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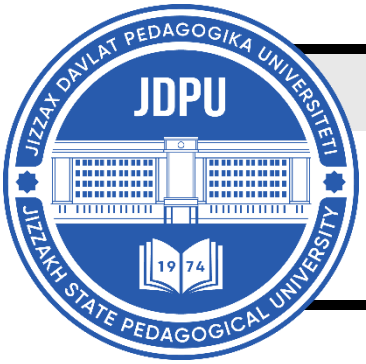

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EFFICIENCY OF IMPROVING THE PHYSICAL PREPARATION OF YOUNG HANDBALL PLAYERS

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ABOUT ARTICLE

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Abstract: This scientific work explores the development of physical qualities in young handball players aged 15–16. The research was conducted at the specialized sports school No. 2 in the Yakkasaray district of Tashkent. The main objective was to enhance athletes' physical fitness through the use of innovative pedagogical technologies. Over a six-month training period, significant improvements were observed in strength, speed, endurance, agility, coordination, and flexibility. Notably, the development of the non-dominant hand, overall endurance, and agility showed positive dynamics, demonstrating the effectiveness of

Introduction

Today, systematic efforts are being made to identify talented young athletes across all sports, thoroughly prepare them, and achieve high results. In particular, the level of physical preparation serves as the foundation for athletes' success. Handball is no exception. The physical preparation of young handball players is of significant importance in shaping their technical and tactical skills and ensuring consistent participation in competitions.

Properly managing the physical development of young athletes, maximizing their potential, and forming competitive teams are among the pressing issues facing modern sports science. Especially in team sports like handball, high levels of physical qualities such as precision of movements, endurance, speed, and coordination are considered critically important. Therefore, studying and improving the efficiency of enhancing the physical preparation of young handball players on a scientific basis is a relevant scientific-practical task.

Strength (muscle strength): Numerous studies emphasize that developing strength qualities in young athletes plays a significant role in improving the precision and effectiveness of technical movements in sports (A. N. Vorobyev, 2010; R. A. Pilyev, 2015). Particularly for handball players, developing the strength of arm and shoulder muscles is essential, as precise and powerful throwing is one of the core aspects of this sport.

Speed: Speed qualities—reaction speed, initiation of movements, and sprinting speed over short distances—are crucial for handball players in making quick decisions against opponents and changing positions. V. N. Platonov (2004) indicates in his works that speed qualities in young athletes develop rapidly between the ages of 10–14, but without proper training, these opportunities may not be fully realized.

Endurance: The ability to withstand high physical loads during a game requires general and specific endurance in handball players. Numerous studies (Maslov, 2009; Nosko, 2011)

substantiate the need to gradually strengthen the cardiovascular system during youth and enhance endurance through long-term training.

Agility: The rapid positional changes and deceptive movements in handball require a high level of agility. A. S. Bondarchuk (2012) emphasizes the need to develop agility through a comprehensive approach in training, which involves reaction speed, muscle elasticity, and coordinated movements.

Coordination: Coordinating movements—especially actions with the ball, dribbling, passing, and shooting—plays a significant role. Studies conducted by G. G. Natalov (2013) show that coordination qualities in young athletes develop effectively through complex movements.

Flexibility: The amplitude of movements is essential, particularly for injury prevention and the free execution of technical actions. Flexibility can be maximally developed during youth, as detailed in the studies of D. A. Donskoy (2007).

Analysis of the literature indicates that developing the physical qualities of young handball players is one of the primary tasks of sports training. By developing each quality comprehensively and with an age-appropriate approach, the overall preparation level of athletes can be enhanced. This, in turn, helps them achieve consistent and high results in competitions.

Research Objective: To develop and monitor the physical qualities of young handball players using innovative technologies.

Research Tasks: To achieve the research objective, we identified the following tasks:

1. Study and analyze the theoretical aspects of scientific articles, literature, and researchers' studies related to the chosen topic.
2. Clearly define the research object, experimental, and control groups for conducting the study.
3. Assess the physical preparation of young handball players through tests.
4. Introduce and apply pedagogical technologies to develop the physical preparation of young handball players in training.

5. Summarize the work conducted during the study, draw conclusions, and provide practical recommendations based on the research results.

Research Object: The No. 2 Specialized Children's and Youth Sports School (BO'SM) for handball in the Yakkasaray district of Tashkent city was selected as the research object. Twelve 15-16-year-old handball players from the initial preparation stage of this BO'SM were chosen, and their physical preparation was monitored over six months.

Materials and methods

To address the tasks outlined above, the following scientific research methods were utilized:

1. The method of studying scientific literature.
2. The method of adopting test standards.
3. The method of mathematical statistics.

