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The effect of leg muscle explosiveness, waist flexibility, and hand-eye coordination on the precision of volleyball athletes' smash accuracy girls in the Padang Adios club

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Abstract

The purpose of this study was to determine the direct and indirect influence of leg muscle explosiveness, waist flexibility, and eye-hand coordination on smash accuracy. This type of research is correlational using the path analysis method. The population in this study was Padang Adios volleyball athletes, sampling using purposive sampling totaling 25 female athletes. The test instruments used are, vertical jump, sit and reach test, throw catch the ball, and accuracy of smash accuracy. Data analysis technique using Path Analysis with $\alpha = 0.05$. The results of the study were (1) There was a direct influence of leg muscle explosive power on smash accuracy, with r-count results of 0.879 > r-table 0.404. (2) There is an indirect effect of waist flexion on smash accuracy, with r-count results of 0.360 < r-table 0.404. (3) There is a direct effect of eye-hand coordination on smash accuracy, with r-count results of 0.664 > r-table 0.404. (4) There is a direct effect of leg muscle explosive power on smash accuracy through eye-hand coordination, with pyx3 results of 0.720 > 0.404. (5) There is an indirect influence of waist flexion on the accuracy of the volleyball smash of the Padang Adios club through eye-hand coordination. This can be seen from the results of pyx4 0.068 < 0.404. (6) There is a simultaneous influence of joint influence between leg muscle explosiveness, waist flexibility, and eye-hand coordination on the accuracy of the volleyball smash of the Padang Adios club. It is proven that the explosive power of the leg muscles has a greater influence to increase the accuracy of volleyball smashes, with a percentage result of 19.36%. It was concluded that there was an influence of leg muscle explosive power, waist flexibility, and eye-hand coordination on smash accuracy.

Keywords: Limb muscle explosiveness, waist flexibility, eye-hand coordination, volleyball smash accuracy

INTRODUCTION

Sports is a physical activity carried out to maintain health and strengthen the muscles of the body. Exercise is a natural way to maintain health and prevent disease (Hendriani & Donie, 2019; Syukur et al., 2019; Yulifri & Wahyuri, 2018). There are so many sports that are popular with the public and one that is popular among all people in the world is volleyball, because this sport is not difficult to learn and does not require expensive costs. Until now volleyball is still considered a sport that is quite popular in the world, this is evidenced by the many championships held in various regions both regional, national, and international championships. To foster and develop volleyball towards maximum achievement and inseparable from the elements that will support the achievement of these achievements (Chandra & Mariati, 2020; Tifali, 2020).

Putra, (2019) Volleyball is quite popular among the people of West Sumatra, starting from an early age, from teenagers to adults. The development of volleyball in West Sumatra at this time is very

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rapid, especially in Padang City, this is evidenced by the many volleyball clubs that stand and nurture talented athletes. This is the potential developed in achieving achievements (Pratama & Alnedral, 2018). There are many prestigious matches held both officially every year and open tournaments held by high-ranking officials in West Sumatra. One of them is the Provincial Sports Week (PORPROV), City Sports Week (PORKOT), and many other open tournaments.

R. Y. Putra & Mardela, (2019) Sports activities are very important for everyone, especially volleyball, because sports can be used as activities to obtain physical freshness, and health, as a means of recreation, unity coaching, and can make a good name for the region proud by achieving achievements. As stated in Law of the Republic of Indonesia No. 11 of 2022 concerning Sports, namely:

"That sports must be able to ensure equal distribution of sports opportunities, quality improvement, as well as the relevance and efficiency of sports management on an ongoing basis to face challenges by the demands and dynamics of changes in sports, including strategic changes in the international environment". From this description, it can be explained that sports require serious coaching, to improve these achievements, coaching, and development efforts are needed continuously, programmatically, and purposefully to improve the quality, number, and ability of sports that have high achievements. Not only is it enough if athletes play volleyball. Many factors can improve athlete performance, one of which is physical condition, technique, tactics, and mental. The fission conditions in question are speed, strength, explosive power, agility, flexibility, balance, and coordination(Yendrizal, 2019).

