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# THE INFLUENCE OF TRAINING METHODS AND LEG MUSCLE POWER ON BADMINTON JUMPING SMASH SKILLS (Experimental Study Using Circuit and Plyometric Methods in Badminton Performance Development at Tunas Pembangunan University Surakarta 2023)

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## Abstract

*This research aims to determine: (1) The difference in influence between plyometric and circuit training methods on jumping smash ability in badminton. (2) Differences in jumping smash ability in badminton between students who have high, medium and low leg muscle strength. (3) The effect of the interaction between training methods and leg muscle power on jumping smash ability and jumping smash accuracy in badminton. This research uses an experimental method with a 2 x 2 factorial design. The population in this research is male students from the Badminton Achievement Development Faculty of the Teaching and Education Faculty, Tunas Pembangunan University, Surakarta, totaling 40 students. The sampling technique used was purposive random sampling, the sample size taken was 30 students. The data analysis technique in this research uses ANOVA. Before testing with ANOVA, first use the prerequisite data analysis test with the sample normality test (Lilliefors test with α = 0.05%) and homogeneity of variance test (Bartlett's test with α = 0.05%).*

*Based on the research results, it can be concluded as follows: 1. There is an influence between plyometric training and circuit training on badminton jumping smash skills. The effect of plyometric training is better than circuit training in improving badminton jumping smash results with Fcount 6.5041>4.11. 2. There is an influence on badminton jumping smash skills between students who have high leg muscle power and those with low leg muscle power. Badminton jumping smash for students who have high leg muscle power is better than students who have low leg muscle power with Fcount 7.8699>4.11. 3. There is an interaction between training method and leg muscle power on badminton jumping smash with Fcount 9.3659>4.11.*

*The suggestions in this research are as follows: 1. Students who have high leg muscle power are more suited to being given plyometric exercises. 2. Students who have low leg muscle power are more suited to circuit training.*

***Keywords:*** *Plyometric Training Method, Circuit Training Method, Badminton Leg Muscle Power*



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## INTRODUCTION

Sport has an important role in human life. Participation in physical activity can result in a higher quality of life by reducing risk factors associated with unhealthy conditions and death (Bushman, Battista, Swan, Ransdell, and Thompson, 2014: 6). Through sport, people can be formed who are physically and spiritually healthy and have high personality, discipline and sportsmanship so that in the end quality human beings will be formed. A reality that can be observed in the world of sports, shows a tendency for rapid increases in sporting achievements over time at regional, national and international levels. This can be seen from the record breaking that continues to be done in certain sports, effective and efficient technical performances reviewed by good physical condition.

Sport is a form of effort to improve the quality of Indonesian people which is directed at forming character and personality, discipline and high sportsmanship, as well as increasing achievements that can arouse a sense of national pride. Sports activities include various branches such as futsal, football, athletics, games, water sports, martial arts sports, and others. Sports science is an applied science that crosses disciplines between related and relevant sciences, so in the implementation of sports coaching to achieve optimal or maximum performance, it needs to be handled in a comprehensive and integrated manner.

The game of badminton is a sport that is very popular among Indonesian people. Badminton can be played by all ages, both young and old. Some of them even consider badminton as a medium for recreation and friendship, therefore it is not uncommon for some to use badminton as a promotional event. This is proven by the widespread formation of established badminton clubs and the many matches held by badminton fans from urban to remote rural areas. In fact, badminton in Indonesia is one of the branches that often makes Indonesia famous on the international stage.

Efforts to improve to achieve high performance, one of the important factors for badminton players to achieve high performance is to master the basic badminton technical skills of playing badminton well. The aspects that support the achievement of badminton achievements must be trained and improved to the maximum. These aspects include physical, technical, tactical, competitive maturity, coaches, training programs, evaluations, medical aspects and psychological aspects. Based on these aspects, coaching and training on basic badminton playing techniques is an important factor so that badminton players have good basic badminton playing technical skills.

Looking at the biological aspect which includes potential (the body's basic abilities), the function of the body's organs, structure and posture as well as nutrition, there are elements of physical condition as well as body structure and posture that are of concern to maximize performance. Physical condition is a prerequisite that is very necessary in efforts to improve an

athlete's performance, it can even be said to be a basic need that cannot be postponed or negotiable. Sajoto (1995: 8) suggests developing physical conditions in sports that if an athlete wants to excel, he must have physical conditions such as: strength, endurance, muscular power, speed, coordination. coordination), flexibility, agility, balance, reaction and accuracy.

