endurance appeared. Number of young men with an 'average'. The level of development of endurance remains unchanged.

Results of the speed and endurance test showed that after the trial, the number of young men with a "high" level of fitness quality increased 3 times (from 4 to 12). The number of young men who have a «medium» speed endurance does not change. Young men with "low" qualifications were not registered.After the trial, the number of young men with a "high" flexibility index tripled, and the number of young men with an "average" increased by 12.5%. No young male with a "low" level of flexibility is registered.

IV. DISCUSSION

Increased physical activity, as a supplement to regular fitness classes, has a positive impact on students' physical health (Talović et al., 2015), following data from our research. The results of using the proposed program for the development of strength abilities of boys aged 15-16, using exercise equipment showed that by the end of the trial, the number of students had 'average' and 'above average' physical health and a decrease in the number of young people with a 'low' level of strength development.

Finding new and improving traditional approaches to increase the effectiveness of PE classes for students continues to be relevant (Kolumbet, & Dudorova, 2016; Natal'ya M, et al,.2020), it confirms the importance of research already. choose ours. Because students' motivation for generally accepted methods of physical activity is still low (Drachuk et al., 2018), some researchers propose organizational methods. other than the student's physical education. Researchers suggest using intensive time-based training (Yessica Segovia & David, 2020) and fitness technology (Valery Zhamardiy, et al., 2020) more widely in school physical education.

The use of the circle training method in the proposed program to enhance the strength of young men increases the motor and emotional density of the classes, making the classes diverse and enjoyable. taste more. Use of a student's approach to physical education in supplemental physical education. Organizational significantly increases the youth's endurance capacity and overall fitness efficiency.

We believe that one of the reasons increases the dynamic, static, and strength of the arms and body, the value of the indices in the motor tests at the end of using our experimental method. The proposed increase is an increase in male youth motivation to be physically active in association with an additional form of extracurricular physical education. This is consistent with survey results of Hispanic students, 1-2 years studying in secondary educational institutions. They point out in their survey important time activities outside the classroom, associated with increased interest in this form of a physical education organization (Zorio-Ferreres et al., 2018). Other researchers especially recommend spending significant time on extracurricular physical activity (Codina N, et al., 2016), which increases not only physical fitness, but also Spiritual evidence is the results observed by other authors. an increase in the student's cognitive and physical function indicators (Berrios-Aguayo, 2017).

This statement is consistent with data obtained by other researchers (Natal'ya M, et al,2020). We believe that researching the development of competencies in the physical complementary learning environment of students is a promising direction of the program to enhance the fitness of modern students.

V. CONCLUSION

The experimental method that we developed and tested to develop the physical capacity of 15-16-year-old boys using exercise equipment in the supplementary physical education system at school has become a useful

method. Significant in enhancing the student's motor and stillness of hand development and measure the dynamics again. At the end of the test, an increase in the values of the indexes of the motor tests of speed, general endurance, speed endurance, and active flexibility of the spine was found. The proposed program to develop strength and strength abilities of 15-16-year-old male expands theoretically knowledge in the physical and sports education domain and it can be introduced for use in other educational institutions.

Conflict of interest. The authors stated that there is no conflict of interest.

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