Original Article Research

Effect of Limb Power, Arm Power, Hand Eye Coordination on the Combination of Punches and Kicks of Martial Arts Athletes

Jeki Purnama Putra[1,2], Nurlan Kusmaedi[1], Mulyana Mulyana[1], Amung Ma'mun[1]*

[1]*Sports Education, School of Postgraduates Studies, Universitas Pendidikan Indonesia, Bandung, Indonesia*
[2]*Sports Science, Faculty of Health, Universitas Kartamulia, Purwakarta, Indonesia*

email corresponding author: *jekipurnamaputra@kartamulia.ac.id*

Abstract

Low achievement in the sport of martial arts is influenced by several factors in the direction of physical condition and the ability to combine punches and kicks. This type of research is quantitative research with an associative correlation approach with a method *(path analysis)*. The purpose of this study is to determine the influence both directly and indirectly of the combination of punches and kicks. The sample in this study was 30 athletes, the sampling technique used *purposive sampling* technique. Punch and kick combination test to measure athlete's attack combination ability, *Vertical Jump* measures limb power, *two hand medicine ball put* measures arm *power* and hand-eye coordination with tennis ball catch throw In this limb power instrument has a validity value of 0.67, and test reliability of 0.79. Data analysis techniques use path analysis techniques. Results show 1). The direct effect of limb power on the combination of punches and kicks of Riau Holy Site athletes is 6.30%. 2). Direct influence of *arm power* on the combination of punches and kicks of Riau Holy Site athletes 8.47%, 3). The direct influence of eye-hand coordination on the combination of punches and kicks of Riau Holy Site athletes 23.04. This research only discusses a few factors that affect the combination of punches and kicks of athletes, there are many other factors such as agility, speed, accuracy, etc. That way, it is hoped that there will be further research that examines other variable factors so that all aspects that can affect the combination of punches and kicks can be analyzed and get answers so that they can improve the achievements of Indonesian martial arts athletes, especially Riau sacred site athletes.

Keywords: Limb Power, Arm Power, Hand Eye Coordination, Combination of Punch, Kick

How to cite:

1. INTRODUCTION

The provision of training programs is very important in improving the performance of athletes in striving for optimal results. Which in the provision of the training program is mutually continuous in the process of biomotor components in athletes, such as arm power, hand eye coordination, and others (Hirwana, et al., 2023) . Pencak silat is a martial arts sport combined with art and derived from the culture of the Indonesian nation, and one of the types of martial arts that is old. Pencak silat is one of the original Indonesian sports that is quite popular (Scientific, 2019), Its popularity can be seen from the many universities spread throughout Indonesia and the world, Pencak silat is a sport that is physically and mentally challenging, because martial artists must make skillful movements artfully and cross pressures able to face what happens in matches with limited time, as well as tough and strong opponents, especially from physical conditions. Pencak silat in the embodiment of Indonesian society, plays a role and functions as a sport, art, martial arts, and as a means of spiritual mental development of the Indonesian nation (Suwiwa, 2021). These roles and functions have cultivated and developed in line. with the development of Indonesian society. In the sport of martial arts, there are some basic movements. Among them, the basic techniques of martial arts are: easel, punch, elakan, tank, cutout, sweep, slam and kick. The basic movement of martial arts is a planned, directed, combined and controlled movement, which has four aspects as a unit, namely the spiritual mental aspect, the martial aspect, the sports aspect and the cultural arts aspect. (Muhtar, 2020).

The basic techniques of pencak silat that are most important for attacking are punches and kicks. Punches are attacks using the arms with fists in the fist and kicks are attacks using the legs and kicks are divided into several types including straight kicks, kick kicks, T kicks and crescent kicks. (Dimyati et al., 2020). Scythe kick is. a kick whose trajectory is in a semicircle, targeting all parts of the body with the back of the foot or toes. A good sickle kick is one that is carried out with a curved trajectory from the side using the back like a sickle leg with as much strength and speed as possible, it is difficult to catch and drop by the opponent. This kick can be executed in the position of the feet in front or behind and can also be kicked vary with jumps (Mulyana & Lutan, 2021).

