An Experimental Study on the Training Method of Athletes' Physical Fitness in College Physical Education

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Abstract. In view of the problems existing in the physical fitness training of men's basketball team members in colleges and universities, this paper explores the quality level and difference between the game training method and the conventional training way in three aspects of strength, speed and endurance of basketball team members by means of comparative experimental research and reasonable grouping. The results show that the game training method can improve the strength, speed and endurance of the test subjects, and the effect of speed, endurance and explosive force is obvious. It can also effectively improve the enthusiasm and interest of the test subjects to participate in the training. The study also found that this training method is inferior to the traditional one in terms of maximum strength. The results of the experiment can provide some reference for the design of the training scheme of men's basketball team in colleges and universities.

Introduction

Physical fitness is the basic guarantee for athletes to participate in sports and complete competitions [1]. For men's basketball teams in colleges and universities, physical training is an important task, which could be carried out by means of various channels. Among them, game training is one of the most effective ways.

Sports game is a special training method which takes the form of game activities, body exercises as its content, and aims at developing body and mind of the people [2]. From its own attributes, sports games are a kind of training measure to achieve certain goals through physical exercise. It is an effective means for athletes, especially basketball players, to carry out physical training.

Basketball includes the characteristics of space confrontation, multi-content, being changeable and comprehensive, fitness, intelligence enhancement, enlightenment, education, occupation and commercialization [3].

The biggest ontological feature of basketball rests with that its movement mode is to launch collective offensive and defensive confrontation around the high-altitude basket and the ball. Its activities are all around how to motivate activists to throw basketball faster, more accurately and more into the basket and destroy opponents to shoot into basket. Therefore, it is the biggest ontological feature of basketball to compete for "high" and "accurate" under the condition of high-speed and high-intensity confrontation. Basketball is a very comprehensive sport which emphasizes speed, bounce, endurance, reaction, explosive force, body coordination.

With the continuous development of basketball and the continuous improvement of its level, the sport has gradually changed to a fast, balanced and three-dimensional sport style. With the gradual blurring of basketball posture recognition and the diversification of style, higher physical requirements are put forward for contemporary basketball players [4]. Under the new situation, how to effectively improve the physical fitness of basketball players in a certain period of time has become a major focus of the current course.

Game training method has been used in many sports because of its practicality, entertainment, cooperation, education and exercise [5]. However, in most sports, game training method is only used as a content of warming-up or a way of introducing curriculum. However, the application of incorporating it into the physical training system is seldom involved. The purpose of this study is to verify whether the game training could effectively promote and improve the physical fitness of college basketball players through teaching and training experiments, and to explore the feasibility and training effect of its

implementation from the view of teaching practice, so as to provide some expanding ideas and practical basis for further enriching the means of basketball physical fitness training [6].

Experimental Design

Subjects and Groups

Taking all the members of the men's basketball team of China University of Geosciences (Wuhan) as the experimental object, the number of the players is totally 30, 14 of them belongs to the first team, and the second team has 16 students. In order to make the experimental group and the comparison group meet the requirements of homogeneity, the two teams were merged into one group. Randomly select 7 students from the first line and eight from the second line in the same way to form a group, pointed as experimental group, and the remaining 15 people became another group called comparison group. The experimental group was taught by means of the game training method, while the comparison group with the traditional training mode.

Index Determination and Data Acquisition

The physical fitness test scope of this study is limited to the three aspects of "strength", "speed" and "endurance". In the purpose of simplifying the number of physical fitness indicators and covering the requirements of basketball for athletes' comprehensive physical fitness as far as possible, the number of indicators is delicately designed and refined [7]. In terms of strength, explosive force and strength endurance are the main subjects of investigation. Speed refers to velocity capability and endurance in anaerobic condition [8]. Endurance items are tested only under the condition o f aerobic status.

After determining the direction of the investigation above, the indicators are further subdivided and screened. Finally, five physical fitness indicators were ascertained: shot throw back, 1 minute sit-ups, 60-meter run, turn-back (or shuttle) run and 3200-meter run. Those five physical fitness indicators of the two groups were detected before the experiment. The results showed that there was no significant difference between the two groups, which belonged to homogeneous comparable samples. (See Table 1, where "experiment group" is expressed as "group 1" or "G1", and "comparison group" is expressed as "group 2" or "G2")

Table 1. Test Results of Main Physical Fitness of Experimental Group and Control Group before Experiment.

