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Changes of level of physical fitness of handball players of 13–14 years old under the influence of acrobatic exercises and exercises with application of coordination ladder

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Purpose: *to develop sets of exercises for the improvement of physical training of handball players of 13–14 years old with use of acrobatic exercises and exercises with application of coordination ladder and to check their efficiency experimentally.*

Material & Methods: *two groups of handball players of 13–14 years old of Kharkov and Ternovka of the Dnepropetrovsk region participated in the research. The following methods were used in work: analysis of scientific and methodical literature, pedagogical testing, pedagogical experiment, methods of mathematical data processing.*

Results: *the level of physical fitness of handball players of 13–14 years old and its change under the influence of specially-selected sets of exercises are determined.*

Conclusions: *the received reliable positive changes of coordination preparedness, separate manifestations of speed, flexibility and high-speed and power abilities of boys allow recommending the inclusion of acrobatic exercises and exercises with application of coordination ladder in the educational-training process of handball players of 13–14 years old.*

Keywords: *physical fitness, handball players, acrobatic exercises, coordination ladder.*

Introduction

Many experts deal with issue of the increase in physical fitness of sportsmen: some study influence of the level of physical fitness on efficiency of the competitive activity [2; 18; 21], others point to the interrelation of physical and technical fitness of sportsmen [11; 12; 15] and so forth. The necessity of the search of new means of improvement of the process of physical training is traced in many works; therefore this problem remains urgent today.

Application of acrobatic exercises in the training process of sportsmen of many specializations becomes more popular and reasonable. So, for example, L. S. Lutsenko and I. A. Zinchenko (2010) emphasize the efficiency of use of acrobatic exercises by sportsmen for performance of technical activity in cheerleading. S. A. Rudenko, L. K. Rudenko (2008) note in the researches that it is possible to raise possibilities of system, balance of sportsmen, which is responsible for function by means of gymnastic and acrobats. N. Grabik (2007) used acrobatic exercises in the works as the mean of the development of coordination abilities of moguls. N. V. Lyulina, I. V. Vetrova (2008) used exercises on trampoline which basis included acrobatic exercises for the development of vestibular mechanism of sportsmen of freestyle. The developed technique of trampoline-acrobatic preparation of taekwondists by I. P. Kravtsevich (2006) improves the efficiency of the educational and training process, promotes the reliable improvement of group results in indicators of physical fitness and competitive activity. D. A. Zavyalov, A. N. Zaremba (2012) developed the matrix of use of acrobatic exercises by sambo-wrestlers which allowed to improve indicators of the development of dexterity and flexibility that well influenced the development of technique and promoted the increase in efficiency of the training process.

A. N. Shalayev (2008) notes that acrobatic exercises are one of the effective remedies of special training of sportsmen in volleyball. The author notes that with their help in those who are engaged speed, dexterity, determination and ability to be together, it is good to be guided in space, namely these qualities are necessary for volleyball players for fast assimilation of technique of a game. Similar provisions were expressed by S. V. Novozhilova, A. A. Melnikov (2010, 2011) who in the researches come to conclusion that use of elements of acrobatics in the educational-training process together with performance of technical elements in volleyball increases the general base of athletic ability of sportswomen, increases high-speed and power preparedness of working muscles and reduces psychological uncertainty before carrying out elements, promoting more effective implementation of technical elements of volleyball players. Yu. V. Parmuzina (2006) reached the increase in efficiency of the educational and training process at young football players, development of technical policy strokes and development of physical qualities by the systematic use of complexes of applied aerobics (set of exercises of gymnastics, acrobatics, sports). A. E. Chernenko, D. G. Serdyuk (2009) specify that application of exercises of acrobatic character allows to optimize the educational-training and competitive process at handball players. Ye. O. Nadezhdin (2004) used acrobatic exercises as means of the connected influence on the development of coordination and improvement of protective actions of handball goalkeepers of 16–17 years old.

Numerical researches emphasize the relevance of use of means of acrobatics in the course of physical and technical training of sportsmen in different types of sport, and just as traumatism prophylactic. Some scientists [7; 10; 13; 16] emphasize the positive influence of use of acrobatic exercises in the training process on the development of certain physical qualities, others note their influence on the process of the development of techniques and increase in efficiency of the competitive activity [11; 12; 15 and so forth], the third indicate the need their uses for study of safeguarding and reduction of traumatism of sportsmen [1; 8].