Riau martial arts athletes did not perform well at the *Pekan Olahraga Nasional* (PON) in 2016 and 2021, did not have a gold medal in the martial arts sport and only contributed 2 bronze medals. In the two events held and the Holy Site College, not a single athlete contributed. There are many factors that can affect the martial arts game including the ability of physical conditions such as Power, speed, combination, strength is very influential and not sturdy and the balance of horses when hitting and kicking, so that the results are not perfect, slow to be easily caught and dropped by opponents, lack in mastery of accuracy trajectory techniques and recognition of insteps. Soo et al., (2018) states that physical condition plays an important role in every daily activity or exercise or in competing. To produce good attacks (punches and kicks) and technically conceptualized, you must pay attention to several very important things including: Power, motor skills, and also combinations of martial arts athletes.

Attack can also be said to be an active defense or defense. The definition of attack in martial arts is a technique to seize the opponent's initiative or make the opponent unable to carry out an attack or defense and everything is carried out tactically (Subekti et al., 2020). Attacks are of two types, namely hand attacks and leg and leg attacks (Johansyah L, 2014). So it can be concluded that an attack is a movement that arises through one's own thinking and is followed by gestures both in a stationary position at the place of stepping forward and munduar and accompanied by active movements using both hands, legs and other limbs. The attack uses the arm with the hand clenched into a fist, the trajectory is straight forward with the upper, middle and lower target points. Muis Joni. (2016) menjelaskan yaitu pukulan jab berupa pukulan lurus ke depan, bisa mengarah ke muka atau badan lawan.

Power is also referred to as *explosive* power. According to Bompa & Buzzichelli (2019) that power concerns the dynamic and explosive strength and speed of muscle contraction and involves the utmost expenditure of muscle strength in the fastest possible time. While according to Harsono, (2018) states power is the product of power and speed. Power is the ability of muscles to exert maximum force in a very short time. But explained again, according to Bompa & Buzzichelli (2019) That is, power is a combination of strength and speed that is realized in the form of the ability of muscles to overcome loads with a high contraction speed. That is, power is a combination of strength and speed that is realized in the form of the ability of muscles to overcome loads with a high contraction speed.

Limb muscles are one of the skeletal muscles found in the human body. This leg muscle is located and wraps around the leg bone from the groin to the heel. Limb muscles according to Saleh (2020) explains that the leg muscles are divided into 2, namely the upper limb muscle and the lower limb muscle. The upper limb muscles have a strong wrapping membrane and are called fascialata which are divided into 3 groups, namely the extensor muscle abductor muscle (four head muscles) and the femoris flexor muscle. While the lower limb muscles consist of the front shin muscles of the extensor muscles of the gutter longus muscles of the thumb, the archiles of the muscles of the long legs of the back calf bone muscles and the muscles of the joint fingers. Another opinion says that the length of the limbs is measured from the bottom spine or it can also be from the trocharter to the soles of the feet. According to Bompa & Buzzichelli (2019) Explaining the ability of power can be distinguished by sprint strength, jumping power, kick strength, strength. throw, pulling force, punch power, and repulsion force. The arms are the upper part of the human body that serves to move the body, such as walking, running and jumping. The occurrence of movement in the hand is caused by the presence of muscles and bones, muscles as active movements and bones as passive movements. The meaning of power arm in this study is the ability to perform a striking movement with a relatively short time of the hand when making a punch in martial arts.

Hand eye coordination is defined as the harmonious relationship of mutual influence relationships among muscle groups during work, which is demonstrated by varying skill levels (Saputro & Siswantoyo, 2018b). This coordination is very difficult to separate visibly from agility, so sometimes a coordination test also aims to measure agility. Coordination is the athlete's ability to string together several motions into one whole, aligned movement. The development of coordination between the eyes and hands is a complex part and develops through spatial awareness, which is the ability to estimate distance. The ability to estimate distance will be obtained through a process of perception. In performing punching techniques in martial arts. an athlete will appear to have good movement coordination if he can move towards

the attack while swinging an accurate punch, then hitting with the correct technique and power, Many factors affect the achievements of martial arts athletes so that the low achievements of martial arts athletes are sacred footprints. Based on the data, theoretical studies and conceptual frameworks above, the research questions are:

1. Is there a significant direct influence of *muscle power* limbs on an athlete's martial arts kick combination?

2. Is there a significant direct influence of *arm* muscle power on an athlete's martial arts kick combination?

3. Is there a significant direct influence of hand-eye coordination on an athlete's combination of martial arts punches and kicks?

