

Фізична культура, фізичне виховання різних груп населення

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FEATURES OF STRENGTH DEVELOPMENT IN HIGH SCHOOL-AGED CHILDREN INVOLVED IN ATHLETIC THROWING

Lyudmila Cherkashina¹, Roman Cherkashyn²

¹ Postgraduate student at Lesya Ukrainka Eastern European National University, Lutsk, Ukraine, lcherkashina1983@i.ua

² Ph. D. in Pedagogical Sciences, Associate Professor. Lesya Ukrainka Eastern European National University, Lutsk, Ukraine

Abstract

Topicality. Relevance of research due to the need to search for and study of new ways to take force of children of high school age who are engaged in athletic throwing. **The aim** – to optimize the training process throwers of high school age through the use of different education methods of power quality. **Results of research** in recent years the tendency of decline in strength, and in connection with this decrease in athletic performance of boys and girls high school age who are engaged in athletic throwing. Therefore there is a need to find the most effective methods of training young people in which they can to reach maximum heights, using all the reserves of the body without harming him. **Conclusions.** Quite popular and promising means of strength training exercises are terasat, which combined with isometric exercises enhance the level of power quality, the effectiveness of the training process and improve athletic performance in the discus. Compared with classic strength training terasat application makes it possible to improve the emotional background of occupation, easy to adjust the load according to individual capacity boys and girls. The gradual reduction of the length terasat can develop not only the strength endurance but also to correct the human physique.

Key words: power quality, physical activity, terasat, the training process.

Людмила Черкашина, Роман Черкашин. Особливості розвитку силових якостей дітей старшого шкільного віку, які займаються легкоатлетичними метаннями. **Актуальність** дослідження зумовлена потребою пошуку й обґрунтування нових засобів розвитку сили в дітей старшого шкільного віку, які займаються легкоатлетичними метаннями. **Мета дослідження** – оптимізація тренувального процесу метальників старшого шкільного віку на основі використання диференційованої методики виховання силових якостей. **Результати роботи.** Протягом останніх років простежено тенденцію до зниження рівня розвитку сили, а у зв'язку з цим – зниження спортивного результату юнаків та дівчат старшого шкільного віку, які займаються легкоатлетичними метаннями. Тому виникає потреба пошуку новаційних засобів розвитку силових якостей і найбільш ефективних методів підготовки юнаків та дівчат, за допомогою яких була б можливість досягати максимальних висот, використовуючи всі резерви організму без шкоди для нього. **Висновки.** Досить популярним і перспективним засобом силової підготовки є вправи з терасетами, що в поєднанні з ізометричними сприяють підвищенню рівня силових якостей, ефективності тренувального процесу й покращенню спортивного результату в метанні. Порівняно з класичними силовими вправами, застосування терасетів дає можливість підвищувати емоційний фон занять, легко регулювати навантаження відповідно до індивідуальних можливостей юнаків та дівчат. Поступове зменшення довжини терасетів уможливило розвиваток не лише силової витривалості, але й коригування статури людини.

Ключові слова: силові якості, фізичні навантаження, засоби, терасети, старший шкільний вік, тренувальний процес.

Людмила Черкашина, Роман Черкашин. Особенности развития силовых качеств детей старшего школьного возраста, занимающихся легкоатлетическими метаниями. **Актуальность** исследования обусловлена необходимостью поиска и обоснования новых средств развития силы у детей старшего школьного возраста, занимающихся легкоатлетическими метаниями. **Цель исследования** – оптимизация тренировочного

процесса метателей старшего школьного возраста на основе использования дифференцированной методики воспитания силовых качеств. **Результаты работы.** В последние годы наблюдается тенденция снижения уровня развития силы, а в связи и с этим – снижение спортивного результата юношей и девушек старшего школьного возраста, занимающихся легкоатлетическими метаниями. Поэтому возникает необходимость поиска новационных средств развития силовых качеств и наиболее эффективных методов подготовки юношей и девушек, с помощью которых была бы возможность достигать максимальных высот, используя все резервы организма без вреда для него. **Выводы.** Достаточно популярным и перспективным средством силовой подготовки являются упражнения с терасетами, которые в сочетании с изометрическими способствуют повышению уровня силовых качеств, эффективности тренировочного процесса и улучшению спортивного результата в метании. По сравнению с классическими силовыми упражнениями, применение терасетив дает возможность повышать эмоциональный фон занятий, легко регулировать нагрузку в соответствии с индивидуальными возможностями юношей и девушек. Постепенное уменьшение длины терасетив позволяет развивать не только силовую выносливость, но и корректировать фигуру человека.