Recently, the increasing popularity in the training process of sportsmen is gained by exercises with application of coordination ladder. So, M. M. Srinivasan and Dr. Ch. VST. Saikumar (2012) reached the significant improvement of maneuverability of movements and use of techniques of badminton players, supplementing the classical program of trainings with classes with use of coordination ladder.

Communication of the research with scientific programs, plans, subjects

The research was conducted according to the subject of the plan of the RW of Kharkiv state academy of physical culture "Psycho-sensory regulation of motive activity of sportsmen of situational sports" (2016–2018).

The purpose of the research:

to develop sets of exercises for the improvement of physical training of handball players of 13–14 years old with use of acrobatic exercises and exercises with application of coordination ladder and to check experimentally their efficiency.

Research tasks:

1. To analyze scientifically-methodical sources concerning physical fitness of young handball players.

Changes of indicators of physical fitness of handball players of the experimental group after the pedagogical experiment (n=14)

Indicators of preparedness		Before the experiment	After the experiment	t	p
Test of Romberg (s)		21,37±0,69	27,16±0,57	6,47	≤0,05
Indicator of dynamic balance in exercise "walking on gymnastic bench with turns" (units)		72,61±5,58	100,09±3,08	4,32	≤0,05
Indicator of dynamic balance in exercise "walking on the line back forward" (units)		3587,44±147,53	3914,24±40,56	2,14	≤0,05
Mistake size at measuring off of size of the set piece (%)		9,03±1,35	5,85±0,62	2,13	≤0,05
Mistake size at assessment of size of the set piece (%)		8,21±1,22	5,44±0,49	2,11	≤0,05
Mistake at throwing of a handball ball on range on the set distance (m)	50% of the maximum indicator	2,00±0,60	1,45±0,17	0,89	≥0,05
	75% of the maximum indicator	1,20±0,21	0,75±0,11	1,87	≥0,05
Mistake at throwing of a handball ball on range on the set distance (m)	light	10,58±1,61	6,92±0,63	2,06	≤0,05
	sound	9,52±1,37	6,26±0,56	2,21	≤0,05
Difference of run of 30 m with run of 30 m with 5 turns (s)		1,76±0,09	1,51±0,08	2,14	≤0,05
Mobility in shoulder joints (sm)		30,93±1,74	35,14±1,02	2,08	≤0,05
Sagging of a back backward (%)		11,56±0,38	12,77±0,41	2,14	≤0,05
Trunk turn aside (sm)		35,21±0,46	36,50±0,26	2,41	≤0,05
Accelerations for a ball (s)		1,90±0,03	1,83±0,02	2,09	≤0,05
Running on the spot with hip lift for 10 s (quantity of times)		34,43±0,57	36,00±0,50	2,07	≤0,05
Speed of simple motive reaction to light (mls)		261,14±4,65	252,50±4,13	1,39	≥0,05
Speed of simple motive reaction to sound (ms)		451,57±15,23	436,93±14,64	0,69	≥0,05
Speed of reaction to the object that moves (mls)		200,21±5,07	185,43±5,10	2,055	≤0,05
Speed of reaction of the choice (mls)		412,21±7,92	389,07±7,27	2,15	≤0,05
Standing long-jump (sm)		189,8±2,86	197,14±2,53	1,91	≥0,05
Run of 30 m from high start (s)		5,22±0,05	5,13±0,04	1,39	≥0,05
Trunk raisings sitting from situation, lying on back for 30 s (quantity of times)		31,07±0,48	31,64±0,46	0,86	≥0,05
Bending and extension of hands in emphasis, lying 15 s (quantity of times)		7,71±0,30	8,07±0,20	0,99	≥0,05
Jump up from the place (sm)		31,79±1,13	33,50±0,69	1,30	≥0,05
Throwings of a handball ball on range by one hand from the place (m)		29,07±0,38	30,00±0,19	2,17	≤0,05

2. To determine the level of physical fitness of handball players of 13–14 years old.
3. To develop sets of exercises for the improvement of physical training of young men with use of acrobatic exercises and exercises with application of coordination ladder and to check experimentally their efficiency.

