

# Research on Improving Physical Function Ability of Badminton Multi-Ball Training Based on Students' Physical Fitness Training

Ligang Wang

Faculty of Physical Education, Baotou Teachers College, Baotou, 014030, China

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**Abstract:** as We All Know, Modern Sports Require Very High Physical Fitness of Athletes, and Athletes with Good Physical Fitness Level Have Great Advantages in Competitions. in Badminton Training in Colleges and Universities, Multi-Ball Exercises Are Used to Improve Students' Physical Fitness Level. in This Paper, through the Methods of Literature Review, Experiment and Mathematical Statistics, the Physical Fitness of Students is Analyzed Experimentally. Four Indexes Are Selected for Testing. through Comparison, There Are Significant Differences between the Experimental Group and the Control Group. Multi-Ball Exercises Have Good Effects on the Development of Students' Physical Fitness. the Results Show That: in the Badminton Teaching Process, the Multi-Ball Training Method is Very Effective for Improving the Badminton Skill and Tactics Level of Sports Majors, and the Physical Quality Indexes Are Also Significantly Improved, Which is a Good Training Method.

## 1. Introduction

Developing Students' Physical Fitness is an Important Task in Middle School Physical Education. Especially in Recent Years, the Physical Fitness of Middle School Students Has Been Declining Year by Year. the Overall Decline in Speed Quality, Strength Quality, Endurance Quality, Flexibility and Explosive Quality Has Attracted Extensive Attention from All Aspects of Society [1]. with the Efficient Development of Strategy and Tactics, the Level of Each Team is Constantly Improving and the Enthusiasm of the Staff is Obvious. on the Basis of More Intense Competition, the Time is Relatively Long [2]. However, the Most Important Points in Badminton Competitions in Colleges and Universities Are Mainly Reflected in Two Aspects: One is the Technique and Pace; Second, Professional Endurance is Physical Fitness. This Puts Forward New Requirements for Badminton Players in Colleges and Universities. They Should Not Only Have Outstanding Physical Ability, But Also Have Accurate Technique. Physical Function Ability is an Important Ability That the Body Needs to Cope with the Skill Level of Various Body Organ Systems, and Has Also Become Physical Quality [3]. This Article Embarks from the University Physical Education Specialized Student Teaching Reality, in the Teaching Uses the Multi-Ball Exercise Method to Carry on the Experimental Research, in Order to Raise Student's Physical Ability Level.

## 2. Current Situation of Badminton Training for Young Athletes

At present, the common problems of young badminton players in our country are poor multi-beat ability and poor physical strength, which are not conducive to high-intensity competition and the exertion of high technical level in confrontation, and are difficult to meet the needs of all-round, multi-change and fast-paced play [4]. At present, Chinese psychological training research on high-level athletes has reached a brand-new stage. Chinese sports psychologists have been stationed in the national team for a long time to provide follow-up services, especially when serving directly for international competitions such as the World Cup, Asian Games, Olympic Games and World Championships. The psychological training characteristics of different events are matched with different psychological control methods and measures. At this stage, it is necessary to strengthen the coordination of all the players' body functions, and to increase the amount and intensity of exercise in order to make the technical movements of young athletes reach the dynamic setting [5].

Therefore, through a series of experiments, it is necessary to systematically test the multi-ball training methods in badminton training methods. Multi-ball training is a training method with Chinese characteristics in our country. It is a comprehensive training method that combines badminton training methods with Chinese national conditions and the physical quality of Chinese people [6]. To improve athletes' psychological quality, we should start with the importance and necessity of psychological training, self-regulation ability, analysis and understanding ability, and coach's leading role. No matter coaches or athletes, it is difficult to understand the true meaning of the content mode, body reaction and training effect of multi-ball training, ignoring its essential elements [7].

### 3. Research Objects and Methods

#### 3.1 Research Object

In this paper, 26 male students were randomly selected from 30 sports major students in the 18-level badminton sub-event promotion class of a sports college as experimental research objects and divided into experimental group (multi-ball training group) and control group (single-ball training group).

#### 3.2 Research Method

Interviews with teachers and coaches of relevant specialties, giving factors that can reflect the students' technical level, and determining the speed that can reflect the students' physical ability level, the 200-meter and 400-meter runs, the horizontal push and half squat runs, and the 1500-meter and 3000-meter runs as test factors for endurance.

For the purpose of this study, the author has consulted more than 60 articles on badminton multi-ball training and has mastered a large number of badminton multi-ball training materials.