Techniques for playing volleyball include: passing, set-up, serving, baiting and blocking (Badminton is a racket sport that requires excellent physical fitness, speed, strength, agility, coordination, flexibility and full concentration throughout the game. M. Furqon (2003: 2) states that: "The physical quality of badminton players is that they must have anaerobic power and capacity, speed, endurance, agility, flexibility, coordination and good muscle quality." There are various basic skills in the game of badminton that every player needs to master. In playing badminton, basic skills or basic techniques are required. By mastering the existing basic skills, a player will be able to play a game well. Icuk Sugiarto (2002: 30) states that, "The various strokes in badminton are mainly serve, clear, smash, drop shot, drive and netting. Basically, this stroke can be done with forehand and backhand.

To be able to play badminton well, you need excellent physical condition and perfect basic badminton playing techniques. The technical or skill aspect is one of the important factors in the game of badminton. The technique referred to is not only about mastering hitting techniques, but also involves other techniques related to the game of badminton. Icuk Sugiarto (2002: 24) states that, "The techniques that an athlete must master include racket holding techniques, ball hitting techniques, and footwork mastery techniques".

There are various basic exercises in badminton that every player needs to master. In playing badminton, basic skills or basic techniques for playing badminton are required. By mastering the existing basic skills, a player will be able to play a game well. Pole (2008:16) states that the basic skills in badminton include:

1. Racket handle (grip)
2. First blow or service (service).
3. Overhead strokes.
4. Underhand strokes.

Apart from these basic skills, there are still many other strokes that players must master in badminton. The most important techniques that badminton players must master include service strokes, lobs, dropshots, drives and smashes. One of the basic technical elements that is very important in badminton is the smash. Every badminton player must master the basic smash technique. The ability to smash also determines victory in a match. If the smash can be done well, quickly, carefully and precisely on target, it will make it easier to kill your opponent so you can get points.

Appropriate and correct methods are needed to improve basic badminton technical abilities to the maximum. Therefore, in the game of badminton, an athlete must practice actively to improve the quality of playing. There are four main components that athletes must master. The four main components are strength, will, strategy, and good individuals. An athlete must have these four main components to support good performance. Badminton players must also master these four main components.

The smash technique plays a very important role in winning a match. Every badminton player must have the ability to smash well, therefore, to improve their achievements, players must be trained intensively in smashing techniques. Players' smash hitting ability must be improved. To be able to improve their smash hitting technique, a training program is needed that can be carried out by paying attention to the elements that influence smash hitting ability. According to Sapta Kunta (2010: 21) the elements that influence the smash include the strength and speed of the arm and the whip of the wrist so that the ball slides into a sharp dive. However, for a player who has a hard smash, he must have his own abilities that can support the implementation of a hard and sharp smash. One of them is the element of physical ability, in addition to technique, mentality and tactics.

Jumping smash is a hard smash done while jumping high. A hard and precise jumping smash is very effective in killing your opponent. To be able to produce a hard and precise jumping smash, power or explosive muscle power is very necessary, especially the strength of the main muscles involved in the jumping smash movement. The main muscles involved in the jumping smash movement are the leg muscles. Thus, to be able to do a jumping smash well, players must have good leg muscle strength. The player's leg muscle strength will influence his jumping smash ability. Jumping smash is very useful in badminton because scoring rally points requires players to move quickly when playing.

According to Soekarman (1987: 70) circuit training is a training program that combines several training items with the aim of carrying out an exercise that will not be boring and will be more efficient. Circuit training is very necessary for badminton athletes, because a badminton athlete must have good physical condition so that when playing they do not get tired easily and can reach peak performance. Circuit training also affects jumping smash ability. If an athlete has good leg muscle power, it is certain that the athlete will have a jump to reach the shuttlecock higher and the shot will be sharp. Therefore, it is clear and cannot be denied that these physical abilities are mainly emphasized on the parts of the body that play an important role in executing smash shots, such as hand reaction speed, wrist flexibility, stick flexibility, leg muscle power, and hand explosive power. .

To increase this power, you can use various training methods, including plyometric training methods and circuit training methods. Of the several training methods used by coaches, there are different opinions and applications for improving smash skills. So, from this conflict of opinion, the researchers wanted to examine in more depth how big the differences between the two training methods are in improving smash skills, especially in jumping smashes. In addition, so that a training method can make a big contribution to a training result, several supporting factors are needed that can influence the training process, including leg muscle power. Based on the background of the problem stated above, this research is entitled "The Effect of Training Methods and Leg Muscle Power on Badminton Jumping Smash Skills (Experimental Study with Plyometric Training and Circuit Training on Badminton Achievement Development Students, Faculty of Teacher Training and Education, Tunas Pembangunan University Surakarta in 2023)".

## METHODS

The research method used in this research is an experimental method using a 2 x 2 factorial design. Treatments have a factorial structure according to Cheng (2014: 3), each treatment is a combination of several factors (variables) called treatment factors. A factorial experiment is an experiment in which almost or all levels of a factor are combined or crossed with all levels of each other factor in the experiment.

