



# Negative Effects of Enhanced Training on Basketball Players' Explosive Power

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**Abstract.** With the development of Chinese basketball towards the direction of “fast rhythm, multiple rounds, accurate long shot, and high intensity”, and the rapid development of domestic basketball sports events, more college basketball leagues have been widely launched, more and more college students actively participate in basketball games, and make full use of their spare time to participate in special training, China’s basketball clubs are becoming more and more mature. Because of the antagonistic characteristics of the basketball project, the attention to the scientific training of the participants is also increasing. With the increase of domestic research on basketball, more and more scholars focus on basketball training. However, through the access to relevant information, the experimental research on basketball specific physical training is not rich. This paper focuses on the study of enhanced training from basketball training, with the purpose of discussing the effect of enhanced training and general intensity training on the explosive power of basketball players’ lower limbs. Through the study of explosive force, we can supplement the new element of enhanced training in daily training, improve its training system, establish a sound training system, and enrich the training content.

**Keywords:** reinforcement training · Basketball players · Lower limb explosive force

## 1 Introduction

### 1.1 Research Background

The development trend of “fast rhythm, multi round, accurate long shot and high intensity” in basketball has been recognized by more and more people. With the rapid development of domestic basketball sports events, more college basketball leagues have been widely launched, and more and more college basketball players actively participate in basketball matches. For this kind of competitive sports, the intensity of competition that athletes participate in is very high. From the individual point of view of athletes; in the technical aspects of basketball, such as breakthrough with the ball, defense, rebounding competition, and getting rid of defense without the ball, all of them need to be carried out under the condition of full physical confrontation [1]. Based on this situation, the physical confrontation becomes more intense and comprehensive. From the perspective

of coaches; in the face of intense and fast-paced basketball, how to reasonably arrange the training content in the training plan, improve the basketball players' confrontation ability and explosive force in the game, so that the players can be handy in the game [2]. Like the strong basketball teams in Europe and the United States, Chinese basketball players are obviously weak in physical resistance and strength. Most of the reasons are that the ability training of Chinese basketball players is far less than that of foreign basketball players. At the same time, the training methods and theories for basketball players are relatively outdated, which is the key to seriously hinder the rapid development of Chinese basketball. In many competitive sports, strength quality belongs to the main part of the physical quality of the players. In the field of competition, ability training plays a relatively high role. In physical training, ability training is one of the main contents. Among the ability quality, speed ability is one of the components, and the performance of speed ability is generally explosive. In recent years, domestic experts and researchers have increasingly attached importance to the research results on improving athletes' explosive power training methods. However, the research status of enhanced training methods in China is not universal, especially the research results on basketball players' explosive power are basically lacking [3].

## 1.2 Research Significance

Nowadays, due to the constant updating of the concept of basketball and the rapid development of basketball technology, basketball has become an open sport. Since its entry into China, basketball has been highly valued, and has been in rapid development for a long time in the future. Its strategic position in China's sports field has become increasingly important. In addition to the fast and changeable playing methods in the past, the power based basketball playing method is also increasingly recognized. Only by combining the above two aspects can it emerge in basketball [4].

Compared with the physical level of basketball players in the world today, the physical quality of Chinese basketball players has not been compared with that of basketball players in other countries at present. The most prominent contrast is that there are certain differences in jumping force, speed, etc. Because Chinese basketball players have been lacking in advantages in the above aspects, so they have never been able to achieve good results in foreign basketball games [5]. After a large amount of research and data analysis, the relevant academic circles have realized that Chinese basketball players can never be compared with basketball players from other countries. In addition to the above quality, explosive power can not be compared. In the development of modern basketball, basketball matches also increasingly focus on the fast rhythm of attack, and this demand for explosive force is also relatively greater. From this, we can realize that in contemporary basketball games, explosive force has become a special skill that basketball players must master. Since explosive force is the product of energy and speed, the issue of improving the efficiency of explosive force practice of basketball players is more critical [6].

## 2 Literature Review

### 2.1 Theoretical Study on Explosive Force

Explosive force refers to the ability of muscles to exert their maximum strength in a very short distance when overcoming the load exceeding 60% - 80% of their maximum capacity. Kuznetsov, a former Soviet scientist, believed that explosive ability refers to the ability of muscles to form large acceleration in the process of overcoming huge obstacles. German scientist Bigger and others put forward that explosive ability refers to the ability of muscles that have begun to increase tension to exert muscle strength at the fastest rate.

Many sports events require players to have the skills to produce great power in the shortest time, such as explosive power. Explosive power training has always been a hot spot in foreign physical training research. The maximum ability growth rate displayed by players in a short distance is usually related to their ability level and explosive power.