2.RESEARCH METHODS

2.1 Participants

The population in this study was adolescent athletes from the Riau Tapak Suci college, totaling 150 people from all regencies/cities in Riau Province. Therefore, this study was conducted using *the Purposive Sampling* technique. According to Fraenkel, Jack R., Wallen (2022) that, *Purposive Sampling* is a technique of determining samples with certain considerations. Referring to the population of Riau Holy Site athletes who have participated in competitions outside Riau both regional level evant and national and international evant, based on these criteria, the sample used in this study was a male male athlete pencak silat Tapak Suci Riau which numbered 30 athletes.

2.2 Research Design

The design of this study is quantitative research with an associative correlation approach (Suharsimi, 2019). The purpose of this study was to determine the effect of limb power*, arm power* and hand eye coordination on the combination of martial arts athletes' kicks. The variables linked in this study are Power of the limbs (X1), *Power* of the arm (X2), and Hand-eye Coordination (X3) against the Combination of Punches and Kicks (Y), (X $_1$) and (X $_2$), as free variables (independent), (X$_3$) as intervening variables, while the bound variables (dependents) are combinations of kicks (Y). To be clear, then a path diagram for the structural model is depicted as follows in Figure 1:

Figure 1.

Path Analysis Model Influence Between Variables Research Form Madiated Path Model
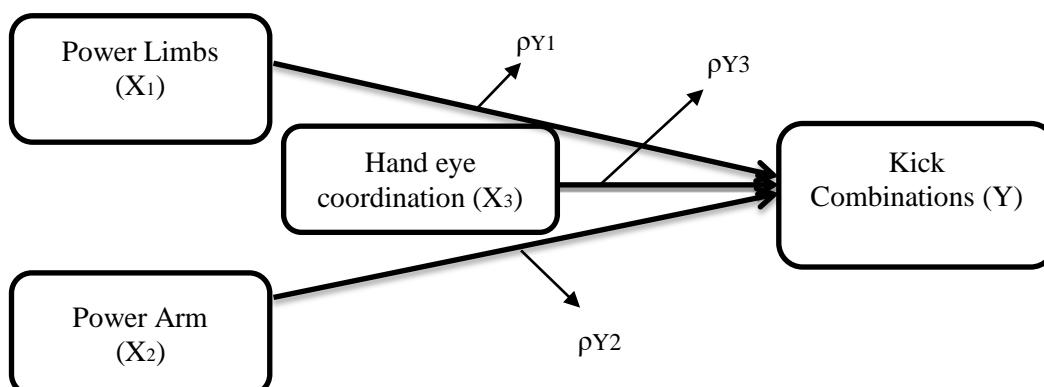
2.3 Instruments

2.3.1 The test used for limb power is a vertical jump, to measure the power of an athlete's limb muscles (Pomatahu, 2018). This test is very appropriate to measure the power of the athlete's limbs with a validity of 0.67, and the reliability of the test is 0.79, thus the instrument is declared valid and reliable.

2.3.2 Power arm test using Two hand medicine ball put The validity of the test is: 0.57, and the reliability of the test is 0.71, thus the instrument is declared valid and reliable (Putra, 2018).

2.3.3 In this study, the hand-eye coordination test was obtained through a ball capture throw test, because using the test will help players in anticipating the direction in which the attack coming from the opposing side. with a validity of 0.57, and a test reliability of 0.72, thus the instrument is declared valid and reliability (Putra, 2018).

2.3.4 The combination of kicks and punches is a form of upper attack in the form of a combination of foot and hand. Attacks are of two types, namely hand attacks and leg and leg attacks (Johansyah L, 2014), with a validity of 0.86, and a test reliability of 0.92, thus the instrument is declared valid and reliable (Putra, 2018).

