Improving the specific physical fitness of young futsal players

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Abstract

This article presents the findings from an assessment of the specific physical fitness of young futsal players during their training process. This data is vital for improving the quality of training for young futsal players, identifying existing errors and shortcomings, and developing measures to eliminate them.

Keywords: football, sports, specific endurance, repetitions, seconds, meters, experiment.

Introduction

Globally, targeted player development, training planning, and the cultivation of specific physical attributes are becoming increasingly important in training highly skilled football players. This is driven by the continuously rising standards of players' physical fitness, which in turn expands their range of actions on the pitch. The ability to plan and monitor athletes' motor activity at various stages of preparation, based on their physical development and fitness levels, is drawing the attention of international experts. Developing physical attributes is a key factor in achieving high performance in football; therefore, enhancing players' endurance to help them reach their peak athletic potential and deliver top results is of paramount importance.

In global football, extensive research is currently underway to examine the technical and tactical development of young athletes, with a particular focus on improving the physical, psychological, and functional performance of futsal players. Drawing on decades of accumulated theoretical and practical experience in the sport, researchers are actively implementing and evaluating comprehensive training methodologies that incorporate non-traditional tools, alongside mechanisms for monitoring their effectiveness. Furthermore, enhancing players' physical fitness by prioritizing endurance development during various stages of the preparatory period, as well as continuously refining training tools and methods, remains essential. Consequently, there is a growing need for further empirical studies to address these challenges.

In the national training process for futsal players, the ages of 16 and 17 represent a transition from youth to adult competition. During this period, the physical development of many players tends to plateau, making it difficult for them to adapt to the demands placed on elite athletes. Consequently, specialists working with players at the stage of athletic perfection currently face a dilemma. On the one hand, there is a need to progressively increase the volume of training exercises aimed at enhancing specialized physical fitness. On the other hand, there is a shortage of well-developed, scientifically grounded training programs designed to improve overall physical fitness, particularly the specialized physical conditioning of 16- to 17-year-old futsal players.

Current state of research on the problem.

Local scholars such as *I.A. Koshbakhtiyev, O.L. Erdonov, D.K. Ismagilov, D.B. Shaymardonov, A.A. Artikov*, and others have explored the physical fitness of futsal players, as well as general and other types of training in their studies. While their research has focused on improving and increasing the effectiveness of training sessions for players across various age groups, information regarding the physical fitness of 16–17-year-old futsal players—specifically their special endurance and its development—has not been fully addressed. This highlights the relevance of the issue of developing and enhancing the level of special endurance in futsal players.

In the scientific literature, the methodology and techniques for training futsal players and their refinement, as well as the optimization of player training, have been studied by CIS specialists, including *E. Aliyev, O.S. Andreyev, A.E. Babkin, V.N. Kalintsev, D.M. Konurov, A.V. Orlov, and V.S. Levin. However,* the issue of using modern technologies to develop and improve the

endurance of young players, specifically 16–17-year-old futsal players, has not been fully explored. Foreign scholars such as J. Bangsbo, J.G. Pereira, V. Correia, and B. Peitersen have provided comprehensive data on developing football players' endurance. Nevertheless, there is insufficient research providing a complete scientific rationale for this issue among the cohort of 16–17-year-old futsal players.

Aim of the study: To enhance and scientifically substantiate the special physical fitness of young futsal players by developing their endurance through the use of innovative technologies.

Objectives of the study:

to develop a set of high-intensity exercises to improve the special physical fitness of futsal players;

to develop a set of tools that simulate game situations by increasing the special endurance of young futsal players;

The object of the study is the training process of the “Dinamo” and “Nasaf” futsal teams.

Results and discussion

Essentially, six tests were selected. These tests are: the “Yo-Yo” test and the 7×50 shuttle run test aimed at assessing speed endurance; the 30-second squat jump test to evaluate strength endurance; the long jump and vertical jump tests aimed at assessing explosive power; the 5×20-meter dribbling test; the long-distance kicking test (evaluating both the right and left feet); and the herringbone dribbling test.

