

## Effect of badminton on physical performance

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### Abstract:

At present, physical performance is most widely studied in sports practice and is of undoubted interest for experts in both biomedicine and sports training (Cherepov, E., Khafizova A., Aminov A, Cherepova I., 2017). Athlete's physical performance is the most important aspect of fitness that depends on the morphological and functional status of the body. The level of development of physical qualities and functional systems that directly affect the result in any sport is reflected in the indicators of physical performance. Physical performance is expressed by the amount of work that is performed at a particular heart rate (Stovba, I.R., Stolyarova, N.V., Petrozhak, O.L., 2018).

The article provides a comparative analysis of the physical performance indicators in badminton players and their peers who are not involved in sports. 10 badminton players aged from 17 to 19 years and their peers (n=10) were examined. An increase in the level of physical performance among badminton players was revealed, which correlated with the growth of sportsmanship.

**Keywords:** badminton players, students, physical performance, physical qualities, Ruffier test.

### Introduction.

Physical performance is an expression of human life inspired by movements. It manifests itself in various forms of muscle activity and depends on a person's ability and motivation for professional success.

Badminton is one of the three most challenging competitive sports and is also considered the fastest racquet sport. This game provides a general technology for physical exercises, creates a set of motor skills, as well as the necessary physical and psychological fitness for faster and more successful mastery of knowledge based on precise motor skills (Lepeshkin, V.A., 2007; Shcherbakov, A.V., 2010; Yarmak, O., Blagii, O., Palichuk, Y., Hakman, A., Balatska, L., Moroz, O., Galan, Y., 2018). Badminton is a new direction in physical education of students. Its introduction to physical education classes at universities can both solve the issue of attracting students to physical education and improve students' health in general (Iconomescu T.M., Mîndrescu V., Talaghir L.G., 2017; Cherepov, E.A., Eganov, A.V., Aminova, A.S., Savinykh, E.Y., 2019).

Many authors write that badminton is an effective means to maintain a healthy lifestyle, increase the functional status of a person and his/her performance (Cherepov, E., Khafizova A., Aminov A, Cherepova I., 2017; Talaghir, L. G., Mocanu, G. D., Iconomescu, T. M., Mîndrescu, V., 2018).

Badminton is acyclic sports with the following characteristics: 1) the speed of movement; 2) the speed of technique with minimum preparation; 3) the speed of thinking; 4) the number of risky attacks.

Badminton allows to diversify the impact on the human body, develop strength, endurance, coordination and speed of movements, improve joints mobility, promote a wide range of motor skills and volitional qualities (Bykov, E.V., Zinurova N.G., Chipyshev A., 2016; Gromov, V.A., 2013). Badminton satisfies the body's need for a load and allows achieving perfect movements with less effort.

Badminton elements distribute load to all muscle groups and all systems of the body. Therefore, they create a significant biological reserve for high performance.

The body of a badminton player adapts more quickly to optimal performance. Indicators that determine performance in badminton are speed maintenance and the number of effective competitive actions. Improving the performance of a badminton player presumes functional improvement by systematically performing training and increasing its qualitative and quantitative characteristics (Povareshchenkova, Y.A., Avdeeva, A.A., 2006).

**The purpose of the study** is to identify the effect of badminton classes on the development of physical qualities and physical performance among students.

### Materials and methods.

The study was conducted on the basis of the South Ural State University during the 2016-2017 academic year. Twenty full-time students aged from 17 to 19 years participated in the experiment.

2 groups were formed of 10 people each. Classes were held 2 times a week for 90 minutes. In the control group (CG), traditional PE classes were conducted; in the experimental group (EG), badminton elements were

added to the training sessions. The methodology is based on the badminton program for high school students (Pakin, A.P., 2004).

To determine the level of preparedness and development of physical qualities, the following tests were used: 30m run (speed qualities), 6x5m shuttle run (coordination abilities); standing long jump (speed-strength qualities); push-ups (strength qualities).

General physical performance in badminton students and non-badminton students was determined by the Ruffiertest.

The Ruffier test was designed to assess the performance of the heart during physical exertion. The technique is considered as accurate and often used. It determines the ability of the heart muscle to adapt to physical activity. The method is based on three principles: simple and active exercises, simultaneous assessment of heart rate (HR) before and after activity, comparison with the standards (Vorobieva, T., Kharchenko, L., Shamshualeeva, E., 2019; Roslyakova, E.M., Alipbekova, A.S., Igibayeva, A.S., 2017). The results obtained were processed with the methods of mathematical statistics. Data analysis was carried out with the Excel software package.