2.4 Procedures

The test kits used in this study were vertical jump test, two hand medicine ball put, tennis ball catch throw and combination of punch and kick.

2.4.1 Limb Power

The data needed in this study is the power muscle of the limbs of athletes. The test used in this study is a vertical jump test, to measure the power of an athlete's limb muscles, the goal is to measure the limb muscle power of Riau Holy Site athletes, A set of tests and tools used by researchers in collecting data to make work easier and better results. Before doing the test, it is necessary to prepare several things equipment: Mounted metered boards are walled with a height of from 150 cm to 350 cm. accuracy level up to 1 cm, Lime powder, Walls at least 365 cm (12 feet) high: Testi standing sideways towards the wall, both feet tightly the soles of the feet are fully attached to the floor, the fingertips near the wall are powdered with lime powder, One hand of the testi near the wall reaches up as high as possible, the foot remains attached to the floor, the height of the reach on the tip of the middle finger. The testi jumps up as high as possible and touches the board, do three jumps note the height of the stepping on the tip of the middle finger. The initial position when jumping is that the soles of the feet remain attached to the floor, knees bent, hands straight slightly behind the body. Should not do the prefix when going to jump up. Assessment Measure the difference between stepping height and achievement height. The value obtained by the testi is a large difference between the stepping height and the achievement height of the three stepping carried out.

2.4.2 Arm Power

The arm power test is basically carried out to find out the level of power of a person's arm muscles, this is indispensable in the development of achievements. Because there will be many faces in sports in various sports, especially martial arts. Power arm test using two hand medicine ball put (Apriantono et al., 2020). Purpose for measuring power

arms: Targets for men and women aged 12 years to college students/I. Equipment needed Medical balls weighing 2.7216 kg (6 pounds) Colored lime or insulation powder, soft ropes to hold the body, benches, and measuring meter.

Execution: Testi sits on his back straight, Testi holds the ball with two hands in front of his chest and under his chin, Testi pushes the ball forward as far as possible and stays attached to the bench. In order to keep his back attached to the seat, when pushing the ball, the testi's body is held using a rope by the tester's helper, Testi performs a replay 3 times. Before doing the testi test can try to do it 1 time. Valuation. The distance measured from the fall of the ball to the end of the bench. The value obtained is the farthest distance from the three tests performed.

2.4.3 Hand Eye coordination test

Coordination test is a test that aims to measure the level of coordination of a person's muscles with the nerve center, Purpose To Measure Hand Eye Coordination Tool :Chalk or ribbon to create a circular boundary The goal is circular made of paper, with a centerline of 30 cm Meter with a level of accuracy of 1 cm, Officer: Test Guide and Score Logger, Execution: The target is placed walled at the level of the test taker's shoulder, The test taker stood behind the throw boundary line for 2.5 m. The test taker is given the opportunity to throw the ball towards the target and catch it back 10 times, using one of the different hands, Assessment: The calculated score is a legitimate throw, that is, a throw that hits the target and can be recaptured, where the participant does not step on the boundary line. A throw will get a score of 1 if the throw hits the target and can be recaptured correctly. The number of scores is the overall result of throwing a catch ball.

2.4.4 Punch and Kick Combination Test

This attack is carried out to obtain points or scores in accordance with the Ikatan Pencak Silat Indonesia (IPSI) regulations on the rules of martial arts achievement sports matches are not allowed to attack the head of the injured and break the opponent deliberately, the attack must be on the body protector of the sliver used on the athlete's body when competing. The goal is to find out the ability of the combination of kicks and punches of martial arts athletes. Data collection tools, Sandsack (expected 50 kg)/ target (Hand box), Meter, Stopwach, Test executing officer, Sandsack/target height gauge, Timmer (time officer), Sandsack guard. Procedure Athletes prepare to stand behind the sandsack/target with both legs in the middle of the line. At the time of aba-aba "yes" the athlete performs kicks and punches towards the dsack / target on a target 15 cm high, for 30 seconds as much as possible. The execution was carried out 3 times and taken the best time with sandsack heights of 75 cm (women) and 100 cm (men) Scores based on the number of hand and foot attacks during the 30 datics that hit the target.

