

Effectiveness of Crossfit exercises introduction as the possibility to improve the level of physical readiness among senior schoolchildren at general education institutions

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Abstract: The article considers the use of “Crossfit” exercises system during physical culture lessons among senior schoolgirls in terms of educational program at general education institution. The author created the experimental content of the lessons on the basis of “Crossfit” exercises. It was distributed within a weekly load fulfillment using different variations of exercises. Owing to innovative technology of this “Crossfit” exercises system, used at physical culture lessons, the authors stated interest increase among senior schoolgirls in physical culture lessons. They proved valid increase of the following indices: the level of physical readiness, subjective indices of psycho-emotional state and in general health state improvement. The held research proves the expediency of “Crossfit” exercises system use at physical culture lessons among senior schoolgirls in comparison to classical variants of means used at general education schools.

1 Introduction

Nowadays one of important directions in the system of education is physical culture. The question of this sphere development is very urgent, as new time demands new conditions. Many means and methods, which were considered basic, nowadays lost their relevance and innovations in the sphere of physical upbringing can't be practically realized in obligatory school curriculum because of their insufficient content component and effectiveness of approaches at physical culture lessons. As a result secondary school age children gradually lose their interest in lessons, which leads to physical readiness level and general health state indices decrease [1; 2].

In this connection urgent became the need for effective ways of physical development among schoolchildren and the ways of their involvement into healthy life style. The opportunity of the need satisfaction is in modern physical exercises introduction into the system of physical upbringing in terms of school program.

According to the research works of some specialists [3-7], the practice of physical upbringing, fitness-industry and mass sport include different means, both with non-standard equipment (plastic bottles with water, sand bags, wall balls, speed skipping ropes and etc.) and with standard equipment (fitballs, medballs, expander, step-platforms, gymnastic sticks, stuffed balls, dumbbells, disks, skipping ropes of different length, rubber bands and others). The authors of these research works mention that physical loads with different kinds of equipment help to achieve higher indices of physical, functional readiness and general state improvement. Global progress in this sphere is achieved by means of new non-traditional motor activity means and health-improving systems creation. One of these means can be “Crossfit” (functional all-round competitions). It is defined as the system of training directed toward all physical qualities development- endurance, power, speed, flexibility and coordination [8].

The base of Crossfit form interval and circular methods of different orientation training: track and field, weightlifting, gymnastics, powerlifting and body-building. The exercises, offered by Crossfit program, can be classified into three groups:

- 1) Exercises with weight;
- 2) Exercises with own weight (gymnastics);
- 3) Exercises for cardiac muscle development (swimming, sprint and long-distance running, exercises at rowing training simulator and others) [9; 10].

The main peculiarity of the exercises, offered in Crossfit, is in maximal amount of muscles groups use simultaneously. The trainings in the structure of this system improve the work of musculoskeletal system, heart, vessels, respiratory and other systems of an organism [11; 12].

In the working hypothesis we supposed that the system of Crossfit exercises introduction into physical culture lessons among the 11th form schoolgirls would help to optimize the process of physical upbringing, increase the interest in a new direction, improve physical readiness and would have a positive influence on All-Russian physical-sports complex “Ready for Labor and Defense” (RLD) fulfillment.

2 Materials and methods

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16-17 year-old schoolgirls, who were the pupils of the 11th form at Lyceum № 12 (Khimki, Moscow region, Russia) took part in the research. 40 girls were divided into the experimental group (EG) and the control group (CG), each group included 20 people. As a result of the medical check-up each of the girls was included into the main medical health group. The identity of the groups was proved by physical indices. They were measured at the beginning of the experiment $p > 0,05$.

The experiment was carried out during 2018-2019 academic year in terms of physical culture educational program. It was created in accordance with the following: Federal State Educational Standards of general education [13; 14], physical culture lessons were held according to the schedule: in both groups 3 lessons a week were held, the duration of each lesson was 45 minutes.

In the control group lessons were held according to the traditional complex program of physical upbringing by V.I. Lyakh, A.A. Zdanevich for the 1st-11th forms [14].