The data obtained can be used for adults to understand how much the heart muscle is prepared for work during periods of exertion. The test is suitable for both sexes (Povareshchenkova, Y.A., Avdeeva, A.A., 2006; Erlikh, V.V., Abzalilov, R.Ya., Isaev, A.P., Temnikova, I.V., 2016).

**Results and discussion.**

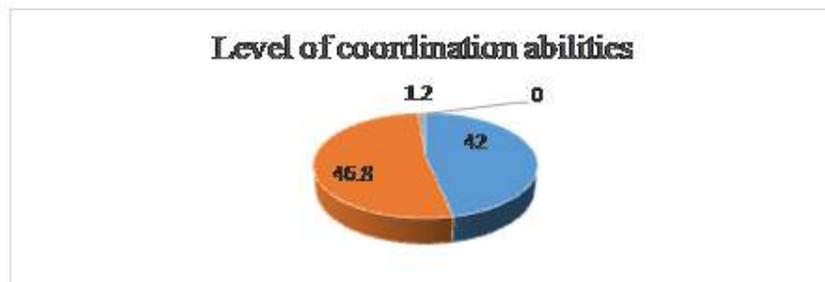
To determine the indicators of physical fitness in badminton players, we used the generally accepted methods recommended by the curriculum in physical education.

Comparing the data obtained with the standards of physical fitness, the following conclusions were made: a high level of development of speed and speed-strength abilities was found among 58.4% of badminton players (Fig. 1).

Figure 1



The average level of these abilities was found in 30.4% of students. The low level was in 11.2% (Fig.1).



The shuttle runtest allowed us to determine the level of development of coordination abilities in badminton players. It turned out to be above average in 42% of subjects, average in 48% of athletes, and low level in 1.2% (Fig. 2).

Figure 2

The growth of strength abilities reaches 35%, the average annual growth - 12.7%. Research data indirectly confirm general statistical indicators. 30.3% of students demonstrated a high level of development of strength abilities, 69.7% of badminton players showed an average level of this quality (Fig. 3).

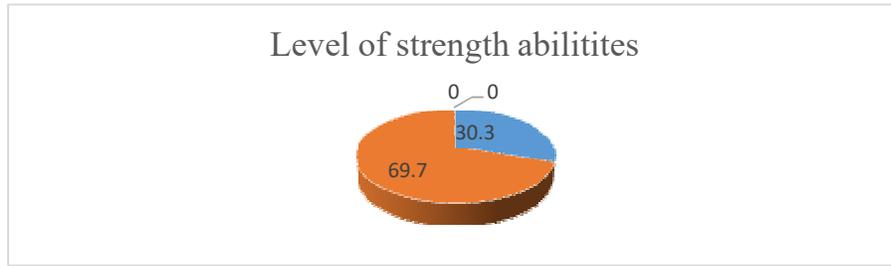


Figure 3  
The results indicate a high level of development of motor skills in 25% of students, in 66.6% - above average (Fig. 4).

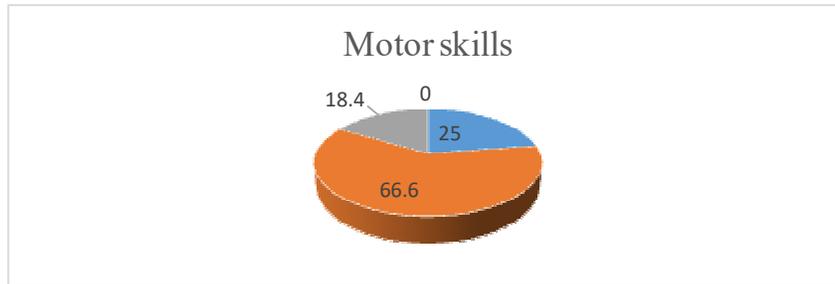


Figure 4  
Table 1 describes the average values for general physical fitness in the EG and CG before and after the experiment.

The control results before the experiment in both groups are almost the same (Table 1)

Table 1

The average value of the results for the EG and CG before and after the experiment

Test	CG		EG	
	before	after	before	after
30 m run (s)	4.24	3.99	4.21	3.92
6x5 m shuttle run	8.94	8.83	8.94	8.71
Standing long jump (m)	2.359	2.40	2.359	2.45
Push-ups (times)	27	32	33	40
Ruffier Index average performance	5.32	5.26	5.33	2.86

After the experiment, the control results in the EG significantly improved, especially in terms of the average value of the Ruffier Index, which indicates a sufficiently high performance of the cardiovascular system.

