

# Improving the means and methods of training of young fencers aged 9-11 years

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## Abstract

**Background and Study Aim** Training of motor actions of young athletes requires consideration the peculiarities of the sensitive period of their development. An important component of the training program is the use of training tools that do not harm the health of young athletes. The purpose of the study is to identify the dynamics of physical training and provide an assessment of technical and tactical techniques of fencers (sword) aged 9-11 years under the influence of the author's program.

**Material and Methods** The study involved young fencers (n = 20; age 9-11 years). The study lasted one academic year. The training was held in the gym of the children's and youth sports school "Wave" (Kharkiv, Ukraine). Athletes were divided into two uniform groups: control group (n = 10) and experimental group (n = 10). Classes were held according to the author's program 4 times a week for 2 hours. A survey of trainers of trainers (n = 12) and experienced fencers (n = 30) was conducted. Parents of children agreed to participate in the study. The following tests were used: "Standing Long Jump Test (Broad Jump), cm"; "4x9 m Shuttle test, sec."; "Hits into the target, 30 sec. points"; "Simulation exercises of a simple fencing combination, sec.". The program "Microsoft Excel" Data Analysis, SPSS was used. The level of reliability is selected p < 0.05.

**Results** Significant changes in the indicators of the control group were obtained: "Standing Long Jump Test (Broad Jump), cm", (p < 0.05); in the test "4x9 m Shuttle test, sec." (p < 0.05); both tests have assessment of technical and tactical techniques (p < 0.01). In the experimental group, all tests showed positive changes (p < 0.01). In comparison of two groups with each other in the tests "Standing Long Jump Test (Broad Jump), cm", "4x9 m Shuttle test, sec." and " Hits into the target, 30 sec. points" there were positive statistically significant changes (p < 0.05). In the test "Simulation exercises of a simple fencing combination, sec." no significant changes occurred (p < 0.05).

**Conclusions:** It is recommended to take into account the effects of exercise on the health of young athletes when designing a fencing training program.

**Keywords:** fencing, physical qualities, physical fitness, health.

## Introduction

The training of young athletes aims to achieve sports results. However, training programs do not always take into account the impact of exercise on the health of young athletes. In the pursuit of results coaches sometimes neglect the health component in building the training process. Therefore, it makes sense to consider the positions of various specialists in fencing on this issue.

Earlier studies have proposed a special set of fencing exercises to expand the arsenal of fighting, as well as the behavior of athletes in unexpected situations [1]. The authors note the need to motivate athletes. This approach should be in the training programs of young athletes.

Building a safe training process takes into account the various components of training. Among them is the formation of young athletes' negative attitudes towards doping. Also, indicate the health consequences of such athletes' behavior. In a study by Poppel et al. [2] it is noted

that coaches play a significant role in the attitude of young fencers (swords) to their own health. The authors offer their own views on the role of the coach in the prevention of doping by young athletes. In this aspect, Mroczkowska [3] believes – "The assessment of objective risk depends more on the rank of what may be lost (health) than on what may be gained (medals)." The author analyzes the possible losses in the use of doping by young athletes. Among such losses is the risk of declining health of young athletes in the early stages of training [3]. An equally important component of the health of young athletes is the compliance of loads with the initial periods of training. In this context, the health component should be present in training programs.

Another area of design training programs for young fencers is the methodological basis for the development of motor skills. Movshovich et al. [4] reveal the methodological foundations for the development of coordination skills of young fencers. The authors believe that the main principle of technical development in the training process of young athletes should be considered

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mastering the performance of fencing movements with maximum variability, rather than maximum speed.

Specialized training of young athletes has its risks. Among them are the risks of injury due to overload. This is confirmed in studies of different orientations [5, 6]. In general, the authors agree that excessive workload is the result of poor construction of the training program. The authors believe that aerobic exercise is more appropriate in the early stages of training young athletes.