According to the formula of energy multiplying efficiency, it has been found that the ability of athletes to produce the highest explosive force is the ability to quickly produce weapons and the ability of muscle contraction rate. The highest detonating force is the generation of energy. Energy and speed are interdependent. When the highest energy and speed are at the most appropriate level, the highest detonating force will be formed. This relationship is clearly reflected in the traditional vertical jump force, reaction speed and explosive force. When one of the standards of maximum force and maximum speed is met, the most explosive force cannot be formed. When a player makes acceleration action in jumping, the time zone of effort will be shorter, which also highlights the necessity of strength growth rate when explosive force is formed.

Among the elements of improving explosive power, the maximum ability plays a leading role, and the improvement of the maximum ability promotes the improvement of explosive power. German scientists pointed out that if the relative strength would not increase and the promotion of the special explosive force would be inhibited, it would be necessary to practice more vigorously before practice. Scientists and coaches in the former Soviet Union obviously had a "radical" view, because they believed that greater strength was essential to enhance explosive power. Therefore, players in the former Soviet Union chose barbell training with greater strength during practice.

### 2.2 Theoretical Basis of Explosive Power Training

The research results of Andimus et al. in 1992 confirmed that the combination of deep squatting and speed strength training to exercise for rapid development is more targeted to enhance the explosive power of people's lower extremities than the previous practice methods that focused solely on the pursuit of deep squatting training or focused solely on fast speed strength training.

John Jesse, a well-known muscle training scholar in the United States, believed at the beginning of the 1970s that players did not need to do too much anti external force exercises in the vertical plane during explosive force exercises. Because in addition to weight lifting exercises and competitions, almost all other sports include more human rotation, forehead, sagittal and other movements. This requires us to keep consistent

with various techniques in terms of running, jumping and shooting, so as to reflect the highest sports efficiency.

According to the importance of explosive force, some experts and scholars in China have carried out a lasting and large amount of in-depth research on explosive force practice methods, and have successively explored several effective explosive force methods, such as high load practice method, large range practice method, incremental practice method, overtime long practice method, etc.

### **2.3 Concept of Reinforcement Training Method**

The essence of enhanced exercise is to develop muscle power through the muscle stretching compression cycle. This compression method, which rapidly changes the muscle from centrifugal work to centripetal work, will promote the rapid release of stored elastic potential energy to improve the effectiveness of centripetal compression. The physiological mechanism of enhanced exercise generally involves two aspects: the storage and release of elastic potential energy of human muscle on the one hand, and the stretch reflex on the other.

Intensive exercise is the rapid stretching produced by the centrifugal compression of tendons, that is, the stretching of muscle fibers, tendons and connective tissue to form a long-term storage of elastic energy. Then the body immediately contracts towards the center to release these elastic energy, thus increasing muscle energy.

## **3 Experimental Design and Conception**

### **3.1 Experiment Purpose**

Through the comparison of 12 weeks' training results of basketball players, it is investigated whether the enhanced training method has more obvious effect on the physical and other aspects of basketball players than the conventional training method.

### **3.2 Subjects**

During the experiment, twenty-four players of Group A men's basketball team of G College were randomly divided into two groups, 12 in the experimental group and 12 in the control group [7]. The men's basketball of Group A of G College during the whole test period was just at the beginning of the preparation for the 16th National Secondary School Basketball League, and met the goal requirements of explosive force training. Most of the participants in the research project have had special basketball training and research, have good physical fitness and basketball experience, and have no history of chronic diseases. The basic information of the study is shown in Table 1.

### **3.3 Experiment Time**

From March 21, 2022 to June 30, 2022, a total of 12 weeks of exercise, three times a day. According to the training plan of group A men's basketball team, each experiment

**Table 1.** Questionnaire on basic information of subjects

Name	Age	Height	Weight	Training years	Standing reach	Injuries and illnesses
Wan Jialong	20	190	80	4	247	null
Han Muqian	21	188	76	10	49	null
Yu Jiajun	21	185	73	8	242	null
Wang zile	19	188	79	3	244	null
Linhong	21	190	90	10	250	null
Zhaochen	22	189	94	10	246	null
Heshengqin	21	188	75	8	245	null
fengyanzhao	21	185	70	9	243	null
huangxinwei	21	183	81	4	244	null
Tanweimin	21	183	80	10	245	null
Zhengjiarui	21	192	83	7	240	null
Huzhikuo	21	183	85	4	247	null
Wushenmin	20	187	76	97	242	null
feng zhipin	21	181	78	6	244	null
zengxuchao	21	182	75	8	242	null
zengqingwei	21	191	77	10	244	null
machenshen	21	184	90	6	242	null
caizituan	20	190	75	5	250	null
yangwushan	21	188	80	7	243	null
liangsujie	22	180	81	8	249	null
liangjiada	20	189	75	5	248	null
majunjun	21	188	80	4	242	null
mahaohao	20	190	86	5	248	null
wangyixing	20	186	77	4	249	null
average	20.79	186.6	79.79	10.5	245.208	/
standard deviation	0.64	3.79	5.65	3.26	2.9	/