Material and Methods of the research

The following methods of research were used during the research: analysis of scientifically methodical literature, pedagogical testing (determination of level of coordination abilities, flexibility, speed, and high-speed and power abilities), pedagogical experiment, methods of mathematical statistics. Control exercises, which are used in the research, are recommended by the program of CYSS on handball [5; 6] and other authors [19]. The pedagogical experiment was under the construction with the assistance of two groups of young men of 13–14 years old on 14 persons in everyone: Kharkiv (experimental group) and Ternovka, the Dnipropetrovsk Region (control group). The defined by us directions of improvement of physical fitness of handball players near set of information, which is received from scientific and methodical literature, provided the bases to offer for use in the pedagogical experiment with the involvement of handball players of 13–14 years old such fixed assets: running and jump exercises, which are directed to the irritation of vestibular mechanism; jump exercises with use of coordination ladder, which are directed to the irritation of vestibular mechanism, and the maintenance of balance on one and two legs; acrobatic exercises.

The pedagogical experiment lasted 26 weeks during which 106 educational and training classes were given, according to standard requirements of the program of CYSS and that made the preparatory period of annual cycle of training of young handball players.

Results of the research and their discussion

The used by us selected sets of exercises in our pedagogical experiment brought to the reliable ($p \leq 0,05$) improvement of coordination abilities, flexibility and separate manifestations of speed of young men of 13–14 years of old years of the experimental group (tab).

The reliable improvement of static balance ($t=6,47$, at $p \leq 0,05$), orientation in space ($t=2,11–2,14$, at $p \leq 0,05$), accuracy of reconstruction of sentries ($t=2,06$; 2,21, at $p \leq 0,05$) and spatial ($t=2,11$; 2,13, at $p \leq 0,05$) parameters of movements at handball players of the experimental group due to application in the training process of acrobatic exercises has the confirmation in the researches of S. V. Novozhilova, 2010; Yu. V. Parmuzina, 2006 and so forth.

Indicators of mobility in backbone of handball players have got the statistical improvement for 10,5% and 3,6% under the influence of the experimental training program. These data have something in common with the data of Ye. O. Kozin (2008) who reached the reliable improvement of flexibility of backbone (for 56,3%) at children of the normosthenic type of constitution by introduction of technique of physical training of the senior preschool children on the basis of use of means of sports acrobatics. The percent of the reliable improvement of mobility of backbone is noticeably lower, which is received in our research, can be explained with age of handball players and obviously smaller orientation of the flexibility development exercises which are selected by us.

The reliable improvement of indicators of speed of motive reaction to the object, which moves (8%), and reactions with the choice (6%) that were received as a result of introduction in the training process of handball players of the experimental group of special acrobatic complexes, is described in methodical literature [3; 4]. Along with it, the reliable improvements tested the frequency of movements in run on the place with high hip lift (4,5%) and indicator of time of performance of acceleration for a ball (3,8%).

The improvement of indicators of high-speed and power abilities within 1,7–5,4% was observed after the pedagogical experiment at handball players of the experimental group, however the reliable changes were observed only as a result of the control exercise “throwing of a handball ball on range».

Changes in indicators of physical fitness of the control group which were observed after the pedagogical experiment, had no reliable character ($p \geq 0,05$).

Conclusions

1. The analysis of scientifically-methodical literature confirmed the relevance of the search of new ways of improvement of physical fitness of handball players and use during the educational-training classes of acrobatic exercises and exercises with application of coordination ladder.

2. The previous researches of physical fitness of handball players of 13–14 years old satisfied to norms for sportsmen of the stage of the previous basic preparation which are stated in the program of CYSS on handball.

3. Use in the training process of handball players of 13–14 years old of exercises with elements of acrobatics and with use of coordination ladder authentically improved condition of physical fitness of handball players: coordination preparedness of sportsmen improved (results of 8 control exercises with 10 experienced the reliable improvement ($p \leq 0,05–0,01$)), mobility in shoulder joints ($t=2,08$, at $p \leq 0,05$) and backbone ($t=2,14–2,41$, at $p \leq 0,05$), experienced positive changes result of throwing of a handball ball on range ($t=2,17$ at $p \leq 0,05$). Time of performance of acceleration for a ball was authentically reduced ($t=2,09$ at $p \leq 0,05$), quantity of cycles of movements in run on the place highly increased raising hips ($t=2,07$ at $p \leq 0,05$), reaction speed with the choice improved ($t=2,15$ at $p \leq 0,05$) and on the object which moves ($t=2,055$ at $p \leq 0,05$).

Prospects of the subsequent researches. The subsequent researches will be sent to the search for ways of the improvement of other parties of preparedness of handball players to competitions.

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