2.5. Data Analysis

According to Tachi et al. (2019), path analysis is a means or technique that can help researchers to explain the process that is causall correlational quantitative data of path analysis. Path analysis is analytical techniques used to study causal relationships between free variables and bound variables where these causal relationships are arranged in the form of hypothetical models based on scientific subtanstion, namely the theoretical foundation. (Riduwan, 2021) that path analysis used to analyze the pattern of relationships between variables with the aim of

determining the direct or indirect influence of a set of free (endogenous) variables onbound variables (exogenous).

From some of the definitions above, it is understood that path analysis is a means or analysis technique used to study causal relationships with the aim of determining the direct or indirect influence of a set of free (endogenous) variables on bound (exogenous) variables where these causal relationships are arranged in the form of hypothetical models based on scientific substance, namely the theoretical foundation (Güneri et al., 2017). Before hypothesis testing is carried out, first testing the analysis requirements include:

2.5.1. Data Description

The description of the data described is the data obtained after research and processed statistically, so the description of each research variable can be explained. The data in this study includes four data variables consisting of two independent variables (free variables), intervening variables (intermediate variables) and dependent variables (bound variables). Independent variables consist of: Power Limbs (X_1), Arm power (X_2), Hand eye cooerdination (X_3), and dependent variables: Combination of punch and kick (Y).

Before the data is further analyzed, a requirement test for analysis is first carried out. Path analysis requirements testing is that the relationships between variables in the model must be linear, so that the requirements applicable in path analysis by themselves also meet the requirements of regression analysis. The test carried out is a normality test for each data variable.

2.5.2. Analysis Requirements Test (Normality Test)

In the first analysis requirement test carried out is a normality test using a test with Kormogorov-Smirnov to find out whether the data collected is normally distributed or not. By testing criteria using provisions; if the probability > 0.05 then Ho is accepted and the data is normally distributed, and vice versa if the probability ≤ 0.05 means that Ho is rejected the data is not normally distributed.

2.5.3. Regression Linearity Test and Regression Significance Test

Analysis after normality test is then carried out regression test to test the relationship between variables. By the criterion of the requirement of linearity if $F_{count} \leq F$ the table means the regression equation is not linear and vice versa if F_{count} F the $>_{table}$ means that the regression equation is linear. As for the significant requirement of the regression coefficient, if F calculate F the table (0.05) means that the regression equation is significant at the level of 0.05 and vice versa if F_{count} the $> \leq F$ t_{table} means the regression equation is insignificant at 0.05. The value of the correlation coefficient is a calculation number that states the level of strength of the relationship. The correlation strength has an accepted degree of significance if $t_{count} > t_{table}$

2.5.4. Homogeneity Test

Analysis after normality test was then carried out homogeneity test to determine the homogeneity between variables in this study using homogeneity variance test kerna this study using regression analysis technique. H0 is accepted when $X^2_{count} < X^2_{table}$.

2.5.5. Path analysis (model testing and hypothesis testing)

According to Riduwan (2021) Path analysis is used to analyze the pattern of

relationships between variables with the aim of determining the direct or indirect influence of a set of free (endogenous) variables on bound (exogenous) variables. After the normality test and the regression liniearity test and regression significance are carried out, it is continued with the path analysis of the trimming model (path analysis) to test the research hypothesis . Tachi et al. (2019) states that path analysis a trimming model is a model used to improve a model of path analysis structure by removing from the model exogenous variables whose path coefficients are insignificant and the researcher needs to improve the hypothesized path analysis structure model.