The experimental program was presented on the basis of fitness-orientation “Crossfit”, but it didn’t contradict generally adopted program. It included different physical exercises with new techniques and variations, which help to fulfill the norms of RLD complex at a high level. For the lessons of this group we created special content. It provided weekly fulfillment of the definite load: the first lesson included the group of multi-structural exercises (M) (only cardio loads); the second lesson was combined and included the group of gymnastic exercises (G) and the exercises with weight (W) – “couplets”; the third lesson included “triplet” and “chipper” variations. It included the combination of three and more different movements, observing the structure (MGW), in particular long –term running, the exercises including different movements with own weight and motor actions. They include all kinds of deadlifts. As there were a lot of exercises of each type, we offered to combine (MM, WW, GG), table 1.

Table 1. Exercises and combinations of Crossfit system

Weekly plan		Variations of exercises and combinations
Day	Exercises and combinations	
Lesson 1. Cardio (M):	<ul style="list-style-type: none"> ➤ Double-Unders (M) – double jumps at speed skipping rope / Shuttle Run (M) 	<ul style="list-style-type: none"> ➤ Running (M) – steady running, sprint distances (200m.,400m.,800m.); ➤ Jumping Jack(M) - jumps, legs wider than shoulder length and simultaneously clap over the head; ➤ High Knees Running(M)
Lessons 2. «couplets» - Gymnastic exercises with own weight/ power oriented exercises with weight (GW) are combined:	<p>Combination (GW)</p> <ul style="list-style-type: none"> ➤ Box jump(G) –to jump on a gymnastic bench or other height / Wall ball(W) – throwing the ball 2,5-3m. height into the wall (from squat position the ball is in front of the chest with further legs straightening and ball throwing up into the wall). 	<p>Combination (GW)</p> <ul style="list-style-type: none"> ➤ Air Squat(G) – air squats /squats without weight / Kettlebell swing(W); ➤ Push-ups(G) / Ball slams (W) – medical ball throwing into the floor; ➤ Burpee(G) - crouch position – lying support-prone position – lift on hips - weight transfer on knees - crouch position – upward jump with a clap behind the head / Dumbbell Box Step Over (W) – step on a gymnastic bench or other height with dumbbells; ➤ Push-up(G) - / Overhead Dumbbell Squat(W); <p>Combination (WW)</p> <ul style="list-style-type: none"> ➤ Dumbbell Dead Lift (W); Dumbbell Clean(W) - taking dumbbells on chest; Dumbbell Snatch(W); Dumbbell Jerk(W).
Lessons 3. «triplets» - three movements are combined (MGW):	<p>Combination (MGW)</p> <ul style="list-style-type: none"> ➤ Running(M) -200 m sprint running / Burpee Medicine Ball Over (G) - Burpee through a medical ball / Goblet squat (W)-Squats with weight ahead of oneself / Dumbbell lunges forward (W) - deep lunges with weight. 	<p>Combination (MGW)</p> <ul style="list-style-type: none"> ➤ Running(M) - 400 m sprint running / Over Head Plate Lunges (W) / Sit up(G) – body lifting from prone position with bent knees with further body lift and floor touching or toes / Planka(G) - static hold.

The experimental program provided Crossfit system of exercises fulfillment at the end of the main part of physical culture lesson, before which general developing complex was fulfilled during the preparatory part of the lesson with cardio load (series of jumps with a skipping rope): simple jumps; two simple jumps – one high jump; double jumps, with interval method. The first part of the main part included detailed lessons topics fulfillment. It corresponded with the units of school program. The final part of the lesson included the following: exercises for statics, relaxation, stretching and respiratory exercises.

The process of physical culture lessons included the method of strict exercises regulation. It provided the set program, accurate dose of the loads and their dynamic variation during fulfillment, clear place and duration of rest intervals setting and controlling loads influence. The whole experimental Crossfit program corresponded with the level of pupils' readiness and was directed toward motor abilities and skills formation, physical qualities development, the level of working capacity increase.

3 Results and Discussion

We revealed that in both groups the structure of the lessons had a traditional form. The effectiveness of the created methodology was defined according to the level of physical qualities change: speed-power oriented (long jumps, shuttle running, 100 meters running, throwing); power endurance (body lifting from prone position), power endurance of the upper shoulder girdle muscles (dip up); general endurance (2000 meters running); flexibility (body bending forward from standing position) and subjective indices of emotional state of senior school girls from the experimental and control groups before and after physical culture lesson.