Ключевые слова: силовые качества, физические нагрузки, средства, терасеты, старший школьный возраст, тренировочный процесс.

Introduction. Strength training – is a specialized process of teaching physical improvement of pupils of all ages and gender, aimed to improve health, develop strength and athletic formation. The means for development of force are exercises with a high burden (resistance), which directed to stimulate an increase in the degree of muscle tension. They divided into: primary and secondary. It should be noted that physical education, one of whose tasks is to develop strength qualities, has its differences for children high school age who are engaged in sports sections compared with other children who attend only the lessons in physical education.

Nowadays, in an era of high sports achievements, one of the major questions is how to prepare young people who are engaged in athletic throwing better, to reach a maximum height using all the reserves of the body without harming it.

We have worked out programs of different authors. They emphasize the importance of improving power capacity, scientifically prove that the power has load positive effect on the health, performance, endurance, agility, speed, convinced of that the optimal level of force is an effective factor in preventing disease and providing energy.

So we can see, the authors do not have a consensus on this issue. Also it should be noted that most of the research and methodical recommendations intended for professional athletes and the general nature without distinction of youth and adult organisms. However, the body of a child is weaker than adult and development of power quality in them is different.

In our opinion, the development of power quality of children of high school age must be methodically properly constructed taking into account age features, rules of selection adequate means regulation of intensity differentiated approach to power quality education.

Thus, based on the foregoing, we concluded that increasing the strength training of children of senior school age, involved in athletics throwing events, is timely and relevant. The aim of our study was the optimization of the training process throwers of high school age through the use of differentiated methodology of training strength qualities.

The aim of our study was to design and experimental verification of program effectiveness through the use of force resistance elastic items (terasat) and static exercises athletes, throwers high school age. To solve the problems raised in the paper, we used the **following methods:** study and analysis of educational, scientific and methodological literature; interviews with experts; pedagogical supervision, pedagogical experiment, methods of mathematical statistics.

Research Results. Discussion. The primary role of physical education of school youth and their peers who are engaged in sports sections belonging to power exercises that form the necessary muscle mass, which provides not only body movements, but also the production of energy. Sports training can lead to significant progress if it is properly organized, carried out according to plan and system that is based on the experience of best practice and science.

An important step in the development of physical qualities, including strength of boys and girls of high school age to training sessions could be the introduction of a popular youth kind of motor activity – exercises with terasat (special latex tape having varying degrees of resistance and fixed on the hand and leg). In comparison with classic power training application of terasat makes it easy to adjust the capacity. The gradual reduction of the length of terasat, increasing their elasticity allows not only strength endurance

development, but also their own power qualities influence on the increase of muscle in diameter, and ultimately on the character of man. For example, teraset applications in such gymnastics exercises as spin in the emphasis lying, substantially increases the load on the upper shoulder girdle.

So, according to the study of modern scientific and technical literature on the development of power quality we have selected all the proposed exercises of which was compiled application of force. For this purpose in our program of development of force in children of the advanced school age we used one of fixed assets of development of force – static exercises in the isometric mode (exercises in which muscular tension is created due to strong-willed efforts with use of external objects) and additional resources, namely exercise with use of resistance of elastic objects where used the sets of exercises developed by us from a terasat.

The program was selected and arranged such exercises, which does not require special equipment, which have the natural character close to competitive exercise, and have no negative impact on the locomotive apparatus young athletes (table. 1). In their working out, we tried to take into account all positive aspects that exist in other methods of strength training.

The features of our program of power quality are:

1. Changing the value of a specific strength training
 - the general strength training was given to 25 % of total training time (Various exercises at the gym, exercise with dumbbells, damn, etc.);
 - the exercise of the local action on muscle groups (with different set of exercises terasat) was given to 40 % of the training time;
 - on exercise of isometric (static), 20 % of total training time;
 - on exercises to develop explosive strength, 15 % training time.
2. Classes carried integral character and conducted in combination with technical training.
3. Exercises were selected on the basis of the impact mainly on those muscle groups that are engaged in the process of throwing. These exercises should have been simultaneously promote the development of power quality and providing valuable skills in the discus throwing.

