STUDY OF PHYSICAL DEVELOPMENT OF STUDENTS IN RURAL SCHOOLS DURING THE PREPUBERTAL AGE PERIOD

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Abstract

The article presents the results of a pedagogical study on the physical development of young athletes in the school education system at the early stage of their sports improvement.

Keywords: physical status, monitoring, focused methodology, young athletes, improvement, sensitive age period.

The aim of the pedagogical research was directed at improving the school system of physical education through conducting a monitoring pedagogical analysis of the continuity of physical development parameters of students aged 12-14 in rural schools over the course of their school years. Anthropometric characteristics were tested, including height, body mass, chest circumference, vital lung capacity, and dynamometric characteristics.

Numerous experimental studies have shown that the accelerated development of motor functions in the younger generation covers various ethnic groups and is not influenced by hereditary factors or regional features.

The widespread phenomenon of accelerative traits in height and weight characteristics of the younger generation has been studied by many domestic and foreign researchers. The issue of physical development, with its correlation to the motor readiness of students, demands pedagogical corrections in the level of physical preparedness of modern youth. This, of course, should be reflected in the improvement of normative indicators in the school physical education system.

The analysis of the results of testing the somatometric characteristics of students in rural schools showed that at the age of 12, the average height was 143 ± 5.0 cm. Sixth-grade students outpaced fifth-graders in height by 5 cm (6.64%) (t=7.14), with an average height of 148 ± 6.0 cm. By the age of 14, the increase in height was 9 cm (2.55%) (t=2.85), with an average height of 157 ± 5.0 cm. Comparing the height characteristics between students in 6th and 7th grades showed a difference of 14 cm (8.92%), with the most significant growth observed between the ages of 13 and 14, followed by a slowdown in growth during this prepubertal period. (Table 1)

Table 1

Experimental Indicators of Physical Development of Adolescent Boys in Middle School, Studying in Rural Schools

Indicators	Classes of middle school age									
	5-Class n=142		6-Class n=136		Difference %	t	7-Class n=138		Difference %	t
	X	σ	X	σ			X	σ		
Body length, cm	143	5.0	148	6.0	6,64	7,1	157	5.0	2,55	2,8
Body mass, kg	36.4	4.5	39.1	3.5	6,91	3,4	42.7	4.3	6,44	2,1
Chest circumference, cm	70.8	5.7	73.7	4.2	5,94	2,4	76.9	6.1	4,17	2,6
Vital capacity (VC), ml	1800	30	1900	30	5,27	2,0	2100	20	8,41	3,8
Dynamometry, kg	22.5	4.4	25.3	4.5	8,07	2,3	29.5	4.1	4,24	2,7
Maximum strength, kg	37.2	4.2	39.4	3.7	5,59	2,2	42.2	5.1	7,85	4,8

Progressive Increase in Weight Characteristics by School Year

Similar progressive increases were observed when analyzing weight characteristics by school year. Thus, the 5th-grade students had an average body weight of 36.4±4.5 kg, while the 6th-grade students surpassed them by an average of 2.7 kg (6.91%) (t=3.48). By the age of 14, 7th-grade students showed a significant increase in body weight, reaching an average of 42.7±4.3 kg, with a difference of 3.6 kg (8.44%) (t=2.13). It should be noted that in the two-year period, the difference in weight characteristics amounted to 6.3 kg (14.76%), which confirms the findings of many researchers studying similar age groups of students. Consequently, this fact is associated with a decrease in their motor potential.

Respiratory Indicators

Evaluating respiratory indicators from the chest circumference test, the average result for 12-year-olds was 70.8±5.7 cm. The 6th-grade students showed a value of 73.7±4.2 cm, exceeding the 12-year-olds by 2.9 cm (5.94%) (t=2.41). The chest circumference for 14-year-olds was 76.9±6.1 cm, exceeding the result of 13-year-olds by 3.2 cm (4.17%) (t=2.66). This clearly demonstrates the positive and progressive dynamics of the development of external respiratory function in middle school-aged children.

Vital Lung Capacity (VLC)

A similar pattern was observed in the test of external respiratory function for students in 5th grade regarding Vital Lung Capacity (VLC). The average result for 12-year-olds was 1800±30 ml. For 13-year-olds, the VLC was 1900±30 ml, a difference of 100 ml (5.27%) (t=2.41). Students in 7th grade at the age of 14 had an average VLC of 2100±20 ml, surpassing 6th graders by 400 ml (3.87%) (t=3.87). It is important to note that no significant differences were found in this physiological test, and the results are within physiological norms.