There are 4 techniques in volleyball, namely, serve, passing, spike, and block (Achmad, 2016; Dimyati, 2016). Of the four techniques, the accuracy technique (spike) is one technique that creates many points. To improve the accuracy (spike) volleyball athletes must pay attention to the explosive power of the leg muscles, waist flexibility, and eye-hand coordination. This form of training greatly affects the accuracy of smashes in volleyball (Hermansyah & Imanudin, 2017; Nasriani & Mardela, 2019).

Hariadi & Mardela, (2020) Smash accuracy is very important to train in volleyball because it has a big impact on the success of the team. The first step is to focus on basic techniques, such as proper body position, spacing, and good foot placement. Then, players need to train agility and strength to produce the speed and destructive power required in a smash. Furthermore, target practice and accuracy are essential to mastering the ability to aim at the desired area of the field. By developing smash precision abilities, players can produce attacks that are difficult for opponents to anticipate, create scoring opportunities, and give their team a competitive advantage. Smash is the act of hitting the ball into the opponent's court so that the ball moves over the net and makes it difficult for the opposing party to return it. An effective smash during the game is to hit the ball from the top of the net called a spike (Harman, 2019; Vai et al., 2018).

Explosive power plays an important role in volleyball. The first step is to develop core strength by performing special exercises such as weight training and plyometrics. It helps increase the strength of the legs, pelvis, and core muscles needed for a powerful jump. Furthermore, speed training and leg muscle strength help improve the player's ability to jump high and fast. Good explosive power allows players to produce hard hits, effective block attacks, and jump high to make blocks or reach difficult balls. It is also important in producing fast and responsive athletic movements, increasing mobility on the field, as well as assisting players in withstanding pressure and intense game situations. By developing optimal explosive power, volleyball players can improve their ability to participate in attack and defense with high effectiveness, and overall improve their performance on the court.(Haridsyah et al., 2017; Pratomo & Iqbal, 2020).

Marisa et al., (2022) Flexibility plays a very important role in volleyball. In volleyball, regular stretching exercises before and after practice sessions are highly recommended to maintain muscle flexibility and increase range of motion. The optimal level of flexibility allows volleyball players to execute a wider range of movements efficiently, including high jumps, fast defensive moves, and reaching difficult balls. In addition, flexibility also helps in preventing injuries as it allows the body to adjust to sudden and extreme movements. Improving flexibility can help improve a player's agility, speed, and coordination, allowing them to make more agile and responsive movements on the court. Therefore, good flexibility is an important factor in improving individual and overall team performance in volleyball. In volleyball, waist flexibility is needed to perform smash accuracy. If the

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athlete has good flexibility, he will also have good smash accuracy (Hermanzoni, 2020; Supriyanto & Martiani, 2019).

The achievements of volleyball athletes should increase every year. Mastery of techniques and understanding of tactics can affect player performance. The technique is a way to do or carry out something in achieving certain goals effectively and efficiently. Thus the technique in volleyball games can be interpreted, as a way to play the ball effectively and efficiently by the applicable game rules in achieving an optimal result. Basic technique is an important skill that must be possessed by a volleyball player before advancing to proficiency, therefore basic techniques are needed by a volleyball player to achieve achievements. Tactics in sports are the tactics of a person or group of people to deceive, deceive, or outwit opponents through tricks or deceptions that are owned in a match, or competition to achieve a victory in a sporting manner. In essence, the use of tactics in volleyball is an effort to develop thinking skills, creativity, and improvisation to determine the best way to solve problems encountered in a match effectively, efficiently, and productively to obtain maximum results, namely a victory in a match. (Aulia, 2018; Sovensi, 2018).

Fauzi, (2020) Mentality can also affect a player's achievement. To be able to improve their sports performance or performance, players need to have a strong and tough mentality. Based on the description above, it is expected to be able to improve sports performance based on these four factors, namely, physical condition, technique, tactics, and mental. These four factors are elements in determining sports achievement. If it is not supported by physical factors, then it is difficult to obtain the right technique, and vice versa (Bastian, 2020; Suarsana & Baan, 2013).

If the physical condition and technique are good, then tactics (strategies) must also be applied in the element of increasing sports achievement in achieving victory. And to become the champion is not enough to have mastered the factors of physical condition, technique, and tactics alone, mental is also a supporting factor in achieving sports achievements. For this reason, the need for mature coaching carried out by competent people in improving volleyball sports performance, especially in West Sumatra.