The research data obtained were analyzed using path analysis or path analysis. According to Riduwan (2021) The steps to test *Path Analysis* are as follows: Calculating hypotheses and structural equations, Structure : $Y = \rho yx1 \, X1 + \rho yx2 \, X2 + \rho yx1x3 \, X31 \, \varepsilon1$; Calculating coefficients based on regression coefficients Calculating the path coefficient simultaneously (overall) The overall test of the statistical hypothesis is formulated as follows: $Ha : \rho yx1 = \rho yx2 = \rho yx1x3 = \rho yxk \neq 0$ $Ho : \rho yx1 = \rho yx2 = \rho yx1x3 = \rho yxk = 0$; Calculating the coefficient individually:

2.5.5.1. Significant direct influence of limb muscle power on the combination of punches and kicks of pencak silat athletes.

$Ho: \rho yx1 = 0$

$Ha: \rho yx1 > 0$

2.5.5.2. Significant direct influence of arm muscle power on the combination of punches and kicks of pencak silat athletes.

$Ho: \rho yx2 = 0$

$Ha: \rho yx2 > 0$

2.5.5.3. Significant direct influence of hand-eye coordination on the combination of martial arts athletes' punches and kicks.

$Ho: \rho yx31 = 0$

$Ha: \rho yx31 > 0$

3. RESULTS

Overall the results of the hypothesis test in this study can be presented in the discussion as follows: Clearly the results of this study say that the combination of punches and kicks is strongly influenced by the Power of the limbs Power of the arm and the coordination of the eyes of the hands significantly, the combination of punches and kicks is good because the power of the limbs, the power of the arms and the coordination of the eyes of the hands are good. To test the hypothesis, it was carried out using the *backward* testing method to see the suitability of the structure model with the research data, and test the coefficient significance of the structural equation path. Can be seen in Table 1.

Tabel 1.

Sumary Koefesien Model Line Model Structure

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.924ᵃ	.853	.836	1.760	.853	50.406	3	26	.000
Predictors: (Constant), X3, X2, X1									

Based on the results of the analysis of the initial model of the proposed structural equation, F was obtained by 50,406 with a probability value (sig) = 0.000. Since the sig value < 0.05, the decision is that Ho is rejected, meaning that Power of the limbs (X_1), Power of the arm (X_2), hand-eye coordination (X_3) directly affects the combination of punches and kicks (Y).

3.1 The results showed the direct influence of limb power on the combination of punches and kicks

In the results of the calculation of path analysis, it was found that there was a direct influence of limb Power (X) on the combination of punches and kicks (Y) (P) 0.251 and obtained a large value of the value t value of 2.113 then in this case H, accepted and H 1.697 rejected which means that the efficiency of path analysis is significant. It turns out that the direct influence of limb power on the combination of martial arts punches and kicks of Riau Holy Site athletes is 6.30%, meaning it is proven and acceptable, As shown in the Table 2 below.

Table 2.

Summary of Hypothesis Test Results X1 Against Y

Coefficientsᵃ

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	11.344	5.128		2.212	.036
	X1	.087	.041	.251	2.113	.044
Dependent Variable: Y						

Influence Between Variables	Coefficient Line (ρ)	T_count	P-Value	T_tabel	Conclusion
X1 towards Y	0.251	2.113	0.044	1.697	Significant

3.2 The results showed the direct influence of arm power on the combination of punches and kicks

In the results of the path analysis calculation, it was found that there was a direct influence of arm Power(X) on the performance of referee(Y) Pyxz- 0.291. Based on the results of the calculations carried out, the thong value is smaller than the table value, the value of 2.643 1.697 then in this case H. is accepted and Ho is rejected which means that the anlysis coefficient of the path is significant. So, arm power has a direct effect on the combination of martial arts punches and kicks of Riau Holy Site athletes by 8.47%. As explained in the Table 3 below.

Table 3.

Summary of Hypothesis Test Results X2 Against Y

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	11.344	5.128		2.212	.036
	X2	.052	.020	.291	2.643	.014

Dependent Variable: Y

Influence Between Variables	Coefficient Line (ρ)	T_{count}	P-Value	T_{table}	Conclusion
X2 towards Y	0.291	2.643	0.014	1.697	Sig.

