Effect tuck jump and plyometric exercise to accuracy smash kedeng in terms of leg muscle strength

Idris Moh. Latar[1], **Bahmid Hasbullah**[1], **Ahmad Zaini Masbait**[1], **Fitri Agung Nanda**[2*]

[1] Health Physical Education, Pattimura University. Street Ir. M. Putuhena Kota Ambon, Indonesia
[2] Pendidikan Jasmani Kesehatan, Universitas Sriwijaya. Indonesia
*Corresponding Author. Email: fitriagungnanda16@fkip.unsri.ac.id

Abstract: Smash is a component and determinant in the game of takraw. One of the most anticipated smashes performed during the takraw game is smash kedeng because in his behavior he always shows acrobatics that attracts the attention of the audience. This study aims to how the knee tuck jump and jump to box exercises to increase the accuracy of the smash kedeng sepak takraw in terms of leg muscle strength. This research using experimental research with quasi-experimental. The research population consisted of 70 physical education students at Pattimura University. The sample withdrawal was carried out using a purposive technique so that the sample used was 35 people. The data were analyzed statistically using the SPSS 23 application with two-way ANOVA. The results obtained in the study were a significance value of p is 0.000 <0.05, which means that there is a significant influence between the training method ((knee tuck jump and jump to box) and leg muscle strength (high and low) the accuracy of the Kedeng Sepak Takraw smash has been proven. The conclusion of the research results revealed that the muscle power of the training program affected the results of accuracy or precision in the takraw game. The existence of this research is expected to be a reference for training training leg muscle strength in order to improve the accuracy of the kedeng sepak takraw smash.

Keywords: Smash Kedeng, Sepak Takraw, Tuck Jump, Plyometric, Accuracy

INTRODUCTION

The culture of traditional games has endured to the present day. They are a game of historical heritage from the ancestors that has positive characteristics for society and numerous advantages for kids so that they become the symbol of the country (Manihuruk et al., 2023). Wibowo (2020) explains that to optimize muscle development, training is needed that tends towards weight training, so that it is hoped that with weight training, the muscles will face resistance to the load. Weight training itself is a form of training that uses weight equipment media to support the training process with the aim of increasing fitness, muscle strength, speed, muscle tightening, muscle hypertrophy, rehabilitation, and weight gain and lossSepaktakraw is one of the game sports traditions that is liked by various levels of Indonesian society (Febrianto et al., 2022). Pratama & Pratama (2022) said is sepak takraw is one of many traditional sports that originates from Indonesian soil and has long developed in the country, with many Indonesian people playing it, especially those living in coastal areas, such as the Riau Islands, West Sumatra, and Makassar. Tamara et al., (2021) said takraw is a sport that is played in a team using a ball made of rattan and plastic. Purwanto et al., (2022) revealed that locomotor skills are the ability to move the limbs at the center of gravity to move from one place to another. In sepak takraw, the main basic skills are stepping, running a few steps, jumping with both feet and jumping with one foot. Mastery of the basic techniques of the game of Sepaktakraw is very important considering that the game of Sepaktakraw is fast. Aswat et al., (2014) revealed that in the game of takraw there are several types of techniques, namely basic techniques and special techniques, basic techniques consist of kicks, heading, sudden, understanding, and shoulder to shoulder, while special techniques consist of bouncing the ball into the tekong, kicking 2 first, receiving kicks, smash and block.

Takraw sports branch is a sport that integrates movements from other branches such as football and gymnastics. The game consists of two opposing teams. As a team sport, takraw is a historical sport in Indonesia, national culture and natural conditions, and natural resources (Purwanto, Rifandy, et al., 2022). Aji & Yudhistira (2023) in sepak takraw have many styles of smashes to get points and win the game, one of the smashes that are often used is the kedeng smash. Continue Aji & Yudhistira (2023) that the smash kedeng smash kedeng in sepak takraw is an important and special skill element of the game. The most important thing to remember when practicing smash skills in a sepak takraw game is to introduce the athlete to being able to smash in a real takraw game situation. Smash is one technique of takraw game. Smash is the last attack that generates a lot of points. To be able to do a good smash, a player must master the smash technique well (Kahar et al., 2022).