Thus, the results of these specific tests were recorded across all four teams and are presented as follows. The OKMK team's average result in the Yo-Yo test was 1,150 meters, while they clocked 64.4 seconds in the 7×50 shuttle run test. In the remaining tests, the team recorded 23 repetitions in strength endurance, 241 centimeters in the long jump, 53 centimeters in the vertical jump, 24 seconds in the 5×20 dribbling test, two points with the right foot and one point with the left foot in long-distance kicking, and 31 seconds in the herringbone dribbling test. As for the Nasaf team, it was found that they achieved 1,140 meters in the Yo -Yo test, 62.9 seconds in the 7×50-meter run, 23 repetitions in the strength endurance test, 244 centimeters in the long jump, 52 centimeters in the vertical jump, and a time of 21 seconds in the 5×20-meter dribbling test.

In the long-range kicking test, the scores were 2 points for the right foot and 1 point for the left foot. A time of 34 seconds was recorded in the zigzag dribbling test. Turning to the results of the Dinamo team, which was selected as the main experimental group, the team achieved the following results: 1,120 meters in the "Yo-Yo" test, 62.7 seconds in the 7×50 shuttle run test, 21 repetitions in strength endurance, 234 centimeters in the long jump, 53 centimeters in the high jump, 25 seconds in the 5×20-meter dribbling test, 1 point (with the

Fig 1. Pre-experiment assessment results for the special physical fitness level of mini-football players

Special physical training	Speed endurance (seconds)		Strength endurance (reps)	Explosive strength (cm)		5×20 m shuttle run with the ball (seconds)	Long-distance kick (m)		Herringbone run with the ball (seconds)
Teams	Yo-Yo test	7×50	30-second squat jumps	Long jump	High jump		right	left	
AGMK	1150	64,4	23	241	53	24	2	1	31
Nasaf	1140	62,9	23	244	52	21	2	1	34
Dinamo	1120	62,7	21	234	53	25	1	0	33
Metallurg	1180	63,5	22	246	56	22	1	1	30

Notes: *The “Yo-Yo” Intermittent recovery test is used to assess soccer players’ repeated high-intensity and aerobic fitness.*

Table 2. Proposed annual training hours for futsal players

No.	Content	16 years old		17 years old	
		Current	Actual	Current	Actual
1	Theoretical training	75	73	105	100
2	General physical training	125	130	128	130
3	Special physical training	190	200	280	300
4	Technical training	297	290	300	289
5	Tactical training	294	294	408	408
6	Training games	70	70	74	74
7	Exhibition and competitive games	70	70	84	84
8	Coaching and refereeing	26	20	32	26
9	Fitness testing	16	16	16	16
10	Recovery methods	50	50	100	100
	Total	1213	1213	1527	1527

Notes: *The content has been optimized without exceeding the total annual hours.*

right foot) and 0 points with the left foot in the long-range kicking test, and 33 seconds in the zigzag dribbling test.

In particular, the Metallurg team achieved the highest score in the modern "Yo-Yo" test, covering 1,180 meters. In the 7×50 shuttle run test, the Dynamo team recorded the best result with a time of 62.7. However, in the strength endurance test—performing squat jumps for 30 seconds—the Dynamo team posted the lowest result at 21 repetitions, a shortcoming that was also evident in the long jump test. Furthermore, while the lowest performance in the long-distance kick was recorded with a score of just one point, both the Nasaf and Dynamo teams also showed very poor results in the herring-bone dribble test. Overall, the preliminary testing of special physical fitness levels revealed the specific strengths and weaknesses of all the teams.