3.3 The results showed a direct influence of hand-eye coordination on the combination of punches and kicks

In the results of the path analysis calculation, it was found that there was an indirect influence of hand-eye coordination (X_1) on the combination of punches and kicks(Y) pvx3 0.480. Based on the results of the calculations carried out, a calculated value greater than the table value was obtained, the value of 3,767 > 1,697 then in this case H, accepted and Ho was rejected which means the coeffesient of analysis of the path is significant. So, hand-eye coordination has a direct effect on the combination of punches and martial arts kicks of Riau Holy Site athletes by 23.04% In this case, the relationship between hand eye coordination ability is needed by a martial arts athlete in carrying out a combination of punches and kicks. As explained in the Table 4 below.

Table 4.

Summary of Hypothesis Test Results X3 Against Y

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	11.344	5.128		2.212	.036
	X3	1.046	.278	.480	3.767	.001

Dependent Variable: Y

Influence Between Variables	**Coefficient Line (ρ)**	**T$_{count}$**	**P-Value**	**T$_{table}$**	**Conclusion**
X$_3$ towards Y	0.480	3.767	0.001	1.697	Significant

4. DISCUSSIONS

This study produced significance To the phenomenon of research The effect of limb muscle power, arm power and hand eye coordination on sacred tread martial arts athletes is expected with these results to improve the achievement of martial arts athletes of the holy tread, it is necessary to discuss some variables that are quite important in training such as other physical condition exercises and pisikological to martial arts athletes,   so that it can be a guide for trainers in implementing exercise programs (Kartomi, 2011)

This study only discusses some physical conditions, there are many other factors that can affect the performance of martial arts athletes that have not been studied, so researchers hope that there will be further studies that discuss other variables that affect martial arts performance. His contribution in the field of education for martial arts coaches and teachers can be a reference and benchmark to improve the physical and technical abilities of his athletes (Ihsan et al., 2017). And the need to develop training models, martial arts athlete training books that discuss physical and technical conditions, and training programs so that they can be a reference for coaches to train martial arts in accordance with sport saince.

The ability of power leg muscles is an ability that is needed by a martial arts athlete, where an athlete must be able to make kicks with Power in training and during matches, therefore an athlete must be able to always take a kick with Power so that it cannot be caught by the opponent and dropped, and can anticipate the opponent's attack and retaliate with a faster combination of punches and kicks, for that it takes a good combination of kicks and punches on the athlete, Power leg muscles can also be interpreted as a person's maximum ability to kick strongly in a fast time (Saputro & Siswantoyo, 2018a)

Based on the explanation and description of the theory about the Power of the limb muscles and the combination of punches and kicks can be. it is understood that the combination

of punch and kick requires the power of the limbs to be able to kick strongly and quickly thus it is suspected that the Power of the limbs has a direct and significant effect on the combination of punches and kicks. The test results are in accordance with theoretical studies, theoretical frameworks and hypotheses proposed in this study, the results of this study can be accepted empirically.

The test results are in accordance with theoretical studies, theoretical frameworks and hypotheses proposed in this study, the results of this study can be accepted empirically. Arm power is the ability of the arm muscles to make punches strongly and quickly. Arm power is a combination of strength and speed in performing a movement with a short time to provide the best momentum to the body or object in a complete movement to achieve the desired goal (Sari et al., 2019). An athlete in a match certainly really needs a Power arm to hit and kick at the right time both when attacking and when defending because in training and matches. An athlete experiences a lot of problems with poor arm power so that the combination of punches and kicks is not optimal, so that athletes' punches are easily avoided and deflected by opponents, and slow when counterattacking.

Based on the explanation and description of the theory about the Power of the arm muscles and the combination of punches and kicks it can be understood that the combination of punches and kicks really requires the Power of the arm in order to be able to kick strongly and quickly thus it is suspected that the power of the arm has a direct and direct effect and is significant to the combination of punches and kicks. It can be interpreted that power has an influence in increasing the ability of punches and kicks, in this case the combination of arm Power is a variable that must be owned as a support for realizing the competence of punches and kicks in matches.