Group	Back Shot Put/m	1min-Abdominal curl	60m/s	Shuttle run /s	3200m/Score
	(X±S)	(X±S)	(X±S)	(□X±S)	(□X±S)
G1(15)	10.1±1.59	43.56±2.64	7.29±0.26	26.35±2.08	66.47±3.62
G2(15)	10.59±1.65	42.37±2.24	7.21±0.33	27.48±2.16	69.58±3.35

Note: The 3 200 meters project is calculated by percentage, and the scoring standard is the National Youth Basketball League physical fitness test standard.

After the index being determined, the data acquisition becomes an important link to ensure the quality of research. The study intends to do no exercise related to physical fitness index in three stages, i.e. before, during and after the experiment, so as to prevent the experimental interference caused by the exercise effect.

All the above five test items belong to ball-less sports. The data in Table 3 was selected by using the same method as the data acquisition of track and field sports, which needs to follow certain principles. In addition to the 3200-meter race, other test items were tested three times, each test interval of 5-7 minutes, and the next test was conducted after a full rest of the players, taking the best results of the three times as the final result.

Experimental Contents

At present, three kinds of game forms, physical fitness, technology and tactics, are widely used in game training as the main teaching contents. Physical fitness games are simple ball-less physical exercises as a means, and their intensity and quantity of motion are large. In the technical category, basketball personal skills are the main content of development, usually with-ball practice. Tactics is based on personal technology, which requires participants to use personal technology at the tactical level to achieve the victory of the game [9].

The games of skill and tactics are lower than those of physical ability in sports load [10]. In this paper, three kinds of interpolation teaching are carried out, but according to their difficulties, physical and technical games are set in the early stage of the teaching progress, while tactical games are the main content of the middle and late stages.

Experimental Procedure and Period

As the content and time involved in teaching experiments are different from those of other disciplines, with more contents and longer period, the planning and trend of the whole experiment are briefly described in this paper [11].

The whole experiment consists of three stages: pre-experiment, in-experiment and post-experiment. Before the experiment, the physical fitness of the players was tested, and the original data was obtained to help understand the basic situation and grouping of the players before the experiment. The experiment is a process in which two groups of players carry out teaching experiments under the guidance of the same teachers (a coach and an assistant coach). The experimental group and the comparison group do their teaching training in staggered time.

In the whole process, a digital camera is equipped to track and record the teaching process during the training session. After the experiment, the physical fitness of two groups of players was tested to gain the physical fitness data. Video was compressed and archived so that video can be retrieved and analyzed in the future.

The experimental period is planned to be 2 months. The physical fitness training of each group is carried out 2-3 times a week.

Control of Experimental Related Factors

In order to ensure the accuracy and reliability of experimental data, the management and control of other factors is also an important guarantee to achieve this goal. In such experiments with human as the object, it is a difficult task to grasp the interference of other factors or variables. Usually there are many interference factors, such as psychological, physical, climatic, facility, site and other factors in the experiment process. This paper briefly introduces the control of the instructor and the monitoring of the experimental process.

Firstly, for teachers' confirmation, the same teachers (coach and his assistant) guide the two groups to avoid the experimental interference caused by the difference of teaching professional ability [12]. About the time, the experiment was arranged in the summer vocation, when the teachers would not be affected by the daily teaching, and could devote themselves to focus on training. At the same time, the difference of teaching effect caused by curriculum fatigue and job burnout is able to be eliminated.

Secondly, video recordings are made for each training session. The analyzing and summarizing could be made based on video after each training session to find out the problems involved and solve them rapidly.

Teaching Design of Game Training

Teaching Objectives and Tasks

Game training promotes competition among participants through specific game rules and rewards and penalties standards, so that they can communicate closely, thereby increasing their interest and achievement in game activities [13]. In such a pleasant, relaxed and open atmosphere, they can

complete the training of physical, emotional and will qualities through game practice remarkably.

Setting and Arrangement of Game Teaching

In fact, the game is presented in the whole teaching as a module in the physical training system [14]. Actually, not all the contents of physical training courses could be completed in the way of games, which only account for about 30-40% of physical training courses. Regular physical training subjects are conducted at other times.

Games can be taken as both preparatory activities for physical fitness classes and main activities of training courses [15]. The setting and arrangement of games should be coordinated according to specific teaching tasks and purposes, and not introduced here.

Selection and Implementation of Teaching Means

As a kind of teaching method, game training has many sub-projects in it. How to select from a variety of game activities has become a problem that should be paid attention to at the beginning of the study. This research is designed and the methods are selected according to the tasks and teaching requirements of game teaching.