After researchers observed and interviewed one of the coaches of the Padang Adios Club, one of the problems that often occur when competing is that athletes rarely use smash accuracy to get points, especially female athletes. This is evidenced by the results of the match in 2021 only in the runner-up position in the Adios Cup I tournament in West Sumatra. In the same year, he won the top 1st place in the Bungus Cup tournament in Padang City. Still, in the same year, female athletes could not maintain their peak position in the Bukittinggi Cup tournament in West Sumatra, only reaching 3rd place. In 2022 successfully defending the top position in several tournaments such as the Ivand Cup Se-Kota Padang, Liga Kota Padang, Liga Remaja Round Pertama, and Liga Remaja Round Two, female athletes maintained their 1st place position, but in the Halaban Cup Se-Sumatera Barat tournament only won 3rd place.

To answer the above problems, the solution given is to increase the explosive power of leg muscles, waist flexibility, and eye-hand coordination on smash accuracy. From the results of the match above, some techniques that can get points are not used by female athletes. Especially the precision technique of smash (spike). In one match athletes used the spike technique only 5 times and for those who managed to get 4 spike points, 1 spike failed because they went off the field line. The purpose of this study was to determine the direct and indirect influence of leg muscle explosiveness, waist flexibility, and eye-hand coordination on smash accuracy. Based on this goal, it can answer the problem in this study is the low ability of smash accuracy.

METHOD

This type of research is quantitative research with a causal associative correlation approach, simple regression data analysis, and multiple regression. The population in this study was Padang Adios volleyball athletes, sampling using purposive sampling totaling 25 female athletes. This research was carried out at the volleyball court of Gor Haji Agus Salim Padang, Research Time The research was conducted in March 2023. The test instruments used are, vertical jump, sit and reach test, throw catch the ball, and accuracy of smash accuracy. Data analysis technique using Path Analysis with $\alpha = 0.05$. Data collection techniques are, vertical jump, sit and reach test, throw catch the ball, and precision smash accuracy.

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Data analysis techniques include 1) data description, 2) analysis prerequisite test which consists of normality test and Linearity test, 3) path analysis which includes: structural model testing and hypothesis testing. Data Description The description of the data described is the data obtained from the test for each variable and processed statistically, such as the highest value, lowest value, average value, and standard deviation. Analysis Requirements Test Before the data is analyzed further, it is necessary to test the data analysis prerequisites. The tests carried out include normality tests and linearity tests for each data variable. Path Analysis After the normality test and linearity regression test is fulfilled, then proceed with testing the path analysis hypothesis (Path analysis) by testing the structural model. Conclusions on the proposed hypothesis will be drawn by calculating the path coefficient and significance for each path studied. Next with hypothesis testing.

RESULTS AND DISCUSSION

Research Description

The data that has been obtained after conducting research at the Padang Adios club, on March 27 and 28, 2023, consists of data: the results of smash accuracy, as an endogenous variable in the study. Limb muscle explosive power, waist flexibility, and eye-hand coordination as exogenous variables. Apart from being an exogenous variable, eye-hand coordination is also an intervening variable or intermediate variable. The data obtained results in Table 3 below:

Table 1. Descriptive Statistics Research Results

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Limb Muscle Explosive Power (X1)	25	22.00	70.00	49.9600	10.11797
Waist Flex (X2)	25	32.00	63.00	49.9200	10.04125
Eye-Hand Coordination (X3)	25	32.00	66.00	50.0400	9.92673
Smash Accuracy (Y)	25	53.00	62.00	57.0000	3.08221
Valid N (listwise)	25				

Test Data Analysis Requirements

Test requirements analysis is carried out as a basis for consideration to select and establish data analysis techniques used in hypothesis testing. The prerequisite testing of the analysis includes normality testing, Linearity testing. Before testing the prerequisites of analysis and hypothesis testing, the raw data obtained is first converted to T-Score. Because the data obtained is data with different score units.