Results and discussion

Comparison of the average test results determining the improvement of physical qualities in young handball players

Table 2

Names of indicators	**At the beginning of the research**			**At the end of the research**	
	$\dot{X} \pm \sigma$		***V*, %**	**$\dot{X} \pm \sigma$**	***V*, %**
30-meter run (*seconds*)	4,9 ± 0,26		5,3%	4,6 ± 0,22	4,7%
Triple jump, cm	692,9 ±27,6		3,9%	750,4 ± 21,7	2,8%
Throwing a 700-gram ball, meters	Right hand	21,5±1,7	7,9%	25,2 ± 1,3	5,1%
	Left hand	10,5±1,3	12,3%	14 ± 1	7,1%

	Both hand	7,9 ± 1,4	17,7%	10 ± 1	10%
Shuttle run, 88-90 meters	26,4 ± 1,5		5,6%	23,9 ± 0,79	3,3%
6-minute Cooper test, meters	2288,2 ± 111		4,8%	2568,8 ± 79,5	3,0%

In sports practice, the variability of measurement results is evaluated based on the value of the coefficient of variation as follows:

- 0 ÷ 10%: small;
- 11 ÷ 20%: medium;
- V > 20%: large.

Conclusion

To develop the physical qualities of young handball players and enable them to quickly and accurately perform motor tasks, they need strength, speed, endurance, agility, flexibility, and strong willpower. By studying literature and scientific articles and analyzing the training process, the following conclusion can be drawn: the use of pedagogical technologies in training programs has been observed to gradually decline.

The results of a six-month pedagogical study conducted on 15–16-year-old handball players fully addressed the objectives and tasks set by the research topic. Specifically, at the initial training stage, conducting sessions using innovative technologies to enhance the physical preparation of young handball players was found to have a significant impact on improving their physical qualities and effectively shaping these attributes.

The results of experimental studies evaluating the physical preparation of young handball players indicate that the targeted training system implemented led to significant improvements in all key physical qualities. Notably, the speed quality, as measured by the 30-meter run, improved from 4.9 seconds to 4.6 seconds, demonstrating enhanced reaction speed

and movement dynamics. This is particularly crucial in handball, where high-speed decision-making and rapid positional changes are required. The triple jump result improved from 692.9 cm to 750.4 cm, indicating increased explosive power and efficiency in lower body muscle movements. This is vital for quick movements with the ball and deceptive maneuvers against opponents. The 700-gram ball throwing tests, performed with the right, left, and both hands, showed comprehensive development of arm muscle strength. In particular, the reduction in variance from 12.3% to 7.1% for the left (non-dominant) hand indicates its increased activation. This signifies the formation of skills to play effectively with both hands, which is a significant advantage in handball. Improvements in shuttle run results reflect enhanced adaptability to sharp directional changes over short distances and increased agility in handball players. As handball is a sport requiring high agility, these results demonstrate the development of movements essential for the game. The Cooper test results indicate an increase in overall aerobic endurance, with the distance covered rising from 2,288 meters to 2,568 meters, reflecting adaptations in the cardiovascular and respiratory systems, which are necessary for sustained high-intensity games.

Overall, these results demonstrate the comprehensive physical development of young athletes. Each physical quality has improved in harmony, enabling them to effectively master technical and tactical training at a professional level. In particular, the increased strength of the non-dominant hand, improved overall endurance, and positive dynamics in agility create a foundation for young athletes to be competitive in future stages. Thus, the proposed training system has proven highly effective in comprehensively developing the physical qualities of young handball players, as evidenced by practical results. This contributes significantly to methodological advancements in future coaching practices.

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№	S.F.P	30 m running, s		Leap three times sm		Throwing a ball weighing 700 grams, m						Shuttle run, 88-90m second		12 -minute Cooper test, m	
						Right hand		Left hand		Both hand					
		t/o	t/k	t/o	t/k	t/o	t/k	t/o	t/k	t/o	t/k	t/o	t/k	t/o	t/k
1	A-v U	4,7	4,6	660	715	22	25	10	13	8	10	25	23	2350	2495
2	M-v D	4,9	4,7	650	705	20	24	9	12	7	9	27	24	2250	2479
3	S-v D	5,1	4,8	720	765	23	26	11	15	9	11	29	25	2425	2655
4	B-v M	5,0	4,5	680	755	21	25	10	14	6	9	26	24	2356	2595
5	B-v D	5,3	4,9	710	760	24	27	12	15	8	10	29	25	2278	2535
6	I-v M	4,8	4,4	670	735	19	23	13	15	9	11	25	23	2190	2490
7	K-v Sh	5,2	4,8	705	760	21	26	11	14	5	8	27	24	2325	2645
8	R-v M	5,4	4,9	695	745	22	25	10	14	7	10	28	25	2025	2435
9	R-v I	4,9	4,5	725	770	20	24	12	15	8	10	25	23	2245	2565
10	S-v M	4,6	4,3	740	775	23	27	11	15	9	11	26	24	2365	2645
11	E-v M	4,8	4,6	675	755	19	24	8	13	10	11	25	24	2235	2647
12	Q-v I	4,6	4,2	685	765	24	27	10	14	9	11	25	23	2415	2640
X		**4,9**	**4,6**	**692,9**	**750,4**	**21,5**	**25,2**	**10,5**	**14,0**	**7,9**	**10,0**	**26,4**	**23,9**	**2288,2**	**2568,8**
difference %		**3**		**57,5**		**3,7**		**3,5**		**2,1**		**2,5**		**280,6**	

Test results determining the improvement of physical qualities in young handball players

Table 1

Note: t/o before the study, t/k after the research