Kedeng smash in several literature studies revealed that there were factors that greatly influenced the results to get points, one of which was maximizing the athlete's leg muscle power. In line with this opinion, Makhril et al., (2022) explain that the Kedeng smash in the game Sepak Takraw is a sharp ball hit that aims to put pressure on the opponent by hitting the opponent's field by extending the leg up chasing the ball with the right or left foot. by leg muscles. Bangko et al., (2020) explains that in implementing the kedeng smash, the physical condition, and the technical aspect also plays a very important role, because the technical aspect must go hand in hand with the physical fitness or physical condition of an athlete because technique is the basis for having good abilities to be able to play takraw properly. When athletes have good physical condition, it will have a positive effect on their performance (Wachid et al., 2017).

Literature studies reveal that targeting accuracy in smashing kedeng is an important component that must be trained to get maximum results. Sipar et al., (2021) says that the factors or obstacles behind the failure to do the Kedeng smash are in taking the starting position when doing the jump while doing the smash due to fear of falling. This condition then causes the students to be less than optimal in doing the smash kedeng technique correctly. Kedeng punches are good because they require good technique and constant repetition to execute them perfectly. Other than the ball used, balls, nets, and balls are suspended (Yarmani & Syafrial, 2020). Look at the explanation of the literature review regarding the game of takraw and the importance of the smash in the game. The author highlights the importance of measuring the ability of the leg muscles, the same training program, and the accuracy in doing the kedeng smash movement especially at Pattimura University so researchers justify the high novelty of this research against previous research literature studies. It is hoped that this research will be able to reveal the kedeng smash in the game of sepak takraw and will later become a reference for further research or training programs related to the kedeng smash to get maximum results.

METHODS

This research is an experimental research that aims to find out how the influence is generated by research subjects in doing knee tuck jump and jump to box exercises to increase the accuracy of the smash kedeng sepak takraw in terms of leg muscle strength. This study used a 2 x 2 factorial design, which is an experiment that has two factors consisting of two levels, namely the dependent, independent, and attributive variables. The independent variable in this study was the knee tuck exercise to meet and jump to the box, then the dependent variable was the accuracy of the kedeng smash, and the attributive variable was leg muscle strength. The population in this study were 70 students of the Pattimura University Physical Education, Health and Recreation Study Program. Samples were taken using a purposive sampling technique where the researcher took samples with certain considerations, namely by giving students serial numbers that were randomly generated, then students who got an even number became the sample in this study so that the sample of this study was 35 samples. The instrument used to measure leg muscle strength used a leg and back dynamometer test with a validity value of 0.745 and a reliability of 0.960, while the Kedeng smash accuracy test instrument with a test validation of 0.631 and a test reliability of 0.409. Data were analyzed statistically using the SPSS 23 application with two-way ANOVA analysis with a confidence level of data analysis in this study was 95%.

RESULT AND DISCUSSION

Results

The data from this research are in the form of pretest and posttest data which are an overview of each of the variables involved in the research. Below will be presented descriptive statistical data on the pretest and posttest results of the Kedeng Sepak Takraw smash accuracy test on students of the Physical Education and Recreation Study Program at Pattimura University as follows.

Tabel 1. Descriptive Statistical Pretest and Posttest Accuracy of Kedeng Smash

Training Method	Leg Muscle Strength	Statistics	Pretest	Postest
Knee Tuck Jump	Tall	Means	22.17	29.17
		Standard Deviation	1.169	0.983
		Amount	6.00	6.00
	Low	Means	18.00	2.757
		Standard Deviation	24.33	1.633
		Amount	6.00	6.00
Jump To Box	Tall	Means	17.00	2.28
		Standard Deviation	24.17	1.941
		Amount	6.00	6.00
	Low	Means	16.67	2.875
		Standard Deviation	25.5	2.168
		Amount	6.00	6.00

After conducting descriptive analysis, then testing the research hypothesis was carried out based on the results of data analysis and interpretation of the two-way ANOVA analysis. This test was conducted to find out the results of the hypothesis of whether there is an effect of knee tuck jump and jump-to-box exercises on the accuracy of the Kedeng Sepak Takraw smash in terms of leg muscle strength.