For example, tactical games will select a small range of football games for teaching, since football games are a sport that basketball players have less contact with, and basketball players' lower limb flexibility and body fast balance and sudden change ability are slightly worse than football players, especially in student players. Therefore, the development of short board ability is needed to make up for the comprehensiveness of their physical quality and ability.

When choosing the way of football game to improve basketball players' athletic ability, because the football field is much larger than the basketball court, athletes' physical requirements are higher, so this game has a positive effect on the physical training of basketball players.

In the process of implementing the game, students are encouraged to let go of their hands and feet, give full play to their imagination and creativity. In grasping the rules and key actions, they should not impose too detailed restrictions on the way of implementation, especially in tactical games.

Results and Analysis

Contrastive Analysis of Strength Quality of Two Groups of Subjects after Experiment

Backward shot put is a good way to examine both explosive power and maximum strength of athletes at the same time, which is a comprehensive assessment of these two types of quality [16]. It involves a large range of muscles, covering both upper and lower limbs and trunk, and is suitable for testing the strength of the whole body.

Table 2. Contrast of Strength Quality between Two Groups after Experiment.

	Number	Back Shot Put /m		1min- Abdominal curl /number	
		Before Experiment ($X \pm S$)	After Experiment ($X \pm S$)	Before Experiment ($X \pm S$)	After Experiment ($X \pm S$)
G1	15	10.1±1.59	11.26±1.69	43.56±2.64	48.39±2.43
G2	15	10.59±1.65	12.22±1.35	42.37±2.24	44.58±2.51
P		>0.05	>0.05	>0.05	<0.05

It is seen from Table 2 that there is no significant difference in the performance of the two groups before the experiment, but after the experiment, the strength quality of the two groups has improved, and the performance of the comparison group using traditional training methods is better than that of the experimental group. The comparison of the data shows that the game method is not necessarily superior to the traditional training method in terms of explosive power and maximum strength.

In terms of strength and endurance, the result of one minute sit-ups is just the opposite. After the experiment, there was a notable difference between the two groups, and the results of the experimental group were significantly better than those of the comparison one. After one stage of experimental teaching, the results of the two groups have been improved, but the game training method plays a greater role in developing the strength and endurance of team members.

Contrastive analysis of speed quality between two groups after experiment

The 60-meter run project is an examination item to inspect the maximum speed ability of the team members under anaerobic condition, and explosive force is one of the key qualities. This testing can distinguish the difference and recognition between the explosive force and the maximum force of the backward shot put. That means, if the 60-meter performance of the experimental group is significantly better than that of the comparison group, it can be inferred that the poor performance of the experimental group is due to the lack of maximum strength. It was found that after the experiment, the 60-meter performance of the experimental group was significantly better than that of the other group, which proved that the game training method also has a prominent advantage in the development of team members' explosive power, but its contribution to the greatest strength is not as good as the traditional teaching method.

Turn-back running is a test item which mainly investigates the speed endurance of athletes under mixed energy supply. Its test effect is similar to that of 400 meters. Because of its sports characteristics and basketball is more appropriate, and belongs to the ball-free exercise, so it is chosen as the measurement project.

Table 3 shows that the performance of the two groups has been improved after 2 months of training, but the experimental group using game training method is obviously better than the comparison group in terms of performance improvement. Therefore, the game training method is better than the traditional training method in the speed and endurance development of the subjects.

Table 3. Contrast of speed ability between two groups after experiment.

	Number	60m/s		Shuttle run /s	
		Before Experiment (X±S)	After Experiment (X±S)	Before Experiment (X±S)	After Experiment (X±S)
G1	15	7.29±0.26	7.01±0.61	26.35±2.08	22.49±2.43
G2	15	7.21±0.33	7.17±0.45	27.48±2.16	25.58±2.51
P		>0.05	<0.05	>0.05	<0.05

Contrastive Analysis of Endurance Quality between Two Groups after Experiment

The 3200m project is a typical index to measure the aerobic endurance of team members. From Table 4, it is shown that the two groups of subjects have also made certain improvements.

Table 4. Comparison of Aerobic Endurance Quality between Two Groups after Experiment.

	Number	3200m/Score	
		Before Experiment(X±S)	After Experiment (X±S)
G1	15	66.47±3.62	75.01±2.61
G2	15	69.58±3.35	71.17±3.45
P		>0.05	<0.05

The aerobic endurance performance of the experimental group is evidently better than that of the comparison group, and the game training method is also greater than the traditional training method in the cultivation of aerobic endurance.