It is known that a complex combination of a large amount of training and academic requirements can hinder the cognitive and academic results of young athletes. Granacher et al. [7] believe that the complex combination of a large amount of training and academic requirements can hinder the cognitive and academic performance of young athletes. The authors offer a program of school 1-year sports training in combination with physical education. The use of such a program improved physical fitness, but did not negatively affect the cognitive and educational performance of young athletes.

Malina et al. [8] investigated the relationship between invasive and non-invasive indicators of biological maturation in young athletes. The authors propose to include in the skills development programs the classification of young people into early, middle and late maturity status. This will improve the quality of training programs and competitions. Detanico et al. [9] consider it necessary to take into account indicators of somatic maturation, growth and training experience in training programs for young athletes.

Another study proposes to include a combination of game training and high-intensity interval training in the training program [10]. Sharma et al. [11] consider it necessary to conduct cardiac screening before the participation of young athletes in sports competitions. Such screening should be voluntary, not mandatory, and performed by experienced physicians.

Gaining fencing experience is impossible without the development of physical qualities, as well as mastering the technical and tactical techniques of fencing. The means and methods of the educational and training process must be constantly improved and correspond to modern trends in the development of the sport. This should be the basis for acquiring and improving the level of fencing skills [12-14].

The purpose of the study: to investigate the dynamics of physical training and provide an assessment of technical and tactical techniques of fencers aged 9-11 years under the influence of the author's program.

## Material and Methods

### *Participants.*

Under observation were fencers ( $n = 20$ ; age 9-11 years) of the basic training group, who train in the gym of the children's and youth sports school "Wave" (Kharkov, Ukraine). Athletes were divided into two uniform groups: control group (CG;  $n = 10$ ) and experimental group (EG;  $n = 10$ ). Classes were held 4 times a week for 2 hours. In EG classes were conducted according to the author's

program. A survey of coaches and experienced athletes was conducted ( $n = 42$ ). The children's parents agreed to participate in the study. This study was approved by the Bioethics Committee for Clinical Research and conducted according to the Declaration of Helsinki.

### *Research design.*

The study lasted one academic year. A survey of coaches and experienced athletes was organized. The purpose of the questionnaire is to identify the main areas of overcoming shortcomings in the training of young fencers.

The control group was engaged in the standard program for children and youth sports school fencing department (4 times a week for 2 hours) [15]. The experimental group worked on the author's program 4 times a week for 2 hours. The content of the author's program differed from the standard set of special exercises.

The author's program consists of special jumping exercises; exercises with sports tires; mobile games with fencing equipment; sets of exercises and maneuvers in the battlefield; special exercises on the target.

Assessment of physical fitness of young fencers was carried out according to the following standard tests: "Standing Long Jump Test (Broad Jump), cm"; "4x9 m Shuttle test, sec." [16]. Testing was conducted at the beginning of the experiment. Retesting was conducted at the end of the experiment.

Evaluation of the implementation of technical and tactical techniques was carried out according to such tests as:

1) "Hit into the target, 30 sec. points" (Fig. 1):  
- used a target that is equipped with 5 marks of different diameters (the smallest - 25 points, the largest - 5 points);  
- starting position of the athlete - short distance;  
- hits are performed on the target. The result is the number of points scored in 30 seconds. The attempt is not credited if the participant has never hit the mark on the target within 15 seconds.

2) "Simulation exercises of simple combination, sec." (Fig. 2):

- steps: forward-jump; forward- lunge;
- steps back- lunge;
- leap forward- lunge;
- backwards-fleche attack.

The athlete gets on a guard position, puts leg (front leg) on the line. On command, the athlete performs:

- 1- steps forward: as soon as the leg (front leg) crosses the line, the athlete performs a leap forward- lunge;
- 2- steps back: as soon as the leg (front leg) crosses the line, the athlete performs a lunge;
- 3- jumps forward: as soon as the leg (front leg) crosses the line, the athlete performs backwards-fleche attack;
- 4- jumps back: as soon as the leg (front leg) crosses the line, the athlete performs a fleche-attack.

The result is runtime of one combination. An attempt can not be counted if the athlete performed the attack before crossing the line.