As is well known, the scarcity of scientific literature and methodological guidelines on training young futsal players makes it necessary to precisely determine the time allocation (in minutes) for planning training sessions and, accordingly, to refine the time distribution within the new annual curriculum. We have refined the time allocation of the annual curriculum specifically for 16–17-year-old players. In particular, the annual time allocations (in minutes) have been developed and refined for theoretical training, general physical conditioning, special physical conditioning, technical training, tactical training, practice matches, exhibition and competitive matches, coaching and refereeing practice, performance assessment standards, and recovery measures.

Here, the distribution was broken down by age group for 16- and 17-year-olds. Specifically, for theoretical training, a workload of 73 minutes was recorded for 16-year-olds, while 100 minutes were allocated for 17-year-olds. The time allocated to general physical training was 130 minutes for both 16- and 17-year-olds. The volume of specialized physical training amounted to 200 minutes for 16-year-olds and 300 minutes for 17-year-olds.

For technical training, 297 minutes were allocated for 16-year-olds and 300 minutes for 17-year-olds. While 70 minutes were allocated for practice matches for 16-year-olds, this was set at 74 minutes for 17-year-olds. Exhibition and competitive matches were distributed at 70 minutes for 16-year-olds and 74 minutes for 17-year-olds. The time designated for instructing and refereeing practice was set at 26 minutes for 16-year-olds and 32 minutes for 17-year-olds. Furthermore, 16 minutes were allocated to each group for passing performance standards. Recovery activities accounted for 50 minutes among 16-year-olds and 100 minutes among 17 -year-olds. The overall total time amounted to 1,226 minutes for 16-year-olds and 1,544 minutes for 17-year-olds. In this manner, the standardization of workloads and the distribution across control and training types were established.

This took into account several factors: the number of training sessions is lower compared to that of professional football players, the sessions are organized based on standards set for the sports perfection stage, training takes place

Table 3. Results of assessing the special physical fitness level of futsal players after the experiment

Teams	Yo-Yo	7×50	30-second half-squat jumps	Standing long jump	Vertical jump	5×20 running with the ball	Long-distance kicking		Zigzag dribbling
							Right	Left	
AGMK	1040	62,1	24	242	54	23	2	2	30
Growth %	0	3,5	4,1	0,4	1,8	4,1	0	50%	3,2
Nasaf	1220	62,1	26	249	56	20	2	20	32
Growth %	6,5	1,2	11,5	2,4	7,1	4,7	0	50,0	5,8
Dinamo	1320	61,7	26	248	57	22	3	1	29
Growth %	15,1	—	19,2	4,0	7,0	12,0	66,6	100	12,0
Metallurg	1180	63,8	24	248	57	21	2	1	28
Growth %	0	–0,4	8,3	0,8	1,7	4,5	5,0%	0	4,2

once a day, and both the duration and variety of competitions are limited. In the improved annual training program, the time allocated to specialized physical training for 16-year-old futsal players was increased from 190 to 200 hours, and for 17-year-old players from 280 to 300 hours. This represents 10 and 20 hours of additional training time, respectively. These changes allow for a greater focus on developing young players' special endurance, speed-strength abilities, and capacity to repeatedly perform high-intensity movements during a match. At the same time, setting the time allocated for recovery activities at 50 hours for 16-year-olds and 100 hours for 17-year-olds helps in planning post-training recovery processes.
Overall, increasing the volume of specialized physical conditioning in the program and purposefully allocating time across different types of training creates a methodological foundation for improving the training process.

Drawing conclusions from the results of the follow-up tests assessing general physical fitness, it became evident that the greatest improvement occurred in the Dinamo team—selected as an experimental group—which showed an average performance change of 22%. In contrast, the changes in results for the Metallurg and AGMK teams proved to be mathematically and statistically insignificant. Meanwhile, the Nasaf team, which served as the second experimental group, demonstrated an average growth rate of approximately 11%. This indicates that applying general physical conditioning methods in an optimized volume yielded positive results.