Table 1

Value Means of Strength Training in the Experimental Group

Strength Training of the Athlete				
The Focus of Exercises	Examples of Exercises	Variants of Training Loads coaches, %		Dosage Load, %
Weight Training of global action	Complex exercises with terasetamy	0	5	40
Exercises of general power orientation	Various exercises at the gym, exercise with dumbbells, damn, etc	60	40	25
Exercises to develop explosive strength	Jumping, throwing, percussion exercises	40	45	15
Isometric exercises	Tension general and local effects (eg. extensor tension legs and torso)	0	10	20

Training program was designed for 12th weeks. In trainings the group method of exercises was used. Exercises are performed serially with accurately dosed load. When doing throwing exercises attention is paid to correct technique of these exercises.

Teacher observations and experiments were conducted to determine the level of force readiness, level of physical development and to assess the effectiveness of the proposed program and its impact on athletic performance in the discus. The 16th young men of 15–16 years which specialize in the javelin throwing participated in a research and had III–II adult categories. In order to identify the effectiveness of the proposed development program force control standards of physical and technical preparedness of javelin throwers were proposed, which included: running 30 meters on the run without and with a spear; triple jump with seats on the right and on the left leg; throwing the core with both hands behind the head, both hands

behind the head, two hands back over his head; squat, jerk and taking the bar to the chest; javelin right away, left from the place, two hands, with 3–4 steps 5–6's steps, javelin with a takeoff (table 2).

Table 2

Indicators of Physical and Technical Preparedness of Young Trainees

Indicators	To exp.	After exp.	Increment	Increment, %	Planned Result
	Speed Quality				
Running 30 meters from the course, <i>sec</i>	4,49	3,99	0,5	11	4,15–3,96
Running 30 meters on the run with a spear, <i>sec</i>	4,87	4,29	0,58	12	4,40–4,30
Running 15 m allotted spear, <i>sec</i>	2,51	2,12	0,39	16	2,20–2,10
Power-speed					
Triple jump away, <i>cm</i>	721	810	089	14	775–845
Jump on the right foot	11,42	12,21	0,79	7	12,00–12,50
Jump on the left leg	11,54	12,42	0,88	8	12,00–12,50
Explosive power					
Throwing a core with both hands from behind the head	14,22	15,49	1,27	9	15,00–15,50
Throwing a core with both hands from the head with running up	16,48	17,72	1,24	8	17,50–18,00
Throwing a core with two hands back over the head	16,96	18,21	1,25	7	17,50–18,00
Power Quality					
Squats, <i>kg</i>	60,0	79,4	19,4	28	70–80
Spurt bar, <i>kg</i>	54,7	67,5	12,8	21	60–65
Taking the bar to the chest, <i>kg</i>	60,4	76,1	15,7	22	70–75
Technical preparedness					
Throwing right from a place, <i>m</i>	4,96	41,06	36,1	14	38–40
Throwing left from a place, <i>m</i>	30,17	35,1	4,93	16	33–35
Throwing a spear with both hands, <i>m</i>	5,47	23,43	28,9	23	28–30
Javelin Throw with 3–4 steps, <i>m</i>	40,26	6,54	46,8	16	43–45
Javelin Throw with 5–6's steps	43,24 m	48,9	5,66	13	45–48
Javelin throwing with a run	47,63 m	53,7	6,07	13	50–53

After the introduction of the experimental programs evident positive dynamics in all control exercises and in some exceeding standard rates. All three indicators are in high-speed figure on the top limit of the planned result, in particular the result of 30 m after the conducted research made of the course 3,99 c, with that on 0,5 sec with exceeded initial result. The result of run of 30 m with the javelin was 4,29 sec, and the result is shown in run of 15 m with the taken-away javelin made 2,12 sec. In high-speed and power exercises of hopping orientation the following results were shown: the triple jump from place increase of 0,89 m and amounted to 810 m; in the fifth jump on the right foot figure increased by 7 % and amounted to 12,21 m; in the fifth jump on the right leg result was at 12,42 sec. All figures are within the intended result.

Some indicators of explosive force of ballistic character exceeded the planned result, namely throwing core with two hands back over his head result was improved by an average of 1,25 m and was at 18,21m, which is 21 cm higher than the top rate of planned results. The results of javelin throwing with two hands behind the head was at the upper limit of the planned and amounted to 15,49 m. The core throwing with both hands behind the head result increased by 9 % and amounted to 17,72 m. In power exercises two of three indicators exceeded the planned result that can testify to efficiency of the offered training program.

Therefore, in breakthrough of a bar the result was at the level of 67,5 kg, in squat with a bar – 79,4 kg, and in capture of a bar on a breast – 76,1 kg.