Tabel 2. Two-way ANOVA test results

Source	Type III Sum of Squares	Mean Square	F	Sig.
Training Method	22.042	22.042	7.287	.014
Leg Muscle Strength	18.375	18.375	6.074	.023
Exercise Method * Leg Muscle Strength	57.042	57.042	18.857	.000

The data from the ANOVA test results in the table above can be seen that the value of the knee tuck jump and jump to box training methods has a p significance of 0.014. Because the significance value of p is 0.014 <0.0, thus there is a significant difference in the effect of the knee tuck jump and jump-to-box training methods on the accuracy of the Kedeng Sepak Takraw smash. Furthermore, the ANOVA results of high and low leg muscle strength can be seen that the significance value of p is 0.023. Because the significance value of ρ is 0.023 <0.05, so there is a significant difference in the effect of students who have high leg muscle strength and low leg muscle strength on the accuracy of the Kedeng Sepak Takraw smash. Furthermore, the results of ANOVA training methods (knee tuck jump and jump to box) and leg muscle strength (high and low) can be seen that the significance value of p is 0.000. Because the significance value of p is 0.000 <0.05, it means that the hypothesis states that there is a significant interaction between the training method ((knee tuck jump and jump to box) and leg muscle strength (high and low) the accuracy of the Kedeng Sepak Takraw smash has been proven.

After testing that there is an interaction between training methods (knee tuck jump and jump to box) and leg muscle strength (high and low) on the accuracy of the Kedeng Sepak Takraw smash, further tests need to be carried out using Post Hoc. Further test results can be seen in the table below:

Tabel 3. Post Hoc Test Results

Group	Interaction	Mean Difference	Std. Error	Sig.
A1B1	**A1B2**	**4.8333***	**1.00416**	**.000**
	A2B1	**5.0000***	**1.00416**	**.000**
	A2B2	**3.6667***	**1.00416**	**.002**
A1B2	**A1B1**	**-4.8333***	**1.00416**	**.000**
	A2B1	0.1667	1.00416	.870
	A2B2	-1.1667	1.00416	.259
A2B1	**A1B1**	**-5.0000***	**1.00416**	**.000**
	A1B2	-0.1667	1.00416	.870
	A2B2	-1.3333	1.00416	.199
A2B2	**A1B1**	**-3.6667***	**1.00416**	**.002**
	A1B2	1.1667	1.00416	.259
	A2B1	1.3333	1.00416	.199

Based on the table above, the results of the calculation of the LSD test on the asterisk sign (*) explain the interaction of several variables with the following pairs:

(1) A1B1-A1B2, namely a group of students who have the high leg muscle strength and are trained in knee tuck jumps, are paired with a group of athletes those who have low leg muscle strength and are trained in knee tuck jumps, then there is a significant effect of 0.000 <0.05;

(2) A1B1-A2B1, namely a group of students who have high leg muscle strength and are trained in knee tuck jumps paired with a group of athletes who have high leg muscle strength and are trained in jumping to box, so there is a significant effect of 0.000 <0.05 ;

(3) A1B1-A2B2, namely a group of students who have high leg muscle strength and are trained in knee tuck jumps paired with a group of athletes who have low leg muscle strength and are trained in jumping to box, so there is a significant effect of 0.002 <0.05 ;

(4) A1B2-A1B1, namely the group of students who have low leg muscle strength and are trained in knee tuck jumps paired with a group of athletes who have high leg muscles and are trained in knee tuck jumps, so there is a significant effect of 0.000 <0.05;

(5) A2B1-A1B1, namely a group of students who have high leg muscle strength and are trained in jumping to box paired with a group of athletes who have high leg muscles and are trained in knee tuck jumps, there is a significant effect of 0.000 <0.05;

A2B2-A1B1, namely a group of students who have low leg muscle strength and are trained in jumping to box paired with a group of athletes who have high leg muscles and are trained in knee tuck jumps, there is a significant effect of 0.002 <0.05. This research has several novelties among other studies because there are still few studies that simultaneously reveal the effect of training programs, leg muscle power, and accuracy in smashing kedengs, especially at Pattimura University so researchers justify the high novelty of this research against previous research literature studies.

Discussion

Based on the results of the analysis that has been done, it was found that muscle power affects the results of the kedeng smash. In addition to muscle power, the training program and the determination of the exercise are also important components and are considered in doing the kedeng smash. Furthermore, the three of them affect the accuracy of doing the kedeng smash in the final result of doing the kedeng smash in the takraw game. The better the motor power and the training program carried out, the more it will affect the accuracy of the target in doing the kedeng smash which affects good and right on target in getting scores or points in the takraw game.