This section analyzes the re-obtained results to determine the special physical fitness level of futsal players. In this regard, the OKMK team covered a distance of 1,040 meters in the "Yo-Yo" test, leaving this indicator unchanged, while in the 7×50 shuttle run test, they recorded 62.1 seconds, showing a 3.5% improvement. It should be specially noted that a 4.1% increase was observed in the 30-second squat jump test, along with improvements of 0.4% in the long jump, 1.8% in the high jump, and 4.1% in the 5×20-meter ball dribbling test, while effective actions with the left foot were recorded at 50%.

The results for the Nasaf team showed a relative increase of 6.5% in the "Yo-Yo" test, 11.5% in strength-endurance, 2.4% in the long jump, 7.1% in the high jump, 4.7% in the 5×20-meter sprint, and 50% in the left-footed kick. For the Dinamo team, which served as the main experimental group, the experiment revealed an increase of 15% in the first test (the "Yo-Yo" test), 16% in the 7×50 shuttle run test, 19.2% in strength-endurance, 4% in the long jump, 7% in the high jump, 12% in the 5×20-meter ball dribble, 66% in the right-footed kick, and 100% in the left-footed kick.

In the Metallurg team, no change was observed in the initial test, namely the "Yo-Yo" test. A decrease of -0.4% was observed in the 7×50 shuttle run test. Additionally, changes were recorded at 8.3% in strength-endurance, 0.8% in the long jump, 1.7% in the high jump, -4.5% in the 5×20-meter run, and 5% in the long-distance kick. This team was selected as the second experimental group, and the overall figure was found to be around 11%. This demonstrates that applying an optimized volume of general physical training exercises yielded a positive effect on performance indicators.

Regarding special physical fitness, it was found that the results of the Dinamo team,

which served as the experimental group, improved rapidly compared to their baseline performance, while the Nasaf team also showed a slight improvement in these indicators. This demonstrated the effectiveness of the methods aimed at enhancing special physical fitness and confirmed the validity of the work conducted with the experimental group.

Conclusion

Based on the findings of the study aimed at developing the special physical fitness of young futsal players, the following conclusions were drawn.

Throughout the study, particular attention was paid to assessing the special physical fitness levels of 16- to 17-year-old futsal players, evaluating existing shortcomings, and developing effective ways to improve the training process. Initial test results revealed variations in the physical fitness indicators among the players from the OKMK, Nasaf, Dinamo, and Metallurg teams. Specifically, areas requiring improvement were identified in speed endurance, strength endurance, speed-strength abilities, dribbling speed, and shooting efficiency.

To assess specific physical fitness, several tests were utilized: the Yo-Yo test, a 7×50-meter shuttle run, 30-second vertical jumps from a half-squat position, long and high jumps, a 5×20-meter dribble, right- and left-footed shooting, and a herringbone agility dribble. These tests allowed for a comprehensive evaluation of the players' endurance, speed-strength, motor coordination, and the effectiveness of their ball-specific skills.

The results obtained at the end of the experiment revealed several significant positive changes within the Dynamo team. Specifically, the Yo-Yo test results increased from 1,120 meters to 1,320 meters, representing an improvement of approximately 17.9 percent. The 7×50-meter shuttle run time decreased from 62.7 seconds to 61.7 seconds. Strength endurance improved from 21 to 26 repetitions, the long jump increased from 234 to 248 centimeters, and the high jump rose from 53 to 57 centimeters. Additionally, the 5×20-meter dribble time dropped from 25 seconds to 22 seconds. These outcomes can be viewed as positive improvements that demonstrate the effectiveness of the training methods applied to the experimental group.

Overall, the findings of the study demonstrated that optimizing the annual training program, systematically applying exercises targeted at specific endurance, and utilizing modern monitoring tools are crucial for improving the specific physical fitness of 16–17-year-old futsal players. Although the positive changes observed in the Dynamo team indicate that the proposed approach is promising, rigorously substantiating its effectiveness from a scientific standpoint requires comparing the baseline and final results across all teams using uniform criteria, as well as conducting a mathematical and statistical analysis.

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