Table 2. The average indices of physical readiness comparison among senior school girls from the control and experimental groups at the end of the experiment

Physical readiness indices	Group		P
	Experimental n= 20	Control n=20	
	X ± σ	X ± σ	
Shuttle run 3x10,s	7,9±0,37	8,2±0,61	< 0,05
2000 m running, m	10,43±16,24	11,03±0,83	< 0,05
100 m running, s	16,45±0,65	16,9±0,58	
Long jump, cm	185,6±5,93	171,5±11,67	< 0,05
Dip up, quantity	16,9±2,69	12,2±2,86	< 0,05
500 gr weight throwing, m	20,95±2,39	17,4±2,39	< 0,05
Body lifting from back posture, times/min	46,2±2,5	40,4±3,73	< 0,05
Forward lean from standing position, cm	17,6±2,28	15,7±12,72	< 0,05

The comparative analysis of the control and experimental groups physical readiness received results shows that in all held tests for physical readiness the respondents from the experimental group had higher results, than the girls from the control group ($p < 0,05$), especially the difference in the average indices of the experimental group are seen in the exercises for power oriented endurance - dip up; speed-power oriented exercises- body lifting from the initial position, back position; long jump.

The effectiveness of physical culture lessons according to the created technology prove the results of emotional state subjective indices study among senior school girls. In order to estimate the influence of lessons on psycho-emotional state of senior school girls during different means use at "Physical culture" lessons we used HAM methodology (Health, Activity, Mood) [15]. It helps to estimate the state according to three aspects emotional-health, physical-activity and behavioral- mood. Senior school girls estimated their state according to 10 points system before the beginning of the lesson and at the end of the lesson during the whole experiment, table 3.

Table 3. The average subjective indices of senior school girls emotional state from the experimental and control groups before and after "Physical culture" lesson

Emotional state indices /(points)		Group		P
		Experimental n= 20	Control n= 20	
		X ± σ	X ± σ	
Health	Before lessons	6,83±0,69	6,96±0,64	>0,05
	After lessons	8,6±0,23	7,91±0,48	<0,05
	Increase	1,8	0,95	

Activity	Before lessons	5,53±0,67	5,97±0,68	>0,05
	After lessons	8,2±0,49	6,94±0,43	<0,05
	Increase	2,7	1	
Mood	Before lessons	6,67±0,67	6,42±0,63	>0,05
	After lessons	9,3±0,28	7,0±0,55	<0,05
	Increase	2,7	1,4	

As it is seen from the table of health, activity and mood subjective indices results after “Physical culture” lesson increased in both groups. However, in the experimental group in comparison with the control group the indices of the average self-assessment are higher and the validity of the differences achieve significant values ($P < 0,05$). Valid health, activity and mood indices increase in the experimental group helps to understand the expediency of “Crossfit” system exercises use at physical culture lessons with senior school girls.

Owing to innovative technology of this system of exercises it is reasonable to expect interest increase in physical culture lessons among senior school girls. Moreover, the system provides physical qualities development, the level of physical readiness increase, psycho-emotional state improvement and in general girls’ health state improvement. During systematic lessons with “Crossfit” exercises school-girls have motivation increase for physical-sports activity. It provides the level of knowledge increase concerning modern approaches to physical readiness organization and the skills of independent physical training improvement.

4 Conclusions

The process of physical upbringing development in general education school among senior school-girls on the basis of Crossfit not only motivates a personality to develop own physical qualities, motor abilities and skills, but also motivate a personality to satisfy the range of important socially important needs: desire to develop, knowledge and communication; positive emotions accumulation. They influence both general physical state and the motivation for further development; the definite aims achievement, during which important factors are volitional, moral and aesthetic characteristics of a personality development. One of the positive consequences of all mentioned above we can define considerable improvement of psycho-emotional state indices after physical culture lessons, the level of physical readiness increase; involvement into mass, school sport development in the country.

It is important to mention the influence of systematic physical trainings and loads as a preventive means against modern bad habits of young people (smoking, alcohol drinking and drugs use).

The model of physical exercises of Crossfit program can be recommended for physical culture lessons not only for senior school-girls, but also for boys and all for all secondary schools and higher educational establishments.

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