## FINDINGS AND DISCUSSION

The discussion of the results of this research provides further interpretation of the results of the data analysis that have been presented. Based on hypothesis testing, two groups of analytical conclusions have been produced, namely: (a) there is a significant influence between the main research factors, (b) there is a meaningful interaction between the main factors in the form of a two-factor interaction. This group of analysis conclusions can be explained further as follows:

### 1. The Influence of Plyometric Training and Circuit Training on Badminton Jumping Smashes

Based on testing the first hypothesis, it turns out that there is a real influence between the group of students who received the training method using plyometric training and the group of students who received circuit training on badminton jumping smashes. The group of students who received plyometric training had better badminton jumping smash results compared to the group of students who received the circuit training method.

Learning badminton jumping smashes with plyometric training has advantages in terms of utilizing movement memory. The advantages and advantages of learning badminton jumping

smashes which are carried out using plyometric exercises are that they do not use weights from outside the body, so they can produce better movement speed, the risk of muscle injury is lower, so it is safer when doing the exercise, serious control in implementing the method training is easier, and allows a number of athletes to train together, saving time. The weakness of teaching badminton jumping smash skills using plyometric training is that the training load is relatively light, so the increase in strength is lower, the element of challenge is lower, so it is less interesting, boredom arises when the training load increases, because the type of training does not change and the emergence very tired for the perpetrator.

Learning to learn jumping smash badminton using circuit training is a total training program aimed at the whole body, does not require expensive sports equipment, can be done in groups with experienced people to help and supervise beginners, and can be adapted to the training they like. The disadvantage of teaching badminton jumping smashes using circuit training is that the training is done in groups, there is a tendency for some people to not be able to practice together and also not be able to follow the training properly.

The figures produced in the data analysis show that the average increase in badminton jumping smash results produced by plyometric training is 2,000 higher than by circuit training.

**2. Differences in Badminton Jumping Smash Skills Between Students Who Have High and Low Leg Muscle Power**

Based on testing the second hypothesis, it turns out that there is a real influence between groups of students with high leg muscle power and low leg muscle power on badminton jumping smashes. The group of students with high leg muscle power had a higher increase in badminton jumping smashes than the group of students with low leg muscle power. The high leg muscle power group has higher potential than students who have low leg muscle power. Leg muscle strength is an asset for learning jumping smash badminton.

The success of the badminton jumping smash is influenced by the student's ability to carry out movements in an integrated and harmonious manner. Leg muscle power can support the success of learning jumping smash badminton, because with good leg muscle power, students can control the movements they make so that they become more accurate. Students who have high leg muscle power have the ability to master badminton jumping smashes more quickly than students who have low leg muscle power.

The figures produced in the data analysis show that the average ratio of improvement in badminton jumping smash results for students who have high leg muscle power is 2,200 higher than the group of students who have low leg muscle power.

### 3. The Influence of The Interaction Between Training Methods and Leg Muscle Power on Badminton Jumping Smashes

From the summary table of the results of the two-factor variance analysis, it appears that the main research factors in the form of two factors show real interactions. Based on the picture above, the shape of the line changing the value of the badminton jumping smash results is not parallel or crossed. However, this line has a meeting point between the use of training methods and leg muscle power. This means that there is a significant interaction between the two. This figure shows that leg muscle power has an influence on the results of badminton jumping smashes.

The effectiveness of using the method in learning badminton jumping smash results is influenced by the level of leg muscle power that students have. Based on the research results in the picture, it turns out that students who have high leg muscle power with plyometric training have an increase in badminton jumping smashes of 9,600 which is better than students with high leg muscle power and who receive circuit training treatment of 9,200. Meanwhile, students who had low leg muscle power with circuit training had an increase in badminton jumping smash results of 9,400 which was better than students with low leg muscle power who received plyometric training treatment of 5,000. The effectiveness of using badminton training methods is influenced by the student's leg muscle power classification.

## CONCLUSION

Based on the research results and the results of the data analysis that has been carried out, the following conclusions can be obtained:

1. There is an influence between plyometric training and circuit training on badminton jumping smash skills of 6.5041>4.11. The effect of plyometric training is better than circuit training in improving jumping smash results and badminton jumping smash accuracy.
2. There is an influence of jumping smash and badminton jumping smash accuracy between students who have high leg muscle power and low leg muscle power of 7.8699>411. jumping smash and accuracy of badminton jumping smash in students who have high leg muscle power are better than students who have low leg muscle power.
3. There is an interaction between training methods and leg muscle power on jumping smashes and badminton jumping smash accuracy of 9.3659>411.
    a. Students who have high leg muscle power are more suited to plyometric training.
    b. Students who have low leg muscle power are more suited to circuit training.

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