was arranged to be completed 45 min before the regular exercises on the first, second and fourth days of each day. On the one hand, it kept the players physically excited during the explosive exercise phase, and on the other hand, it protected the technical and strategic training objectives of group A men's basketball team.

### **3.4 Experiment Content**

In order to ensure the effectiveness of practical activities, the learning projects carried out in the practice stage strictly follow the requirements of the theory of image. The enhanced exercise content is generally based on the jumping exercise content, supplemented by the rapid development of the body and the balance exercise content, as well as the specific half squat jump, one foot weight lifting exercise, etc., which are the key to this research experiment.

### **3.5 Experimental Test Index**

Take off distance and accelerated moving speed are the main basis for players to choose the fastest ability in vertical and horizontal directions in the competitive process. They can often reflect the competitive level of players in the competition, and are also one of the key factors for players to achieve success in the competition. Therefore, it is very necessary to test the explosive force training effect based on the take off distance and movement speed. In view of the characteristics of the explosive training needs and the integration of speed and strength, this paper made a statistical analysis of the explosive index of basketball players measured in the expert questionnaire, and decided to use standing long jump, 20M straight line sprint, run-up touch high, and turn back at the line to evaluate the effectiveness of explosive training of players.

### **3.6 Experimental Hypothesis**

- (1) Assume that the use of enhanced training methods in basketball players' explosive exercise is quite feasible and effective;
- (2) Assume that after the completion of the experimental activities, it is concluded that enhanced exercise can enhance the exercise effect of basketball players' explosive power.

### **3.7 Experimental Control Factors**

#### **Balanced processing should be carried out for the members participating in the experimental activities**

It is necessary to conduct awareness difference test for the test participants before and after the test activity.

It is required to conduct the basic human condition difference test for the test participants before the test item.

It is required that the corresponding personnel participating in the test should carry out the standing touch height difference test before and after the test activity.

It is required to conduct the standing long jump difference test for the members participating in the test before the test activities.

It is necessary to conduct a 20M straight-line sprint difference test for the members participating in the test before the test activity.

It is necessary to conduct run-up and height test for the test participants before and after the test.

It is required to carry out line seeing turn back run difference test for members participating in the test before the test activity.

### **Control the experimental variables**

In the process of practice, the two groups have the same number of members, the same time of practice, and the focus of practice has always been the same, but the way and time of practice are different. After each trial training, except for special circumstances, the contestants can timely practice according to the test method.

### **Avoid the experimenter effect of experimental activities**

In order to prevent the experimenter's reaction in the experiment, it is necessary to ensure the positive attitude of the participants. The test method they use is single blind experiment, so that the blind test data can produce test results. Test: the final test, which disrupts the two groups of time and tests at the same time, ensures that the test conclusion is fair and scientific.

**Ensure that the validity will not decrease during the experiment. Make sure that the experiment efficiency will not decrease during the experiment.**

## **3.8 Experimental Arrangement**

### **Arrangement of control group**

The training time of the control group was mostly single strength training. In the 45 min experimental exercise of each training class, the first 15 min are the basic training for explosive sports, and the last 30 min are the ability training, which mainly includes:

- a. On the court line chase game, the subjects used half of the basketball court floor's baseline, sidebar, centerline, and free throw line to chase and escape online in various lengths.
- b. Step racing game: the test object uses a waterfall shaped ladder (such as the ladder at the entrance of the physical education institute library) to run in pairs or multiple steps. The starting point of the team is at the bottom of the ladder. After the command is given, the team quickly rushes to the end of the ladder and uses the method of racing to decide the winner or loser.
- c. Turn back run, the distance from the baseline to the free throw line, five round trips per group, a total of two groups, fast, full interval.
- d. Push ups, 12 X4 groups, fast and intermittent.
- e. Lie prone with two heads up for 12 s in X4 groups, fast and intermittent.
- f. Sit ups, 20 X4 groups, with sufficient speed and interval.
- g. Degree pull up, 8 times in X4 group, fast action, sufficient interval.
- h. The barbells with both hands are lifted at the same time, in 12 s X4 groups. Each barbell weighs about 10 kg, fast and with sufficient intervals.

