

# Effect of Leg Power, Arm Power, Eyes and Foot Coordination and Self Confidence on Back Attack Smash in Volleyball

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**Abstract—** This study aims to determine the effect of limb power, arm power, eye-hand-foot coordination and self-confidence against smash back attack in volleyball. The research using path analysis. Population and sample of this research is athletes PELATCAB PORDA Bekasi. The results of this study explain that limb power, arm power, eye-hand-foot coordination and self-confidence can influence the ability of smash back attack. Indirect effect of limb power, arm power, eye-hand-foot coordination through self-confidence can improve smash back attack ability. Self confidence to do smash back attack is determined by physical ability in this research is power limb, power arm and eye-hand-foot coordination. Confidence itself is the determining factor of the success or failed of the implementation smash back attack. The conclusion of this study that changes in smash back attack ability can be explained by limb power, arm power and eye-hand-foot coordination either directly or indirectly in this case through confidence. A change in self-confidence for an athlete can be explained by physical abilities in this case are arm power, limb power and eye-hand-foot coordination.

**Keywords—**power limbs, arm power, eye-hand-foot coordination and self-confidence and smash back attack

## I. INTRODUCTION

The volleyball game is a very exciting sport to play. Volleyball is no stranger to the community, from the first until now very popular by the community, it is evidenced by the number of tournaments volleyball from village to international level.

The game technique of volleyball shows an interesting skill to watch. volleyball game has a fairly complex technique and not easy to do by everyone. Volleyball game is a complex game that is not easy for everyone to do. This game also has a variation of play by combining several techniques such as smash techniques [15].

The influence of the highly dominant spiker, making the smash as the main orientation of the exercise so that other techniques less attention. Smash is one type of attack in the form of a hard blow and sharp down, so the ball will be difficult returned by the opponents. A game of volleyball, smash is the most decisive success of an attack [3]. Smash is the main weapon of attack in the game of volleyball [21]. Smash is one form of art in the volleyball. To achieve points through smash is not easy to be done by a player, because it must master the technique effectively and efficiently. Smash is a way to play the ball efficiently

and effectively in accordance with the rules of the game applicable to achieve an optimal result [11].

The game of volleyball has several types of smash, the type of smash can be divided into two parts. The first type of smash that is differentiated by the type of feed given by the setter is (1) Open spike; (2) Semi spike; (3) Quick spike, and (4) Back attack spike.

Smash back attack is a variation of the smash technique from the back row. Smash performed by one of the players who are in position 1, 5, 6 behind the attack line. The back attack is invalid when the libero feeds in the attack line (3 meters), the spiker jumps right in front of the attack line (3 meters), and the feeder is the defender. Smash can be called a back attack if the defender jumps before the attack line (3 meters) and attacks / hits the ball perfectly over the net. Back attack is a deadly attack, when opponents off guard this can be a reliable main attack. This smash involves muscle power from almost all parts of the body and requires good coordination compared to other techniques. Besides the psychological aspects that play a role in it like self-confidence.

The complexity of smash back attack implementation and the many factors that influence it including one aspect psikologis. This study only discusses the effect of limb and arm power, eye-hand coordination and self-confidence. According to the author of the above three factors is the most important factor in doing smash back attack. Power is the ability of one to use the maximum power deployed in the shortest time. Power is the ability of muscles to direct maximum strength in a very fast time [8]. Limb and arm power is the ability of the muscles to exert maximum power in a very fast time [13].

Power limbs are the energy used when jumping by the way the legs contract strongly and quickly give a boost from the bottom up. Power limbs and power arms will be visible during the smash back attack to the opponent's area. Coordination is a complex motor skill necessary for high performance [4]. Coordination is the ability to move at different levels of difficulty quickly and efficiently [6]. Coordination is the ability to perform movements with various levels of difficulty quickly, efficiently, and full of precision [17].

The higher coordination level, the easier it is to learn new and complicated technical and tactical skill [4]. Eye-hand coordination will produce timing and accuracy.

Smash back attack is a technique that combines the coordination of the eyes, hands and feet. In general every technique in volleyball is a blend of eye-hand and footwork.

These three physical components will result in a better technique if supported by confidence by an athlete. Self-confidence is the power of a person's mental beliefs over his ability and condition and has an influence on the condition and development of a person's personality as a whole [22]. Self-confidence is self-confidence to achieve something or target that has been determined [9]. Self-confidence as a feeling that contains the strength, ability, and skills to perform or produce something based on beliefs for success [2]. Concluded that a spiker who has a good sense of trust will be able to smash back attack well also in accordance with predetermined targets.