Strength Indicators

The evaluation of grip strength through hand dynamometry revealed that the average result for 5th-grade students was 22.5±4.4 kg. 6th-grade students showed a higher result of 25.3±4.5 kg, exceeding the 5th graders by 11.07% (t=2.33). 7th-grade students had a significant strength advantage over 12- and 13-year-old students, with an average result of 29.5±4.1 kg, a statistically significant progressive difference of 4.2 kg (16.6%) (t=2.72). This statistical fact supports the idea of increasing the volume and intensity of strength exercises in physical education lessons for 14-year-old students.

Deadlift Strength

Another test, deadlift strength, which is of significant importance when performing strength exercises, showed that for 5th-grade students, the average result was 37.2±4.2 kg. 6th-grade students surpassed them with an average result of 39.4±3.7 kg, exceeding the 5th graders by 2.2 kg (5.59%) (t=2.20). By the age of 14, the 7th-grade students showed a significant increase in deadlift strength, reaching 42.2±5.1 kg, a difference of 10.8% (t=9.87).

Analysis of Anthropometric Indicators

An analysis of the anthropometric indicators of middle school students in rural schools revealed a non-significant increase in the studied parameters ($p>0.001$). This suggests that the traditional system of physical education may need improvement, considering the shortcomings identified in sociological studies.

Complex Research Aimed at Identifying the Relationship Between Physical Development and Motor Fitness Level of Young Basketball Players at the Preparation Stage for Important Competitions

The goal of the complex research was to determine the relationship between physical development and the motor fitness level of young basketball players at the stage of preparation for important competitions. In this regard, during the formative pedagogical experiment, the effectiveness of selected means and methods of physical education aimed at enhancing the physical fitness of young basketball players was determined.

Monitoring Research During Pedagogical Testing of Physical Abilities

Monitoring research during the pedagogical testing of physical abilities for young athletes specializing in track and field, based on specially selected physical exercises, characterized the level of development of basic motor qualities aimed at assessing their physical status. The testing battery included a complex set of exercises that allowed for determining the level of physical fitness development and dynamics in speed, strength, endurance, and speed-strength abilities, considering the specifics of track and field sports. For example, when assessing the level of speed-strength abilities, exercises like long jumps and vertical jumps were proposed, and speed and coordination were determined based on shuttle run results.

Methodological Foundation of Comprehensive Control

The methodological foundation of the comprehensive control includes:

- Correct selection of tests and their compliance with statistical criteria for reliability, objectivity, and informativeness;
- Determining the optimal volume of indicators for evaluating the functional state and level of athlete preparedness, their sufficiency, and the standardization of conditions and sources of information;
- Compliance of control methods with the testing objectives.

Analysis of Pedagogical Testing Results

Analysis of the pedagogical testing results revealed that the dynamics of the technical preparedness of young basketball players showed significant progress in ball handling (zig-zag drill) and movement within the 6x5 meter area, indicating the development of speed and coordination. Statistically significant differences in the number of successful free throws and expert evaluations of game activity were not found in the experimental group.

Informative Criterion of Effectiveness

An informative criterion reflecting the effectiveness of the applied methodology is the rate of improvement in speed and coordination, determined by the results of the 90-meter shuttle run, with an average improvement of 20.2% and a range of variation from 21% to 38%.

Expert Evaluation Method for Assessing Potential of Young Basketball Players

To check the effectiveness of the comprehensive evaluation of young basketball players' prospects, the expert evaluation method was used. This method allowed for studying the dynamics of indicators related to technical and tactical skills and game activity. In the context of competitive activity, experts assessed indicators that characterize the technical preparation of the players: off-ball movement; passing technique; dribbling technique; shooting technique; and reaction to the game situation.

Monitoring Analysis and Adjustments

Monitoring analysis allowed for adjusting the content and focus of individual lessons and intermediate comparisons with the initial results. At the end of the experiment, it was found that the expert evaluation of young basketball players' game activity increased by 23.8%.

Experts identified an advantage in the young basketball players' tactical thinking, their ability to accurately execute relatively complex motor tasks, and quickly adjust their actions based on changes in the game situation.

Summary of Results

In summary, the results of the pedagogical experiment revealed that with a rationally organized motor regime for young basketball players in the prepubertal age period (from 11 to 12 years old), there is a progressive development of both general and specific physical qualities. This development is accompanied by the acquisition of new motor skills, which contribute to achieving high sports results.

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