3) "Complex reaction with a choice, sec." (Fig. 3)

The athlete gets on a guard position. The cones are



**Figure 1.** Test “Hits into the target, 30 sec. points” (photo - Irina Kriventsova)



**Figure 2.** Test “Simulation exercises of simple combination, sec.” (photo - Irina Kriventsova)



**Figure 3.** Test “Complex reaction with a choice, sec.”

placed in front, behind, to the right and to the left at a distance of 2 meters on all sides of the participant. Depending on the placement (side) of the cone (front, back, left, right), the corresponding option of moving to it is performed: in front – steps forward; behind – jumping forward; on the left – steps back; on the right – jumping back. The coach step by step naming the parties freely.

The athlete must react as quickly as possible: perform the appropriate movement option and go beyond the line of a certain cone. If the direction of the athlete's starting position does not coincide with the direction of movement, he/she must jump to take the correct starting position. The result is the average latency reaction time (the time from the moment when a certain side was named



to the beginning of the participant's movement) for 3 attempts. Remarks: the participant must keep the guard position when moving; legs should not be straightened while performing movements. An attempt can not be counted if the participant has incorrectly completed the appropriate movement option.

**Statistical analysis.** The program "Microsoft Excel" Data Analysis, SPSS was used. It was determined the following indicators: standard deviation, the reliability of the differences between the parameters of the initial and final results and between CG and EG (Student's t-test). The level of reliability is selected  $p < 0.05$ .

## Results

According to the results of the survey of coaches and experienced athletes, it was found that the main areas of overcoming shortcomings in the training of fencers are:

- inclusion in the training process of strength training, stretching, jumping exercises, exercises on special devices, exercises to prevent typical injuries;
- improvement of material and technical support of the sport, assistance of the state and/or sponsors in financing the participation of athletes in ranking competitions;
- involvement of assistant coaches in providing individual lessons in fitness and other types of physical training, rehabilitation, psychological training; the use of video reviews of the training of leading fencers, the use of modern devices for determining physiological parameters [17].

The dynamics of the level of general physical fitness under the influence of the developed program indicates significant changes in indicators (Table 1). In CG: "Standing Long Jump Test (Broad Jump), cm" ( $t = 0.014$ ,  $p < 0.05$ ); "4x9 m Shuttle test, sec." ( $t = 0.021$ ,  $p < 0.05$ ); in both tests of assessment of technical and tactical techniques ( $p < 0.01$ ).

In comparison of two groups with each other in the tests "Standing Long Jump Test (Broad Jump), cm", "4x9

m Shuttle test, sec." and "Hit into the target, 30 sec. points" there were positive statistically significant changes ( $p < 0.05$ ) (Table 1). In the test "Simulation exercises of a simple combination, sec." and "Complex reaction with a choice, sec." no significant changes occurred ( $p > 0.05$ ), although there is a noticeable trend of improving the results in EG. It is possible that one year is not a sufficient period for the reliable formation of these indicators. It takes more time.

As can be seen from Table 1, the reduction of the standard deviation in the groups occurred in the tests "4x9 m Shuttle test, sec." and "Simulation exercises of simple combination, sec.". This indicates a gradual alignment between stronger and weaker athletes in the groups.

Results of "Standing Long Jump Test (Broad Jump), cm" and "Hit into the target, 30 sec. points" show the increase in standard deviation. This indicates a greater discrepancy between the representatives of the group against the background of a slight and significant improvement in test results. The same tendency is observed at mastering of technique of performance of difficult exercises by separate athletes of groups.

## Discussion

The study confirms the opinion of many experts in the field of physical culture and sports about the importance of health-oriented training of young athletes. McGuine et al. [18] note that health policy experts should take health indicators into account when designing and implementing policies to improve adolescent health. Baumgartner et al. [19] believe that moderate physical activity in young athletes is associated with a reduced risk of cardiovascular disease. Other studies [20-24] also emphasize the need to care for the health of children and young athletes in physical activity at various levels. The authors also note the role of parents / coaches and the benefits of gender-sensitive physical activity programming. Our program also takes into account such an important component as the health of young athletes.