Then 30 people were selected from the experimental class and 20 from the control class. The experimental class uses multi-ball exercises for 8 weeks, with 3 classes each week for 90 minutes. The control class is also practiced for 8 weeks, with 3 classes per week for 90 minutes. The control class followed the traditional teaching method.

Before and after the experiment, the data on the effect of multi-ball training and the changes of physical function of students were input into the computer, and SPSS13.0 and EX-CELL13.0 software were used for data processing and analysis according to the analysis of the article.

### 4. Results and Analysis

#### 4.1 A Comparative Analysis of the Special Skills Examination Results of the Two Groups of Students after the Experiment

From the analysis of the technical examination of forehand hanging net and forehand ball in the back court of the two groups (as shown in Table 1), after 4 months of multi-ball training, the students in the experimental group have better results than the students in the control group in terms of the number of accurate shots, the technical skills of shots, the range of returns and the quality of landing. There are various forms of ball training. Different numbers of balls, groups and different training methods have different effects on the training effect. This paper takes the running of each item of students as the judgment standard and tries to provide reference for improving the special physical training of badminton majors.

Table 1 Comparison Table Of Evaluation Results of inside Angle and Outside Angle of Forehand Net Hanging in Backcourt (16 Strokes Per Person on Average)

Effective batting count	13 or more	12	11	10	9 or less
The experimental group (13 people)	9	3	2	1	2
%	69.23	23.07	15.38	7.7	15.38
Control group (13 people)	2	4	3	1	3
%	15.38	30.77	23.07	7.7	23.07

Judging from the technical evaluation of forehand and backhand ball rubbing in two groups of students, because the technical difficulty of the small ball in front and backhand rubbing is relatively small, it is easier for students to master. Therefore, the student's success rate during technical training and assessment Will be higher (Table 2). From this point of view, for the athletes in the experimental group, the indicators before and after the experiment showed significant changes in track and field events at different distances, and the indicators for standing long jumps and running jumps also changed, of which  $P < 0.05$  . For the experimental group and the control group, there is no obvious change before and after the quiet heart rate index experiment, while the vital capacity index control group has obvious change before and after the experiment, while the experimental group has almost no change before and after the experiment. The students in the experimental group strengthened and mastered the technology under the multi-ball training, and they were very well aware of the hand feeling, beat feeling and wrist strength during the training. However, the students in the control group did not perform well in the examination.

Table 2 Cross-Reference Table of Forehand Rubbing and Forehand Ball Examination Results Before the Net

Effective batting count	13 or more	12	11	10	9 or less
The experimental group (13 people)	11	2	1	1	0
Hitting success rate (	84.61	15.38	7.7	7.7	0
%	5	1	1	2	4
Control group (13 people)	38.46	7.7	7.7	15.38	30.77

In the forehand forehand pick back court examination before the net, the students in the experimental group are obviously better than the students in the control group in terms of technical mastery and back court feeling. The students in the experimental group are very accurate in the range and landing of the back court, which basically meets the training requirements. After a one-minute rest, the heart rate of the experimental group was still higher than that of the control group. After common measurement, the gap between heart rates disappears. From the relevant data, it can be seen that in the training process, the training intensity of the experimental group is closer to the limit degree of the body, which belongs to the form of high-intensity training. In addition to improving the technique and pace, it also requires higher physical fitness of trainers. After the experiment, the indexes of the 50 and 1000-meter run of the experimental group are obviously improved compared with those before the experiment, and the indexes of the standing long jump are obviously higher after the experiment than before the experiment. However, in the control group, only 1,000 meters of running was significantly improved after the index experiment compared with before the experiment.

#### 4.2 A Comparative Analysis of the Changes of Physical Function Indexes between the Two Groups of Students Before and after the Experiment

From the results of the study, it can be seen that the vital capacity index was significantly changed in the control group before and after the experiment ( $P < 0.05$ ), and the experimental group was also significantly changed before and after the experiment ( $P < 0.01$ ). After the experiment, the vital capacity index of the experimental group was significantly better than that of the control group ( $P < 0.05$ ). The experimental results show that the teaching effect of multi-ball practice method is obviously better than traditional teaching methods.  $P$  value  $< 0.05$ , showing a significant difference. Multi-ball practice can indeed improve students' physical fitness. After exercise, the heart rate of the experimental group was significantly higher than that of the control group. After a short rest of one minute, the heart rate of the experimental group was still higher than that of the control group. After a three-minute rest, the heart rate difference between the two gradually narrowed. Ball practice is not only helpful to establish correct technical movements, but also to improve physical fitness. The intensity and density of students' continuous movement of hitting balls are much higher than that of traditional teaching methods. It is an ideal teaching method for students to improve their physical fitness. That is to say, the ability to perform intense sports in a short period of time, one must choose a training method that closely combines the rhythm of badminton movements and

combines skills and qualities. Multi-ball training is the ideal method to meet this requirement.