Barbell squatting, 8 times in X4 groups, barbell weight is about 60 kg, the knee forward position should not be higher than the toe during the whole process of hunching or weight bearing squatting, and the intermittent action is sufficient.

### Arrangement of the experimental group

The test content has three practice classes every day, Monday, Tuesday and Thursday in turn. The practice requires the method of cycle and repetition, and requires a certain interval of practice, so that athletes can get enough rest and rehabilitation in time, and improve the efficiency of the next activity.

The training conducted by the experimental team has a gradual nature, mainly to improve the explosive muscle group ability of the athletes gradually. Athletes carry out self weight exercise through jumping exercise and swinging arm exercise, and then begin to feel the changes to the body after the enhanced exercise. With the increase of the number of groups and time, athletes begin to strengthen their muscle control ability, and pay attention to the breathing rhythm during the exercise. In order to ensure that the effectiveness of the experiment is realized, it is also necessary to conduct on-site assessment and inspection of personnel [8].

## 4 Analysis and Results

### 4.1 The Situation and Analysis of the Explosive Force Test Data of the First Two Groups of Players

In the test, both the test group and the control group passed the four tests of standing long jump, 20M vertical rush, run-up touch high, and turn back running at the line. After the T test, it can be found that the P value is greater than 0.05, so the results that can be understood in the test are not biased. In the experiment, there was no obvious difference between the experimental group and the control group in terms of physical strength. See Table 2 for specific data.

After calculation and data analysis of the above data analysis, it is concluded that there is no significant difference between the experimental group and the control group in standing long jump, 20M vertical sprint, run-up jump touch high, see line turn back run and other aspects. Therefore, we realized that the test should have a certain validity. In order to ensure that the efficiency of the whole test will not decline, we must strictly ensure the smooth conduct of the test [9].

**Table 2.** The situation and analysis of the explosive force test data of the first two groups of players

index	experience group	control group	T value	P value
Standing long jump	276.75 ± 10.61	273.42 ± 7.53	0.888	0.384
20M Straight Sprint	3.62 ± 0.07	3.65 ± 0.08	-0.921	0.367
Run up and feel high	318.33 ± 6.46	315.33 ± 4.94	1.278	0.215
Turn back running at the line	29.79 ± 1.33	30.2 ± 1.84	-0.625	0.538



## 4.2 Statistics and Analysis of Test Results After the Experiment

The test conclusion after the test has shown in Table 2. Through Table 1 and Table 2, we can recognize the great changes of the two groups after the test, and the athletes' explosive power level generally has been greatly improved.

Through the research on its mechanism, it can be understood from the perspective of the personnel participating in the research project that the participants are all students at school, and no targeted strength training project has been conducted, so the team members have the ability development space. The use of jumping exercises in research projects can make the human body's ability explode, and can enhance the explosiveness of the team members themselves. In addition, the team members have not carried out long-term systematic training before, so under the impact, it is bound to bring added impact. The basic nutrient supply system of human muscle cells can be roughly divided into three categories, and these three types of nutrient supply systems all show different energy supply capacities under different exercises and at different times, so the exercise intensity of personnel here can be shown as the range of muscle activity. Intensive training belongs to high-intensity exercise. Under this condition, all nutrient supply systems of human muscle cells can supply ATP. Through the study of relevant data, it can be found that when people engage in high-intensity activities, the supply of energy supply system of muscle cells has been significantly enhanced, which can recognize that intensive exercise can enhance the exercise effect of athletes' body explosive force.

## 5 Conclusion

After 12 weeks of intensive training, the members of the experimental group can recognize that the experimental group believes that the basketball players' explosive power has been effectively improved after participating in the intensive training activities through the analysis of experimental data, and find that the four test index data have been improved before and after the practice activities, among which the performance of the other three test indicators except the line turn back run has significant differences; The results of the four test indexes of the control group using traditional explosive force training before and after the test also improved, indicating that the effect of enhanced training on enhancing the explosive force of basketball players is obvious and effective [10].

Compared with the traditional explosive force training, the enhanced training can significantly improve the standing long jump, 20M straight sprint and approach jump of basketball players, and bring great reference value to the physical fitness training of basketball players [11]. The experimental group applied the enhanced training method to improve the work technology of basketball players' achievements in the line seeing turn back run. Although the results of the line seeing turn back run in the experimental group did not have a significant difference compared with the control group after the experiment, the average number was still above the control group, indicating that the enhanced training had a great negative impact on the explosive power training of basketball players. Enhanced training is a reasonable remedy for the traditional explosive force training in China. If scientific combination can be carried out according to the corresponding turn, the training technical intensity will be greater, which can better promote the sustainable development of competitive sports.

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