By results of technical readiness positive changes were recorded on all indicators, and on five of six they exceed the planned standard indicators. Results in javelin throwing indicators from different positions and options on average increased from 14 to 23 %.

According to many scientists, for athletes of 13–18 years satisfactory rate of growth results in control exercises that characterize the level of physical qualities are such as sprint running (30–60 m) – 8,5–11,0 % jumping tests – 8–20 %, throws tests – 8,5–25,0 % strength tests (spurt, squats) – 15–37 %. In adult athletes, these criteria are slightly higher.

Indicators of running, jumping, throwing and power exercises on average increased from 8 % in core throwing from various of provisions to 23,66 % exercises with a barbell that fit into the limits of model parameters result of a gain of control exercises proposed by scientists, and is satisfactory (tabl. 3)

Table 3

Summarized Indicators of Experimental Groups

Experimental Groups		Exercises Orientation				
		Throwing	Crossing	Hopping	Throwing	Power
	x	5,6	0,88	1,25	15,96	0,49
	%	15,83	9,66	8	23,66	13
Model indexes	%	8–20%	8–20%	7,5–25%	15–37%	8,5–17%

In order to add general information about the status of individual features of physical development of high school children who are engaged in athletic throwing, we determined anthropometric indicators: (high, weight, circumference of chest) functional performance (vital capacity, heart rate at rest, blood pressure) respiratory system (test weights, test Serkina) and cardiovascular and physical development indexes (tabl. 4).

Table 4

Indicator of Physical Development of Young Trainees

Age	Anthropometric Indicators					Functional indicators			
	DT	MT	WGC			Systolic	Diastolic	Pulse	GJEL
			Rest	Inhale	Exhale				
15–16 Years	175,51	68,53	90,12	94,97	86,89	116,91	67,73	64,01	3640
	Index				Samples				
	BMI	Skibinski	ЖІ	Serkina			Ryfeu	Shtangi	Ghen
				a	б	в			
390,83	33,8	53,11	59,1	42,3	55,2	5,31	59,4	43,9	

We studied groups of throwers 15–16 years whose length of the body is bigger compared with their peers not involved in physical activities (175,6 cm). Weight average– 67,53 kg.

Systematic physical training and sport contribute to the development of respiratory muscles and chest expansion. Thus, the average value of VC in throwers was 3640 ml (for young people trained range from 3 to 4,5 liters). Chest circumference (WGC) is at rest – 90,12 cm. Overall throwers anthropometric parameters within the model characteristics for trained people. HR as the most simple and informative indicator of the functional state of the cardiovascular system – 64,01 beats / min, indicating that heart learned to handle work more economical than their peers who are not involved in sports. But do not forget that the heart rate in athletes can significantly vary depending on lifestyle, food conditions and individual characteristics.

The second common method of cardiovascular system – blood pressure – 117/67 mm correspond to the normal values of blood pressure for healthy young people (–100–129 mm Hg for systolic, diastolic for – 60–79 mm).

To determine the distribution of weight per cm tall and definition of overweight was defined body weight code. In general, we can observe that the weight–height indicators are within normal limits children high school age (325–375 g in girls, boys 350–400 g. boys). The results of the Ruff'ye test were able to identify cardiovascular adaptation to exercise. Thus the average index of Ruff'ye at 5,31 points on the table that corresponds to the assessment index well.

Index by Skibinska is at the level of 33,8 and allows to characterize a functional condition of the respiratory and cardiovascular systems of an organism investigated on «well» (it agrees the classification techniques developed by the author).

On the basis of the data of a functional condition of breath and blood circulation (Serkina) obtained during the research we found out what groups of the throwers investigated by us, belongs to the category of the healthy trained people. The average value put (59,1sec–42, 3sec–55, 2sec). This indicator in investigated by us equaled – 53,1 ml/kg which is in limits of the average sizes characteristic for male, – to 60 ml/kg].

Our data on the quantities of breath duration (with 59,4 and 43,9 –the inspiration from – on exhalation) is higher than the performance characteristic of young people (40–55 s and 20–40 s on inhalation to an exhalation). However, these figures are within the ranges inherent athletes (60–90 c to inhale and exhale 40–60 s).

Conclusions and Perspectives for Further Research. The experimental materials presented in a research allowed to note that the program of training sessions in which static exercises and exercises with terasat were used to increase the level of power qualities, the efficiency of training process and improve sports result in a throwing. Results on all indicators increased from 8 to 23,66 %, as gives us the chance to claim about efficiency of the training program offered by us and to recommend its use in training process of throwers of the high school age.

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