To compare both groups before and after the experiment, a comparative analysis of the Mann-Whitney U test was used. The resulting comparison showed that the EG and CG were approximately equal before the experiment (Fig. 5).

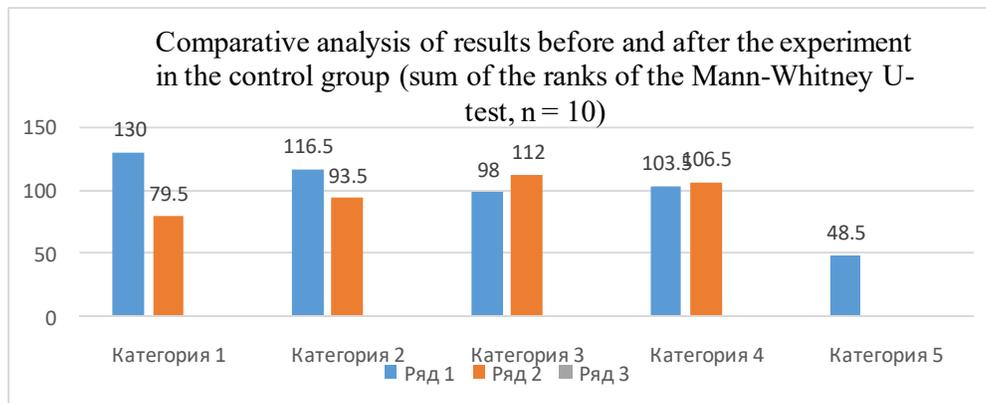


Fig 5. Category 1 - 30m run; 2 - 6x5 m shuttle run; 3- standing long jump, cm; 4- Ruffier Index; 5- U empirical.

Data analysis showed that after the experiment, the results in the experimental group improved compared with the control group. In the control group, U fell into the insignificance area for all indicators. Hence, the hypothesis H0 is accepted (Fig. 6).

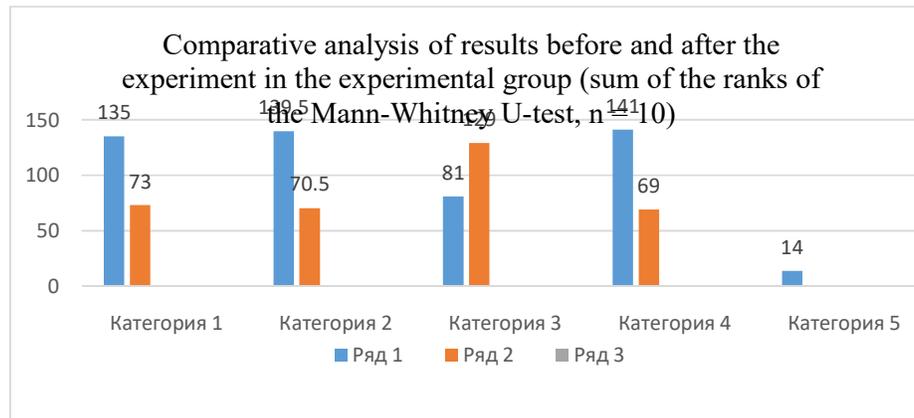


Fig 6. Category 1 – 30 m run; 2 - 6x5 m shuttle run; 3- standing long jump; 4 - Ruffier Index; 5 - U empirical.

In the experimental group, U fell into the significance area, which stands for an alternative hypothesis or H1 for the following indicators: 30 m run, shuttle run and the Ruffier Index.

### Conclusion.

Badminton contributes to significant changes in the cardiovascular system and muscle activity.

The results of the study demonstrated that the level of development of the indicators corresponded to the average indicators typical for students, and in some parameters they exceeded the average results (indicators of the development of speed and speed-strength abilities exceeded the average level in more than 50% of the group, coordination abilities were above average in 42%, strength abilities exceeded the average level in more than 30% of students).

The formation of motor skills is above average in 66% of badminton players.

Based on the results of this experiment, badminton is considered as recommended for inclusion in the educational process of university students. In a group of students not engaged in badminton, U empirical fell into the insignificance area for all indicators. Hence, hypothesis H0 is accepted about the similarity of the obtained indicators before and after the experiment. In the experimental group, U fell into the significance area for the following indicators: 30 m run, shuttle run and Ruffier Index. Hence, H1 hypothesis is accepted, which indicates the positive effect of badminton on the educational process of students.

The results of the study allow us to conclude that badminton classes had a positive impact on the development of physical qualities and the formation of motor skills in students. Effective impact on the body is determined by the inclusion of this sport in the system of physical education at universities.

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