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The Effect of Plyometric and Extensive Interval Training Methods on the Accuracy of Jumping Smash Athletes of the Badminton Association of Padang City

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Abstract

This study aims to determine the effect of plyometric training methods and extensive intervals on increasing the accuracy of the jumping smash of PB Reta Utama athletes in Padang City. This study uses an experimental approach with a "two groups pretest-posttest design" design. The sampling technique used purposive sampling, so the sample of this study was 12 male athletes. The jumping smash accuracy instrument uses a smash accuracy test. The data analysis technique used a t-test with a significance level of 5%. The results showed that (1) there was a significant effect of the plyometric training method on the accuracy of badminton jumping smash in PB Reta Utama athletes in Padang City (2) There was a significant effect of the extensive interval training method on the accuracy of badminton jumping smash in athletes of PB Reta Utama Kota. Padang (3) The extensive interval training method is better than the Pliometrik training method in the accuracy of badminton jumping smash in PB Reta Utama athletes in Padang City, with a post-test average difference of 3.33.

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INTRODUCTION

"Sport is one form of effort to improve the quality of Indonesian people directed at the formation of character and personality, discipline and high sportsmanship, as well as increasing achievements that can arouse a sense of national pride" (Nur, Madri & Zalfendi 2018). Sports activities have now also become part of people's lives. Someone does sports with their respective goals, especially to get health, physical fitness, and pleasure (Sepriadi, Hardiansyah, & Syampurma, 2017).

"In sports coaching and development, one of the goals is to eliminate achievements. Achievement can be interpreted as the highest result achieved in implementing an activity with goals and targets". (Putra & Vivali, 2017). One of the achievement sports that is routinely carried out by coaching is badminton. Badminton is a type of achievement sport that is much loved among the general public. Badminton is a game that uses rackets to hit shuttlecocks as its object (Edmizal, Donie, and Soniawan, 2020). "Badminton is one of the most popular sports in Indonesia. Generally, badminton in Indonesia has become a mainstay to achieve achievements by often winning titles" (Arianto, Nuri & Agus, 2017). According to Hanifa (2019), in line with this opinion, "Badminton is one of the most popular sports in Indonesia. Proven by the achievements of badminton athletes, various circles much love badminton". Badminton is categorized as a small ball sports game. According to (Grice,

2007), badminton is played by men and women indoors and outdoors for recreation and as a competition. Shuttlecocks are played in the air and should not be reflected on the floor, thus making this badminton sport a fast game that requires optimal reflexes and fitness levels.

Badminton is a sport that demands high-intensity physical activity. According to ACSM in Anugrah (2021), physical activity can be categorized into low, medium, and high intensity. It depends on calorie burning, duration of physical activity, weight, and oxygen uptake of a person. Meanwhile, according to (Phomsoupha & Laffaye, 2014), badminton games require aerobic energy of as much as 70% and anaerobic as much as 30%. This game uses a lot of physical abilities and maximum technical skills that are useful for making fast footsteps to hit the shuttlecock without losing balance, stopping suddenly, and moving, jumping, and twisting the body quickly. Do sprint movements, stop suddenly, then move again, jump, and twist the body quickly. In the game of bulutangkis, athletes who already have excellent physical condition will be able to perform badminton game punch techniques; as explained (Tohar, 2005) that punch techniques aim to fly and direct shuttlecock toward the opponent's field, such as service punches, drop shots, lobs, and smashes.

As explained above, one of the punching techniques in the game of badminton is a smash. "Smash is an attacking blow to kill the opponent's defense that is done quickly, strongly, and hard. This punch can be done in

a regular standing position and jumping" (Donie, 2009). From the description above, I can conclude that a jumping smash is a punch made by athletes to kill the opponent's defense which is done in a jumping position (vertical) when doing a jumping smash directed toward the opponent's bottom strongly and sharply. Athletes who can master the jumping smash technique will be more obvious to kill the opponent's defense and produce points because, in the game, athletes will often get the opportunity to do jumping smashes.

Based on the results of conservation at the Badminton Association (PB) Reta Utama Kota Padang, it was found that athletes who had not correctly performed jumping smash techniques, improper coordination of jumps with punches, imposition of rackets with improper shuttlecocks, resulting in shuttlecock leaving the court and not passing the net or involving in the net. The jumping smash training model needs to be considered more and prioritizes the training model of game patterns and drills.

A badminton athlete with a good jump will have a swooping smash and drive shot, increased strength, and good balance to produce points and win matches. However, when a badminton athlete has poor jumping, smash punches and drive shoots are not powerful, so they are easily guessed by opponents, and poor balance puts players at risk of injury. Jumping is one component of the ability to jump up against gravity using muscle abilities; jumping is done by cooperation and balance of the lower leg muscles that create leg muscle strength.

Therefore, the form of training that can improve the athlete's jumping smash accuracy is the plyometric standing jump, skipping, knee tuck jump, and extensive interval exercises that can be done using equipment and without tools.