**Table 1.** Comparison of the dynamics of indicators of physical training under the influence of the program in CG and EG

Test	The beginning of the experiment				The end of the experiment			
	$\bar{X} \pm \sigma$		t	p	$\bar{X} \pm \sigma$		t	p
	CG (n=10)	EG (n=10)			CG (n=10)	EG (n=10)		
Standing Long Jump Test (Broad Jump), cm	163.2±10.6	164.7±6.7	0.32	>0.1	164.7±12.47	172.7±10.07	0.02	<0.05
4x9 m Shuttle test, sec.	11.8±0.44	11.94±0.51	0.27	>0.1	11.64±0.42	11.2±0.42	0.024	<0.05
Hit into the target, 30 sec. points	474.5±131.5	547±82	0.12	>0.05	493.5±136.5	618.5±93.5	0.04	<0.05
Simulation exercises of simple combination, sec.	12.43±1.45	12.91±1.36	0.17	>0.05	12.08±1.08	11.7±1.05	0.29	>0.05
Complex reaction with a choice, sec.	1.698±0.24	1.69±0.22	0.49	>0.05	1.627±0.19	1.503±0.13	0.15	>0.05

We agree with the conclusions of other authors that the development of tactical thinking is based on the ability to monitor closely, quickly analyze and make the right decision [1, 25]. The authors note that the development and improvement of tactical skills has individual and long-term acquisition of relevant skills.

Our program was designed taking into account the need to diversify the techniques of fencers and adhere to the quality of their performance. Techniques during the fight acquire tactical meaning and become fighting operations. It is the expansion of the arsenal of hostilities that favors the fencer.

Harrison CB et al. [10] note that the combination of game and high-intensity interval training provides positive changes in the training of athletes. We believe that game and competitive methods are leading in the training of young athletes. That is why we have developed and adapted 8 games using fencing equipment.

Palmer-Keenan and Bair [26] note that the competitive method is a factor that can confuse competitors. We do not fully agree with this statement. In such cases, it all depends on the proper planning of exercise, which should be available to participants. In this context, our program takes into account the pedagogical principles of accessibility and adequacy of the level of physical activity of young athletes.

We agree with the opinion of other authors [4, 27, 28] that mastering the performance of fencing movements should be performed with maximum variability. However, it should be noted that when performing technical techniques, it is necessary to apply a gradual transition from the minimum rate of execution to the maximum and return to the minimum. In this case, the athlete should try to adhere to the preservation of exercise techniques.

Chtara et al. [27] note that the use of the test of change of direction for fencers is closely related to the selected indicators of physical fitness. In this context, we can say that such tests were used in our program. These tests were

developed and tested by us with the participation of young athletes and they differed slightly from the standard ones offered by the program for sports schools.

An important element of our program is the special attention to the implementation of fleche technique. This attack is also analyzed in the study of Fatemeh [29]. The author presents estimates of biomechanical indicators of fencing athletes according to the criteria of ankle injury during landing after fleche technique. It is stated that professionals should pay attention to the balance of muscle strength before tournaments. We fully agree with this statement. However, it should be noted that the correct technique of performing a complex fleche attack should be gradually formed in young fencers under the careful control of the coach.

Our results prove that under the influence of the author's program there were positive changes in the indicators of all selected tests. Tests on general physical fitness and hits into the target are reliable ( $p < 0.05$ ). And tests on the implementation of simulation exercises and the composition of the reaction of choice have a tendency to improve. This indicates a long-term acquisition of relevant skills.

### Conclusions

The author's program was aimed at diversifying the educational and training process at the stage of initial specialization. The program is based on the expansion of jumping exercises, complex coordination exercises, exercises for stretching muscles, methods of manoeuvring in the fighting stance, exercises on the target.

It is recommended that the effects of exercise on the health of young athletes be taken into account when designing a fencing training program.

### Conflict of interest

The authors report no conflict of interest.

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