### 4.3 Comparison of Changes of Physical Fitness Indexes between Two Groups of Athletes Before and after the Experiment

As can be seen from Table 3, the 50m and 1000m running indicators of the experimental group were significantly improved after the experiment ( $P < 0.01$ ); the standing long jump indicators were significantly improved after the experiment ( $P < 0.05$ ). This characteristic also formed the characteristics of energy metabolism in badminton. The special characteristics of badminton determine that athletes' energy metabolism process should belong to a mixed metabolic process with both anaerobic and aerobic metabolism. In energy metabolism, it is composed of aerobic and anaerobic metabolism. Which system will play a role in the sport depends on the intensity, time and characteristics of the sport. Because the game is affected by the rules, it is doomed that badminton is a lasting sport. After the experiment, the indexes of 50m run and 1000m run in the experimental group were significantly better than those in the control group ( $P < 0.01$ ), and the indexes of standing long jump were significantly better than those in the control group ( $P < 0.05$ ). However, moderate intensity multi-ball training can also be used to develop athletes' aerobic metabolism, such as controlling the quality of aerobic training through multi-ball, multi-group and certain duration. Therefore, multi-ball training is widely applicable.

Table 3 a Comparative List of Changes in Physical Fitness Indexes between the Two Groups of Athletes Before and after the Experiment

	50 m run(s)		1 000 m run(s)		Standing long jump(cm)		Lead up (times)	
	Before the experiment	After the experiment	Before the experiment	After the experiment	Before the experiment	After the experiment	Before the experiment	After the experiment
Control group	7.86± 0.25	7.65± 0.13	245.2± 5.2	243.7± 5.2	223.5± 5.0	224.1± 4.3	6.2± 1.2	6.4± 0.8
Experimental group	7.66± 0.22	7.44± 0.11	242.5± 5.6	235.5± 5.1	221.6± 4.2	226.1± 3.8	6.1± 1.7	6.7± 0.7

## 5. Conclusions and Suggestions

### 5.1 Conclusions

1) The multi-ball training used in badminton training is of high intensity and density, which has a positive effect on the improvement of students' cardiovascular circulation system and respiratory system functions. It has a significant effect on improving learners' cardiopulmonary function, developing anaerobic exercise and aerobic exercise, and greatly promoting physical quality.

2) Increase the intensity and amount of exercise, increase the hitting power, increase the difficulty of exercise and improve physical quality.

3) Multi-ball training is of high intensity and density, which has positive effects on the improvement of cardiac circulation system and respiratory system. It is the main means to train basic skills, develop special quality and improve technical and tactical level.

4) Multi-ball training can enable learners to master the pace and technique of badminton training and competition, and the rhythm of hitting the ball more closely to the intensity of the real competition, so as to better find the feeling of competition, and at the same time can also cultivate and improve the students' indomitable will quality.

5) Due to the characteristics of multi-ball practice methods, there are higher requirements on the practice time and the rhythm of hitting the ball, which to a certain extent stimulates the enthusiasm and initiative of students and improves the teaching effect.

### 5.2 Suggestions

1) Any kind of practice method has its inherent rules. When using multi-ball practice, attention should be paid to the control of the practice time, the rhythm and speed of ball supply, and the interval time, instead of blindly seeking speed and difficulty, the difficulty should be gradually

increased according to the development of students' abilities. Generally, each group is practiced for about 1 minute, 3 ~ 5 groups are practiced, and 10 ~ 30s of rest are taken between groups.

2) When students practice with multi-ball combination, they should pay attention to the reasonable arrangement of fixed, semi-fixed and irregular ball path training, and pay attention to the principle of gradual and orderly progress.

3) Multi-ball exercise is only a method, it can not replace single-ball exercise for technical and tactical training, nor can it replace competition. In teaching, teachers should appropriately intersperse teaching competitions and other training methods according to the actual situation in order to achieve better teaching effects.

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