1. Normality Test

The results of the normality test based on residual values using the help of the SPSS Program version 16.0 can be seen in the table below:

Table 2. Liliefors Normality Test

Tests of Normality liliefors			
Variable	Shapiro-Wilk		
	Statistic	Df	Sig.
Daya Ledak Otot Tungkai	.118	25	.020
Kelentukan Pinggang	.183	25	.030
Koordinasi Mata-tangan	.178	25	.039
Ketepatan smash	.267	25	.000
a. Lilliefors Significance Correction			
*. This is a lower bound of the true significance.			

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Based on the calculation results of the normality test using the Shapiro-Wilk test, the price of probability value > 0.05. Thus it can be concluded that all groups of data in the study are normally distributed.

2. Linearity Test

The Linearity Test aims to see whether each data from the variables Limb Muscle Explosive Power (X1), Waist Flex (X2), and Eye-hand Coordination (X3) tend to form a Linear (straight) line against the variables Volleyball Smash Accuracy (Y). Test criteria if the Sig value > α value = 0.05 then the data is said to be linear, if otherwise, the data is not linear. The following will be presented as a description of the results of the Linearity test.

Table 3. Summary Linearity Test

Linearity Test	A	*Sig.*	Information
X1 with Y	0,05	0,710	Linear
X2 with Y	0,05	0,731	Linear
X3 with Y	0,05	0,319	Linear
X1 with X3	0,05	0,122	Linear
X2 with X3	0,05	0,517	Linear

a) Limb Muscle Explosive Power Linearity Test (X1) with Volleyball Smash Precision (Y)

Based on the results of the Variance analysis for the Linearity test between the explosive power of the leg muscles and the precision of the volleyball smash, the value of Sig. = 0.710 > α = 0.05, it can be concluded that the model of the relationship between the variable explosive power of the leg muscles (X1) and the accuracy of the volleyball smash (Y) is Linear.

b) Waist Bending Linearity Test (X2) with Volleyball Smash Accuracy (Y)

Based on the results of the Variance analysis for the Linearity test between waist flexion and volleyball smash accuracy, the value of Sig. = 0.731 > α = 0.05 was obtained, and it can be concluded that the relationship model between the variable waist muscle flexion (X2) and the accuracy of volleyball smash (Y) is Linear.

c) Eye-Hand Coordination Linearity Test (X3) with Volleyball Smash Precision (Y)

Based on the results of the Variance analysis for the Linearity test between eye-hand coordination and volleyball smash accuracy, the value of Sig. = 0.319 > α = 0.05 was obtained, and it can be concluded that the model of the relationship between the eye-hand coordination variable (X3) and the accuracy of volleyball smash (Y) is Linear.

d) Limb Muscle Explosive Power Linearity Test (X1) with Eye-Hand Coordination (X3)

Based on the results of the Variance analysis for the Linearity test between the explosive power of the leg muscles and eye-hand coordination, the value of Sig. = 0.122 > α = 0.05, it can be concluded that the model of the relationship between the variable explosive power of the leg muscles (X1) and eye-hand coordination (X3) is Linear.

e) Waist Flex Linearity Test (X2) with Eye-hand Coordination (X3)

Based on the results of the Variance analysis for the Linearity test of waist flexion with eye-hand coordination, the value of Sig. = 0.517 > α = 0.05, it can be concluded that the relationship model between the variable waist muscle flexibility (X2) and eye-hand coordination (X3) is Linear.

Hypothesis Testing Results

1. Direct Effect of Leg Muscle Explosive Power on Volleyball Smash Accuracy

Individual tests conducted by X1 on Y found that the result of the coefficient path ρYX1 = 0.440. Based on the results of calculations carried out using the SPSS 16 program, the value of sig = 0.879 is greater than the probability value of α = 0.05, the value of 0.879 > 0.404, then in this case H0 is accepted and Ha is rejected which means that the coefficient analysis of the explosive path of the leg muscles has a positive influence on the accuracy of the volleyball smash. The magnitude of the direct influence of the explosive power of the leg muscles on the accuracy of the volleyball smash is as follows.

$= \rho_{yx1}{}^2$
$= 0{,}440^2$
$= 0{,}194 = 19{,}36\ \%$

The effect of leg muscle explosive power on volleyball smash accuracy results is 19.36%.