The results of this study, if related to previous studies, have an attachment to the power of the muscles and the training program to the results of the accuracy of the kedeng smash in the takraw game. The results Amalla (2019) reveal that the smash is the most important attack to get points to win, but to produce a good, accurate, and sharp smash it must be trained systematically and with a good program. To be able Developing basic Smash techniques, cannot be separated from a practice process, which must be done regularly. Ruskin (2021) The kedeng smash is a smash that is done using the feet, for that

players flank the left and right flanks which have many opportunities to smash, in attacking opponents need to be adequately trained to have good smash skills or abilities. Rosti et al., (2020) leg muscle strength and flexibility on the accuracy of passing long distance players aged 14 years. In line with that, there is a significant relationship between flexibility and the basic skills of takraw.

Setiawan et al., (2022) to be able to maximize movement and add points in the game of takraw through smashes, one of the important components that must be considered is explosive power. Good explosive power will also result in a good jump when smashing in takraw. Hidayat et al., (2020) good posture can have a profound effect on performing many tacra movements, including basic mechanical movements such as steering, passing, and braking. Speak Takraw because in its implementation it always displayed interesting acrobatics, leg muscle strength functions to use the legs optimally both in doing kedeng smashes and in maintaining body position or holding body weight. Because when serving, one of the legs supports the body weight, and the other kicks (Sahabuddin & Fadillah, 2022). (Wibowo et al., 2020) explains that plyometric training can cause hypertrophy. This occurs as a result of an increase in the number of actin and myosin filaments in each muscle fiber, causing the enlargement of each muscle fiber, which is simply called fiber hypertrophy. The event that causes hypertrophy is the effect of the muscle response to a muscle contraction that occurs at maximum strength

Bragazzi et al., (2020) revealed that the legs showed a significant relationship between high-intensity actions and lower legs on smash ability in takraw. Saeterbakken et al., (2022) lower leg muscle strength (small) and linear sprint speed (medium). The reasons for differences in sport-specific performance outcomes between the sexes are unclear and may be related to factors such as training volume, training intensity, or skill level. Lower limbs that can be worn on the lower leg have small effects on subjective variables (mainly on late-onset muscle soreness, degree of perceived exertion, and proprioception) and anaerobic pathways (through running ability), and trivial to large effects on muscle strength and power, physiological variable (Duarte et al., 2022). Guan et al., (2022) Interlimb asymmetry in muscle flexibility is usually assessed by measuring the difference in joint range of motion between the two sides. Despite using the same parameters (range of motion), flexibility asymmetry between limbs has been assessed in several joints, including the ankle

Kyselovičová et al., 2023) for lower limbs, it is highly recommended to focus on relationships between different types of coordination between muscles and the occurrence of lower extremity injuries and to modify the landing strategy in the game of takraw. Massa et al., (2022) basic technique of sepak takraw players in receiving and also controlling the ball which will be tested uses two different drill methods in its application. Rusli et al., (2022) Leg muscle power involves a lot of muscles that are used in explosive serving activities in a hard, sharp, and accurate manner so that mastery of techniques is carried out optimally in generating points. Smash kedeng service training to improve service accuracy results, namely by training static targets and dynamic targets. Static target training is a way of training to perform back serve movements at stationary or fixed target positions such as a suspended ball. In a static state of the target training model, athletes can find errors during service, so they can quickly fix them and the coach can always supervise or monitor the implementation of the exercise (Marpaung & Siregar, 2022).

CONCLUSION

Based on the results of the analysis that has been done, it can be concluded that the muscle power ability of athletes affects the results and strength of the kedeng smash in the takraw game. In addition to muscle ability, there are also training programs that affect the accuracy or accuracy of the kedeng smash in the game of sepak takraw, students who have muscle power then have accuracy and precision in the kedeng smash can properly do the maximum kedeng smash and earn points. Even though the research results show good points, this study has drawbacks, namely that it only focuses on a sample of Patimura University sports students. The results of this research is expected to be a reference for training training leg muscle strength in order to improve the accuracy of the kedeng sepak takraw smash.

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