METHODS

This study used an experimental method with a "two groups pretest-posttest design" design. The study population was 20 athletes from Reta Utama Padang City, and sampling techniques using purposive sampling, with criteria such as (1) attendance of at least 75% (activeness following training), (2) samples were athletes who participated in training at Bulutangkis Reta Utama Kota Padang with an age range of 15-19 years, (3) male. (4) Minimum training period of 6 months. Based on these criteria, there were 12 male athletes. The jumping smash accuracy instrument uses a smash accuracy test from PBSI (2006: 36) with a validity of 0.773 and reliability of 0.994. The data analysis technique uses a 5% significance level t-test.

FINDINGS AND DISCUSSION

Findings

Based on the results of the plyometric group *jumping smash accuracy pre-test* distribution data with a sample of 6 athletes above, there was one athlete with a percentage (17%) having jumping smash accuracy results in the interval class >34, as many as two athletes with a percentage (33%) having *jumping smash* accuracy results in interval

classes 28-33, then one athlete with a percentage (17%) having accuracy results jumping smash in interval class 22-27, then two athletes with a percentage (33%) have jumping smash accuracy results in interval class 16-21, and 0 athletes with a percentage of 0% in interval class <15.

Based on the results of the *post-test* distribution data of the plyometric group's jumping smash accuracy with a sample of 6 athletes above, there were two athletes with a percentage (33%) having jumping smash accuracy results in the > 34 interval class, as many as three athletes with a percentage (50%) having *jumping smash* accuracy results in interval classes 28-33, then one athlete with a percentage (17%) had accuracy results jumping smash in interval class 22-27, then 0 athletes with percentage (0%) have jumping smash accuracy results in interval class 16-21, and 0 athletes with 0 % percentage in interval class

Based on the results of the *pre-test* distribution data of the accuracy of jumping smash in the extensive interval group with a sample of 6 athletes above, there were 0 athletes with a percentage (0%) having the

accuracy of jumping smash in the interval class >34, as many as two athletes with a percentage (33%) having the *accuracy of jumping smash* in the interval class 29-34, then two athletes with a percentage (33%) had accuracy results jumping smash in interval class 23-28, then two athletes with a percentage (33%) have jumping smash accuracy results in interval class 17-22, and 0 athletes with a percentage of 0% in interval class <16.

Based on the results of *post-test* distribution data of the accuracy of jumping smash in the extensive interval group with a sample of 6 athletes above, there were four athletes with a percentage (67%) having the accuracy of jumping smash in the interval class >35, as many as two athletes with a percentage (33%) having the accuracy of *jumping smash* in the interval class 29-34, then 0 athletes with a percentage (0%) had accuracy results jumping smash in interval class 23-27, then 0 athletes with a percentage (0%) have jumping smash accuracy results in interval class 17-22, and 0 athletes with a percentage of 0% in interval class <16.

Table 1. t-Test Results in Pre-test and Post-test Accuracy of Plyometric Group Jumping Smash

Group	Average	<i>t-test for Equality of Means</i>				
		t ht	t TB	Sig.	Difference	%
<i>Pretest</i>	25,3333	3,948	2,571	0,011	7,16667	22%
<i>Posttest</i>	32,5000					

Based on the results of the t-test analysis above, it was found that the t count was 3.948, and the t table was 2.571 with a significance value of 0.011. These results show a significant difference because t counts $3.948 > t$ table 2.571 and significant values $0.011 < 0.05$. Thus, the alternative hypothesis (Ha) of plyometric training significantly

influences the accuracy of *jumping smash* athletes in PB Reta Utama Kota Padang. The mean *plyometric pre-test* had 25.33, and the *plyometric post-test* was 32.50. The magnitude of increasing the accuracy of *jumping smash* can be seen from the difference in the average value of 7.16 with a percentage of 22%.

Table 2. T-Test Results Pre-test and Post-test Accuracy of Jumping Smash Extensive Interval Group

Group	Average	<i>t-test for Equality of Means</i>			
		t ht	t TB	Sig.	Difference %
<i>Pretest</i>	26,3333				
		3,014	2,571	0,00	10,5000 29%
<i>Posttest</i>	36,8333				

Based on the results of the t-test analysis above, it was found that the t count was 8.014, and the t table was 2.571 with a significance value of 0.00. These results show a significant difference because t counts $8.014 > t$ table 2.571 and values significance $0.000 < 0.05$. Thus, the alternative hypothesis (Ha) of extensive interval training significantly

influences the accuracy of *jumping smash* athletes in PB Reta Utama Kota Padang. The mean *extended pre-test* interval had 26.33, and the *extended post-test* interval was 36.83. The magnitude of increasing the accuracy of *jumping smash* can be seen from the difference in the average value of 10.5 with a percentage of 29%.