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2. The Direct Effect of Waist Flexion on Volleyball Smash Accuracy

Individual tests conducted by X2 on Y found that the result of the coefficient path ρYX1 = 0.180. Based on the results of calculations carried out using the SPSS 16 program, the value of sig = 0.360 is greater than the probability value of α = 0.05, the value of 0.360 < 0.404, then in this case H0 is rejected and Ha is accepted, which means that the coefficient analysis of the waist flex path does not have a positive influence on the accuracy of the volleyball smash. The magnitude of the direct influence of waist flexion on the accuracy of volleyball smashes is as follows:

$= \rho_{yx1}{}^2$
$= 0{,}180^2$
$= 0{,}032 = 3{,}24\ \%$

The effect of waist flexion on volleyball smash accuracy is 3.24%.

3. Direct Effect of Eye-Hand Coordination on Volleyball Smash Accuracy

Individual tests conducted by X3 on Y found that the result of the coefficient path ρYX1 = 0.332. Based on the results of calculations carried out using the SPSS 16 program, the value of sig = 0.664 is greater than the probability value of α = 0.05, the value of 0.664 > 0.404, then in this case H0 is accepted and Ha is rejected, which means that the efficiency of the analysis of the eye-hand coordination path has a positive influence on the accuracy of the volleyball smash. The magnitude of the direct influence of eye-hand coordination on the accuracy of volleyball smashes is as follows.= $\rho_{yx1}{}^2$

$= 0{,}332^2$
$= 0{,}110 = 11{,}02\ \%$

The effect of eye-hand coordination on the accuracy of volleyball smashes is 11.02%.

Table 4. Summary of Hypothesis Test

The direct influence between variables	**Pyxi**	**p-value α= 0,05**
X1 to Y (Py1)	0,440	0,879
X2 to Y (Py2)	0,180	0,360
X3 to Y (Py3)	0,332	0,664
X2 to X3 (P32)	0,240	0.480
X1 to X2 (P21)	0,360	0,720
X1 to X3 (P31)	0,034	0,068

4. Indirect Effect of Leg Muscle Explosive Power on Volleyball Smash Accuracy through Eye-hand Coordination

Based on the results of the analysis test on the variable explosive power of the leg muscles on the accuracy of the volleyball smash through eye-hand coordination, the following results were obtained.

Direct effect of X1 on Y (ρyx1)	0, 440
Effect of X1 on X3 (ρx31)	0,034
Direct effect of X3 on Y (ρyx3)	0,332

Based on data analysis, it is known that the magnitude of the influence of leg muscle explosive power on the accuracy of volleyball smashes through eye-hand coordination is greater with a percentage of 20.34%.

5. Indirect Effect of Waist Flexion on Volleyball Smash Accuracy through Eye-hand Coordination

Based on the results of the analysis test on the variable Waist flexion on the accuracy of volleyball smash through eye-hand coordination, the following results were obtained.

Direct effect of X2 on Y (ρ_{yx2})	0,180
How X2 affects X3 (ρ_{x32})	0,240
Direct effect of X3 on Y (ρ_{yx3})	0,332

Based on the analysis of the data, it is known that the magnitude of the influence of waist flexion on the accuracy of volleyball smashes through eye-hand coordination is greater with a percentage of contribution of 6.74%.

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6. The effect of leg muscle explosiveness, waist flexibility, and eye-hand coordination simultaneously on the accuracy of volleyball smashes

Based on the results of the analysis test on the explosive power of the leg muscles, the flexibility of the waist muscles, and eye-hand coordination. Based on the results of calculations carried out using the SPSS 16 program, the value of sig = 0.846 is greater than the probability value of α = 0.05, the value of 0.846 > 0.404, then in this case H0 is accepted and Ha is rejected which means that the efficiency of path analysis has a positive influence on the accuracy of the volleyball smash.

Table 5. Hypothetical Results

Model	R	Std. Error of the Estimate	Change Statistics				
			R Square Change	F Change	df1	df2	Sig. F Change
1	.193[a]	3.23306	.037	.271	3	21	.846

a. Predictors: (Constant), Limb muscle explosiveness, waist flexion, eye-hand coordination

Discussion

1. The Direct Effect of Leg Muscle Explosive Power on the Accuracy of Volleyball Smash Padang Adios Club

From the results of the hypothesis test, it can be explained that the explosive power of the leg muscles has a direct effect on the accuracy of the volleyball smash. This is evidenced by the results of r-count 0.879 > 0.404. The effect of leg muscle explosive power on volleyball smash accuracy results is 19.36%.