**II. METHOD**

This type of research is associative quantitative research or relationship. This study aims to determine the relationship between two or more variables by using correlation analysis. Associative research is a study that aims to determine the relationship of two variables or more. In this research will be built a theory that can serve to explain, predict, and control a symptom [19]. The instrument used in this study is :

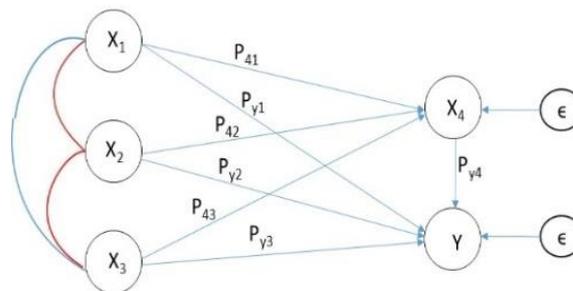
- Vertical jump, this test aims to measure the power of athlete's limbs by centi meters.
- Soft Ball Throw, this test measures the power of an athlete's arm by meters
- Eye, Hand and Foot Coordination Test. This test aims to determine the level of eye-hand and foot coordination, with frequency units.
- Psychological scale using behaviorally anchored rating scale behavior (BARS) approach method to reveal self-confidence variable with Likert scale modeling.
- Test the ability of smash back attack. This test aims to measure the ability of an athlete's back attack, with a unit of frequency

Technique of data analysis in research using path analysis consist of direct and indirect influence. To get the value of direct and indirect influence used regression analysis with intervening variable. The model of this study as shown below.

**TABLE II. THE COEFFICIENT OF REGRESSION OF THE FIRST EQUATION**

Model		Unstandardized	Coefficients	Standardized Coefficients	t	Sig.
		B	Std. Errors	Beta		
1	Constant	119.110	12.928		9.213	.000
	Leg Power	.421	.185	.385	2.274	.044
	Arm Power	.786	.415	.324	1.894	.085
	Eye and Foot Coordination	.400	.092	.627	4.343	.001
a. Dependent Variable: Self Confidence						

Path coefficient on the first expression referring to the regression output above can be seen that the significance of limb power and hand-eye and limb coordination have a value of 0.044 and 0.001 and a 5% confidence level respectively. For arm power has a value of 0.085 and a significant level at alpha 10%. The results conclude that the first equation of limb power, arm power, foot-hand coordination has significant effect on self-confidence. The



**Fig 1. Model of Study**

**Explanation:**

- X1 = power Limbs
- X2 = Power Arm
- X3 = Coordination Eyes, Hands And Feet
- X4 = Self-Confidence
- Y = Smash Back Attack

This research uses two equations as follows:

$$\text{Self-confidence} = a + \beta_1 (\text{power limbs}) + \beta_2 (\text{power arm}) + \beta_3 (\text{coordination}) + e_1$$

$$\text{Back attack} = a + \beta_1 (\text{power limbs}) + \beta_2 (\text{power arm}) + \beta_3 (\text{coordination}) + \beta_4 (\text{self-confidence}) + e_2$$

**III. RESULTS**

There are five variables to be seen in this path analysis: power limb, arm power, eye-hand-foot coordination, self-confidence, and smash back attack. There are seven path parameters to be known: Py1 up to Py4 and P41 to P43 as in picture. 4. Get the values of these parameters, two regression equations are needed, first is limb power, arm power, hand-foot coordination to self-confidence. Second is power limb, power arm, eye-hand-foot coordination, self-confidence, against smash back attack. The total effect is the sum of the direct and indirect effects. The result of data analysis using regression analysis in the first equation, there are result which summarized in table below.

**TABLE I. FIRST EQUATION**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.892 <sup>a</sup>	.795	.739	4.88994
a. Predictors: (Constant), Self Confidence, Hand-Eye and Foot Coordination, Leg Power, Arm Power				

amount of R Square value contained in the model summary of 0.795 shows that the effect of limb power, arm power, hand-foot coordination has significant effect on self-confidence is 79.5%, while the remaining 20.5% other variables not included in this study while the value of  $e_{10.452} (\sqrt{1-0.795})$ , thus obtained the first path diagram as follows:

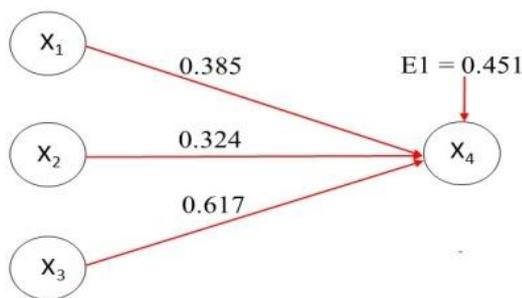


Fig 2. Diagram path analysis of the first equation

TABLE III. SECOND EQUATION

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.943 <sup>a</sup>	.889	.845	1.83013
a. Predictors: (Constant), Self Confidence, Hand-Eye and Foot Coordination, Leg Power, Arm Power				