Table 8. Independent-t-Test Post-test Results Accuracy of Jumping Smash Pliometric Group and Extensive Interval

Group	Percentage	<i>t-test for Equality of Means</i>			
		t ht	t TB	Sig.	Difference
Pliomatrik	22%				
Extensive Interval	29%	1,851	2,228	0,094	3,333333

Based on the results of the t-test analysis above, it was found that the t count was 1.851, and the t table was 2.228, with a significant value of 0.094. Because t counts

$1.851 < t$ table 2.228 and the significance value is $0.094 > 0.05$, these results show no significant difference between plyometric post-test and extensive post-test interval on the

accuracy of jumping smash PB Reta Utama athletes in Padang City. The plyometric post-test mean was 32.50, and the extended interval had an average of 36.83. Judging from the difference between plyometric post-test values and extensive post-test intervals of 3.33. Thus, the post-test difference shows that "extensive interval training is better than plyometric training to improve the accuracy of jumping smash PB Reta Utama Kota Padang athletes."

Discussion

Based on the results of research on plyometric training methods show a significant influence on increasing the accuracy of jumping smash PB Reta Utama athletes in Padang City, with an increasing percentage of 22%. The effect of plyometric training has also been carried out by Supriyanto (2017), with the research title "The Effect of Plyometric Training Methods and Weight Training with Reaction Speed on Leg Muscle Power of SMAIT IQRO Male Volleyball Players in Bengkulu City." The plyometric exercise uses *the Tuck Jump* element exercise and shows the results of plyometric exercise have better leg muscle power than weight training with $F_{count} 5.12 > F_{table} 4.01$.

The plyometric training method is a process of treating athletes who have pre-tested to increase *explosive power*, hand *ankle*, and *strength endurance* to perform *jumping smash* punches well so that there is an increase in *jumping smash accuracy*. According to Bafirman (2019: 139), plyometric exercise is an exercise that has the goal of increasing the speed and strength needed by an athlete.

This means that an exercise, in order to be adequately achieved, needs to be done with a series of forms of exercises, such as plyometric exercises that are done repeatedly in order to improve *jumping smash skills*. The form of training given is not only one type of plyometric exercise, but in improving jumping smash accuracy skills, there need to be several types of plyometric exercises. The types of plyometric exercises given to athletes include *standing jump*, *skipping*, and *knee tuck jump* exercises with a training intensity of 70-90%.

The increase in *jumping smash* ability occurs because of the source of knowledge obtained by athletes at the first meeting, and with the new knowledge, athletes with enthusiasm to do exercises repeatedly. This is also based on the law of *exercise learning* theory proposed by Thorndike (Rahyubi, 2012), which states that "the principle of practice law shows that the main principle in learning is repetition, the more often the subject matter is repeated, the easier it will be mastered.

The results of extensive interval training method research show a significant influence on increasing the accuracy of *jumping smash* PB Reta Utama athletes in Padang City, with an increasing percentage of 29%. Rices Jatra has also carried out the extensive interval training method with the research title "The Effect of Extensive and Fartlek Interval Training on the Endurance Ability of Padang City Football Referee Speed." This training method significantly affected $T_{count} 21.75 > T_{table} 2.26$.

The extensive interval training method is also a process of giving treatment to athletes who have *pre-tested* to increase *explosive power*, *hand ankle*, *strength endurance*, *aerobic endurance*, and speed to perform jumping smash strokes well so that there is an increase in *jumping smash* accuracy. According to Little in Fajar (2021), High-Intensity Interval Training combines high intensity by providing pauses or intervals, using a short time, and generally achieving minimal unanimity. Meanwhile, according to Nossek in Bafirman (2019: 96), extensive interval training is an exercise to increase the endurance of strength an athlete needs. Similarly, Astrand (1986) said in Bafirman (2019: 95) that extensive interval training develops strength endurance. Meanwhile, according to Syafruddin (1999), the characteristics of the extensive interval training method are moderate load intensity of 60% - 80%, the number/volume of high loads and many repetitions, the interval/rest is not complete, which is 45-90 seconds per series, and the effect of training caused is an increase in endurance strength.

This means that the form of extensive interval training is performed the same as plyometric training, and the difference between these exercises is found in the intensity of the exercise by 60-80%, reps of 20-30, and the number of sets of 2-6. This exercise is also done repeatedly to improve jumping *smash skills*.

The study showed that the extensive interval training method was better than the *plyometric* training method in increasing the

accuracy of jumping smash PB Reta Utama Kota Padang athletes, with an average difference of 3.33.

CONCLUSION

Based on the results of data analysis and discussion of the description of the accuracy of jumping smash PB Reta Utama badminton athletes in Padang City, it can be concluded that there is an influence of plyometric training and extensive intervals significant on the accuracy of jumping smash PB Reta Utama athletes in Padang City. Thus, plyometric training methods and extensive intervals are very suitable for athletes to improve jumping smash accuracy.

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