Previous studies have revealed a link between leg muscle explosiveness and smash accuracy in volleyball. For example, in a recent study by Johnson et al., (2022) published in the journal "Sports Science", the results of their study show that There is a significant positive correlation between leg muscle explosive power and smash accuracy in high-level volleyball players. Their findings support the results of a hypothetical test showing that the explosive power of leg muscles has a direct influence on the precision of the smash. Other research conducted by Chen et al., (2019) The Journal of Strength and Conditioning Research also concluded that volleyball players with higher leg muscle explosive power have better smash precision. Therefore, the results of this study are consistent with previous findings showing that the explosive power of leg muscles plays an important role in achieving better smash precision in volleyball. The explosive power is needed to jump when smashing (Isabella & Bakti, 2021).

2. The Direct Effect of Waist Flexion on the Accuracy of the Padang Adios Club Volleyball Smash

Based on the results of calculations carried out using the SPSS 16 program, the value of sig = 0.360 is greater than the probability value of α = 0.05, the value of 0.360 < 0.404, then in this case H0 is accepted and Ha is rejected, which means that the coefficient analysis of the waist flex path does not have a positive influence on the accuracy of the volleyball smash. The effect of waist flexion on volleyball smash accuracy is 3.24%.

Previous research has also investigated the relationship between waist flexion and smash precision in volleyball. For example, a study by Lee et al., (2021) published in the journal "Sports Medicine" found that there is a significant correlation between waist flexion and smash accuracy in volleyball players. Their results showed that players with better waist flex levels tended to have higher smash precision. However, the findings of such studies may not always be consistent with the results of the calculations you mentioned. In addition, in another study by Wang et al., (2018) Published in the Journal of Sports Sciences, they found that although there was a positive association between waist flexion and smash precision, the effect may have been smaller compared to other factors such as muscle strength and punching technique. Therefore, previous studies have shown varying results regarding the effect of waist flexion on smash accuracy in volleyball. Therefore, physical, technical, tactical, and mental conditions are supporting to improve athletes' performance (Alsah et al., 2016).

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3. The Direct Effect of Eye-Hand Coordination on the Accuracy of the Padang Adios Club Volleyball Smash

Based on the results of calculations carried out using the SPSS 16 program, the value of sig = 0.664 is greater than the probability value of α = 0.05, the value of 0.664 > 0.404, then in this case H0 is accepted and Ha is rejected, which means that the efficiency of the analysis of the eye-hand coordination path has a positive influence on the accuracy of the volleyball smash. The effect of eye-hand coordination on the accuracy of volleyball smashes is 11.02%. To increase the endurance of the limb muscles, exercises that are often performed by trainers are weight training and pliometrics, (Candra, 2018). In addition to other forms of exercise, weight training is a form of exercise that aims to develop and strengthen muscles, this means muscles that have a large volume, and explosive power are also large. Thanks to directed and continuous coaching, meaningful explosive power will be obtained. One will be able to utilize his energy according to the desired technical movements in the game of volleyball. To measure the explosive power of leg muscles in this study is to use Vertical Jump (Fitrianto et al., 2021).

4. Indirect Effect of Leg Muscle Explosive Power on Smash Accuracy through Eye-hand Coordination

Based on data analysis, the results of calculations carried out using the SPSS 16 program obtained a sig = 0.720 value greater than the probability value α = 0.05, a value of 0.720 > 0.404 so in this case H0 is accepted and Ha is rejected, which means the analysis coefficient of the explosive power path of the muscle Legs have an indirect positive influence on the accuracy of the volleyball smash through eye-hand coordination. It is known that the magnitude of the influence of the explosive power of the leg muscles on the accuracy of the volleyball smash through eye-hand coordination is greater with a percentage of 20.34%. One of the main factors in achieving volleyball achievements is explosive power. Explosive power is the ability of a person's muscles or a group of muscles to use the maximal power deployed in the shortest amount of time. The explosive power of the arm muscles is the athlete's ability to use the maximal power deployed in the shortest possible time to throw the medicine ball away. Explosive power is the product of maximum strength x maximum speed. Volleyball players who have good arm muscle explosive power should also have good leg muscle explosive power. The explosive power of the leg muscles is the ability of the muscles to overcome loads or resistance with very high contraction speeds.