Analysis of Training Result

After two months of teaching and training experiment, it is found that both of the game training method and traditional training have improved athletes' strength, speed and endurance quality. From the results of the test, the game training method is superior to the traditional one in enhancing performance. But it does not mean that it is perfect, there are also some problems and shortcomings, the following questions and phenomena in the experiment are to be considered and probed deeply.

Through Psychological Guidance, The Game Training Method can Fully Tap the Enthusiasm of Player to Participate in Practice.

It is distinctly found from the video that most players often feel happy and relaxed when the game module is embedded in the physical training. But at the same time, it is definitely pointed out that there are certain requirements for the composition and types of games.

First of all, the game training method, with its relaxed, free and pleasant situation, makes the dull and arduous physical training course no longer conflicted and bored by the players. Team members are full of novelty and curiosity about this training means. Initial attempts to participate in it will also find that game training can improve their ability of breathing system and energy supply system in a happy and competitive atmosphere when they get pleasure through actual participation. They began to accept and admire the game training method.

The game training takes the sense of freshness, happiness and achievement as the breakthrough point, and guides the players to participate in physical training actively and energetically from the psychological level. We have to notice that the players are not always interested in the game training method. They have several demands for the type, interest, function and arrangement of the game.

Feedback information tells that game design should not be too monotonous in the whole training progress, patterns need to be constantly renovated, tactical and competitive games are more popular, and the timetable in class should be more flexible.

The Promotion and Blind Point of the Game Training Method for the Physical Fitness of Basketball Players

Game training method has certain improvement on strength, endurance and speed, especially for explosive force, speed endurance, absolute speed, aerobic endurance, so on and so forth. But similarly, its contribution to the greatest strength is not as good as the traditional training method, and the improvement effect is relatively small, which means, it also has some training blind spots.

At the beginning of game design and selection, absolute speed and speed endurance are the two main physical types in most games, especially for speed endurance. By participating in games, the subjects in the experimental group put aside the fears and worries of physical training in a pleasant and relaxed situation, mobilized all muscle groups and other motor systems wholeheartedly and without psychological obstacles, and could positively and actively adjust their physical fitness through cooperation, encouragement and achievement goals when the poles appeared. In order to continuously improve the level of physical fitness.

However, it can still be seen from the experiment that the game training method is weak in promoting maximum strength. Because most games belong to non-weight-bearing sports or because of insufficient load, the strength stimulation of the subjects is insufficient, so that their maximum strength growth is very slow. This is also a short board encountered in the implementation of game training, which needs further consideration and improvement measures.

The implementation of the game training should follow the principles of training, and the psychological development process of personnel.

Usually, the validation and implementation of a new training method are mainly analyzed from the perspective of training science. However, some special attention should be paid to the fact that the game training method actually makes use of the characteristics of its activities to make the subjects fluctuate in their psychological activities, thus realizing the change of attitudes and participation in training.

Unlike other training modes, game training seeks behavioral breakthroughs based on psychological changes. In the experiment, it is not only necessary to follow the basic principles of training to design and monitor the amount of exercise, intensity, training content arrangement, setting and exercise density, but also need to pay close attention to the psychological development process of the subjects in the experimental group and grasp their psychological changes in real time, so as to provide the basis for the implementation of the next stage of teaching experiment.

Recommendation

The measure of game training should be viewed and analyzed objectively and comprehensively, but it could not be used arbitrarily instead of the original training method. Because there are some blind spots and shortcomings in game training, the effective way is to enhance the infiltration of traditional training content reasonably in the process of game training innovation and training course settings, and seek the appropriate proportion and reasonable balance between the two.

In the application of the game training, some issues, such as psychological fluctuation of the players and the changes of the training indicators, should be carefully noticed, which is helpful for the planner and manager to grasp the teaching situation and adjust the teaching strategies and arrangements in time in order to achieve the ultimate teaching objectives.

Conclusion

By examining the origin of the project, it can be found that basketball evolved from the game in the beginning, which implies that the essence of basketball is based on the game. However, from the point of view of current college sports teaching, it is becoming a dull and tedious training process of technology and skills, which also directly affects the quality and effect of college basketball teaching.

The experimental results reveal that both the game training and the traditional training have improved the strength, speed and endurance quality of athletes, but there are some differences in the improvement of the three qualities of "strength", "speed" and "endurance".

Game training performs better than traditional training method in explosive force, absolute speed, speed endurance and aerobic endurance. The effect of traditional training method on maximum strength is greater than that of game method.

The game training method attracts participants to take part in the experimental process through the characteristics of the activity itself, and then produces a sense of pleasure and satisfaction after participating in the exercise, which makes the psychological process a change, and then produces a more active attitude and desire to participate.

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