Hand eye coordination is a complex part and develops through spatial awareness, namely the ability to estimate distance, and eye coordination: and the hand is the ability to feel, understand, and effectively apply emotional power and sensitivity as a source of energy, information, connection, and humane influence (Sampurna et al., 2021). If good hand-eye coordination is owned by the Athlete then it will be easier to perform a combination of punches and kicks at the right stuation and attack distance, because in the match the Athlete must attack on the right target to obtain points, then the combination of punches and kicks really needs good hand-eye coordination.

Based on the explanation and description of the theory of hand-eye coordination and the combination of punches and kicks, it can be understood that the combination of punches and kicks really requires hand-eye coordination in order to be able to hit and kick firmly and quickly on target. Thus, it is suspected that hand-eye coordination has a direct and significant effect on the combination of punches and kicks The test results are in accordance with the study of the theory, theoretical framework and hypothesis proposed.

Thus it can be used to explain the relationship and influence that occurs between exogenous variables, and endogenous variables shown in the model (Figure 2). The results of the path coefficient significance test on the initial model of sub-structure 1 are summarized in the path cofesien table and the similarity of the structure Y= ρy1 X1 + ρy2 X2 + ρy3 X3 + Ɛ1 So that the equation Y = 0.251 X1 + 0.291X2 +0.480 X3+ 0.38 is obtained.

Figure 2.

Relationship of X1,X2,X3 Structure with Y
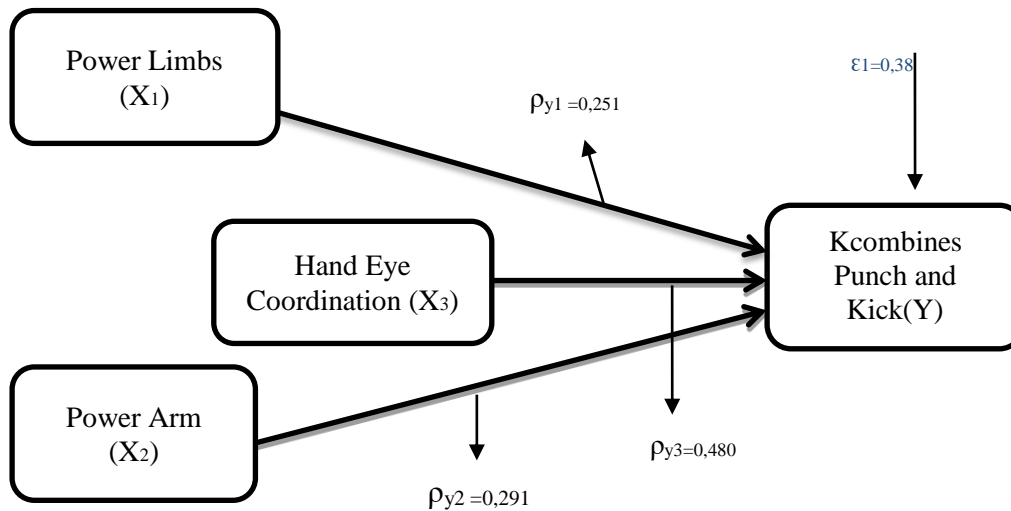
5. CONCLUSIONS

Based on the results of the analysis and discussion above, the conclusions that can be drawn in the study are as follows: 1) There is a significant direct influence of limb muscle power on the combination of martial arts kicks of Riau holy site athletes, 2) There is a significant direct influence of arm muscle power on the combination of martial arts kicks of Riau holy site athletes. 3) There is a significant direct influence of hand-eye coordination on the combination of punches and martial arts kicks of Riau holy site athletes. The results of this study are expected to be applied during training and in matches for holy tread athletes.

This research answers that limb power, arm power, and hand-eye coordination contribute significantly to the combination of punches and kicks, so it is hoped that the combination of punches and kicks of martial arts athletes can improve the game in the match and achieve their best achievements. This research only discusses a few factors that affect the combination of punches and kicks of athletes, there are many other factors such as basic techniques and good motor movements, agility, speed, accuracy, etc. That way, it is hoped that there will be further research that examines other variable factors so that all aspects that can affect the combination of punches and kicks can be analyzed and get answers so that they can improve the achievements of Indonesian martial arts athletes, especially riau sacred site athletes.

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