TABLE IV. THE COEFFICIENT OF REGRESSION OF THE SECOND EQUATION

Model		Unstandardized	Coefficients	Standardized Coefficients	t	Sig.
		B	Std. Errors	Beta		
1	Constant	-37.255	13.458		-2.768	.020
	Leg Power	.349	.071	.657	4.943	.001
	Arm Power	-.090	.238	.383	1.871	.071
	Eye and Foot Coordination	.136	.035	.432	3.931	.003
	Self Confidence	.210	.086	.434	2.445	.035
a. Dependent Variable: Self Confidence						

The correlation coefficient in the second equation refers to the regression output above can be seen that the significance of limb power and eye-hand-eye coordination and self-confidence each have a value of 0.001, 0.003 and 0.035 and a significant level of 5%. As for power arm has a value of 0.071 and a significant level of 10%. The result concludes that the second equation of limb power, arm power, eye-hand-foot coordination and self-confidence have significant effect on smash back attack. The value of R Square in the summary model of 0.889 shows that the effect of limb power, arm power, foot-hand coordination and self-confidence have significant effect on smash back attack is 88.9%, while the remaining 11.1% is the influence of other variables that are not included in this study while the value of  $e_2$  0.333 ( $\sqrt{1-0.889}$ ).

**A. Direct Effect**

Based on data analysis can be explained that the direct influence between variables such as (1) There is direct influence between leg power and eye-hand-foot coordination to self-confidence with the value of 0.044 and 0.001 and 5% significant level. The arm power to self-confidence has a significance value of 0.085 and a significant level of 10%. (2) There is direct influence of limb eye-hand coordination and self-confidence on smash back attack with value 0,657, 0,617 and 0,434 significant level at alpha 5%, while power has value 0,383 and significant level 10%.

**B. Indirect Influence**

The effect of some independent variables on smash back attack against other independent variables is: First influence of limb power to smash back attack, through of self-confidence that is  $(0.385 \times 0.434) + 0.657 = 0.824$ . Based on the results of the calculation is known the value of direct influence of 0.657 and indirect influence of 0.824, the value of indirect influence greater than direct influence, it shows that indirectly limb power through self-confidence have significant influence on smash back attack.

Second, the effect of arm power on smash back attack, and self-confidence is  $(0.324 \times 0.434) + 0.383 = 0.523$ .

based on the result of the calculation is known the value of direct influence of 0.383 and the indirect effect of 0.523, the value of indirect influence greater than direct influence, it shows that indirectly arm power and self-confidence have significant influence on smash back attack. The three eye-hand-foot coordination of smash back attack, and self-confidence is  $(0.617 \times 0.434) + 0.432 = 0.699$ . based on the results of the calculation is known the value of direct influence of 0.432 and the indirect influence of 0.699, the value of indirect influence greater than direct influence, it shows that indirectly coordination eye-hand-foot and self-confidence have significant influence on smash back attack.

**C. Total Influence**

The total effect of limb power, arm power, eye-hand-foot coordination, self-confidence, against smash back attack is as follows: The total effect of limb power on smash back attack is 0.824. The total effect of arm power on smash back attack is 0.524. The total effect of eye-hand-foot coordination on smash back attack is 0.700. while the total influence of self-confidence, on smash back attack is 0.434.

**IV. DISCUSSION**

Based on the data analysis, the power is very influencing the smash back attack, this result supports the framework of thought and theories that have been described on the previous page. Power limb when doing smash back attack done behind the attack line, so an athlete needs a high jump. A high jump should require good limb power.

Back attack is in need of eye-hand-foot coordination. Timing is on time accuracy while accuracy is oriented towards target precision. If the timing is good, then the smash will be in accordance with the desired. So it will produce effective moves and get good results as well.

Self-confidence greatly affects the smash back attack. Some mental skills that become the demands of gymnasts in every tool, such as imagery, managing anxiety, energizing strategies, confidence, positive self talk, focus, staying calm, activation control [5]. Three psychological

characteristics of male and female gymnastics athletes as follows: motivations that include commitment, achievement goals, self-confidence, perseverance and self-determination [10]. The results showed that the physical condition can increase confidence. Physical aspects in this case are limb power, arm power and eye-hand-foot coordination. There is a relationship between physical aspects with psychological keterampilan aspect in athletes [7].

## V. CONCLUSION

From the analysis of data and discussion that have been described can be concluded that power limbs, arm power, eye-hand-foot coordination and self-confidence can affect smash back attack. The indirect effect of limb power, arm power, eye-hand-foot coordination and self-confidence can improve the smash back attack ability.

Self confidence to do smash back attack is determined by physical ability in this research is power limb, power arm and eye-hand-foot coordination. Confidence itself is the deciding factor of successful or not implementation of smash back attack. Can be explained that changes in the ability of smash back attack can be analyzed by power limbs, arm power and eye-hand-foot coordination either directly or indirectly through Self-confidence. Self-Confidence changes for an athlete can be explained by the physical abilities that include arm power, power of the foot and eye-hand-foot coordination.

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