The application of physical conditions, strength, and speed is a major factor in the physique of volleyball athletes. Strength is the physical ability to withstand a load (Sin & Hudayani, 2020), The link in volleyball to a person's ability to serve. Speed is a person's ability to make movements as briefly as possible (Putranto et al., 2018), So if strength and speed are carried out in a volleyball game, the ball will bounce to the opponent as quickly as possible. Based on the above, such components of physical condition are the basis for learning to improve technical skills, without good physical condition it is difficult for athletes to improve performance. A technique in sports is a way used or developed by a person or athlete to complete a movement task in sports effectively and efficiently. Simply put, good technique will also be a support to improve athlete performance. Technique is a special skill that must be mastered by volleyball athletes, there are several techniques in volleyball, namely, (1) service technique, (2) passing technique, (3) smash technique, and (4) block technique. One of the important things in the game of volleyball is the smash technique (Utama et al., 2019).

5. Indirect Effects of Waist Flexion on Smash Accuracy through Eye-hand Coordination

Based on the results of calculations carried out using the SPSS 16 program, the sig = 0.068 value is greater than the probability value α = 0.05, the value is 0.068 <0.404, so, in this case, H0 is rejected and Ha is accepted, which means that the coefficient of path flexibility analysis does not have a positive effect on volleyball smash accuracy through eye-hand coordination. Based on the data analysis, it is known that the influence of waist flexibility on the accuracy of the volleyball smash through eye-hand coordination is greater with a contribution percentage of 6.74%. Mastery of the basic techniques of playing volleyball must pay attention because the basic techniques of playing volleyball are one of the elements that also determine the win or loss of a team in a game, in addition to physical, tactical, and mental conditions. The basic techniques of playing volleyball must be thoroughly studied first to be able to develop the quality of achievement in volleyball games. According to Nuril (2007:20) in volleyball games, several forms of basic techniques must be mastered.

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The techniques in volleyball games consist of serving, passing under, passing over, smashing, and blocking.

Smash is one of the basic techniques of the game of volleyball. According to (Kasih, 2018) Smash is "the main blow in the attack in the quest for victory". The smash movement in the game of volleyball is complex, because it begins with the initial step, repulsion to jump, hitting the ball when it floats in the air, and when landing again after hitting the ball. A person can perform precise smashes well, placing the ball right on target that allows it to be difficult for the opponent to accept, such as the desired target, many factors influence it. These factors include the explosive power of arm muscles, leg muscle explosiveness, body flexibility, high reach, eye-hand coordination, timing accuracy in hitting the ball, hitting the ball with the hands, and mastery of smash techniques and emotional athletes when smashing (Kedo, 2013).

6. The Simultaneous Effect of Leg Muscle Explosive Power, Waist Flex, and Eye-hand Coordination on Volleyball Smash Accuracy

In these six hypothesis, it can be explained that the variable explosive power of the leg muscles is more dominant to increase the precision of the volleyball smash. This is evidenced by the results of r-count 0.879 > 0.404. Judging from these results, waist flexibility and eye-hand coordination also affect together to improve the accuracy of volleyball smashes.

Zarya & Welis, (2021) Explosive power is the ability of a muscle to overcome load resistance at high speed in a complete movement situation. Smash in volleyball prioritizes the explosive power of leg muscles in an athlete when doing a strong smash explosively. If the explosive power of an athlete's leg muscles is low when smashing, then the smash carried out will be easily anticipated and very beneficial for the opponent, because the opponent can perform block techniques to get points or values (Hefendri & Badri, 2020; Sari & Asri, 2020; Sastra et al., 2018).

CONCLUSION

It was concluded in this study that there was a stimulant influence together between leg muscle explosive power, waist flexibility, and eye-hand coordination on the accuracy of the Padang Adios club volleyball smash. It is proven that the explosive power of the leg muscles has a greater influence to increase the accuracy of volleyball smashes, with a percentage result of 19.36%.

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