



## Contribution of Leg Muscle Explosive Power and Eye-Hand Coordination to The Accuracy Smash of Athletes in Volleyball Club of Universitas Islam Riau

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### Abstract

The purpose of this study was to determine the contribution of leg muscle explosive power and eye-hand coordination. The type of research was correlational. The population in this study was all athletes who actively follow the training as many as 20 people and using total sampling technique. Thus the sample in this study amounted to 20 men athletes. The data were collected using the measurement test on the three variables: the leg muscle explosive power data was using vertical jump test, eye-hand coordination was using ballwerfen und fangen test and smash accuracy was using smash accuracy test. The data were analyzed by product moment correlation and double correlation and then continued with contribution of the determinant formula. Based on data analysis found that there was contribution of leg muscle explosive power equal to 35,52%, eye-hand coordination equal to 20,79%, and both equal to 40,70% regarding to the accuracy smash of volleyball athletes of Universitas Islam Riau. It was concluded that there was contribution of leg muscle explosive power and eye-hand coordination to the smash accuracy of volleyball athlete of Universitas Islam Riau..

### How to Cite

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## INTRODUCTION

Improving the quality of human resources is one of the development strategies in Indonesia. These efforts have a strategic role in the development of Indonesia as a whole, because it concerns the preparation of human resources as the executor of development in the future. One of them can be realized by training the youths with sports activities.

Physical exercise is one of the ways to improve human resources, by exercising regularly and continuously will improve the physical and mental quality of a person. Today, exercise is not only done to obtain physical fitness, but also to achieve the highest achievement so as to raise the prestige of a nation. So that coaching in the field of sports needs to be considered in the effort to form good personality of Indonesian who is disciplined and sportive.

This is in accordance with the provisions of the Law of the Republic of Indonesia no. 3 of 2005 Chapter II article IV on the national sports system as follows In Indonesia, sports is not only for education, recreation, and physical fitness, but also as a media to get achievement. This is in correlated with the Law of the Republic of Indonesia no. 3 of 2005 Chapter II Article IV in the chapter of National Sport System.

From that law article, one of the national sport goals is to improve sports achievement. Achievement of this sport can be achieved through the development and coaching. The coaching of the sport in college is a place to improve achievement of the students who are talented in certain sports.

Volleyball is one of the coaching programs in Universitas Islam Riau. The volleyball sport is one of the most popular sports among the students and has long been coached and is expected to make qualified young players so that later it could bring the glory of the university both at regional and national and even international level. In achieving a desirable achievement during coaching, it can not be separated from continuous and integrated training conducted continuously so that players/ athletes can have good volleyball skills.

In volleyball coaching, to achieve an achievement can not be separated from the influence of physical conditions, mental, techniques and tactics. Physical preparation is one of the most important factors in training to improve and strengthen the quality of technique. Without adequate physical condition preparation it will be difficult to achieve high achievement. Therefore,

to improve the performance of volleyball athletes, they need to improve the elements of physical condition, technique, mental maturity, cooperation and solidarity and experience in the match.

In volleyball game, smash is one of the technical skills to master. Smash is a complex movement, because it begins with the first step, repulsion to jump, hitting the ball as it floats in the air and landing back after hitting the ball.

In performing smash well with good accuracy and putting the ball right on the target that makes it difficult for the opponent to accept, there are many factors that affect it. The factors are the leg muscle explosive power, body shape, height of reaching, eye-hand coordination, arm swing, precision timing in hitting the ball, meeting ball with the hand and mastery of smash techniques and emotional athletes at the time of smash.

The author saw the smash of the athletes of Universitas Islam Riau in several games and practicing was not on target so the making it easy for the opponent team to return the ball, sometimes even the ball over the net and also often out of the field. This means that the accuracy of smash athletes has not been so good, so it was advantageous for the opponent to get points because smash accuracy is the main capital in obtaining numbers or points.

The lack of accuracy in smash of volleyball athletes might be caused by several factors such as dominant influenced by leg muscle explosive power, eye-hand coordination, body elasticity, reaching height, arm swing, timing when hit ball, low technique, meeting of the ball with the hands that have not fit and the emotional condition of athletes at the time of smash. From the facts above, the author was interested to conduct a study related to the smash accuracy of volleyball athletes in Universitas Islam Riau

How big is the contribution of leg muscle explosive power to smash accuracy of volleyball club athletes of Universitas Islam Riau. How big is the contribution of eye-hand coordination to smash accuracy of volleyball club athletes of Universitas Islam Riau. How big is the contribution of both leg muscle explosive power and eye-hand coordination to smash accuracy of volleyball club athletes of Universitas Islam Riau

## METHOD

The type of research was correlation to see the relationship between independent and dependent variables. The independent variables in this study were the leg muscle explosive power and eye-hand coordination, while the dependent va-

riable was the accuracy of smash.

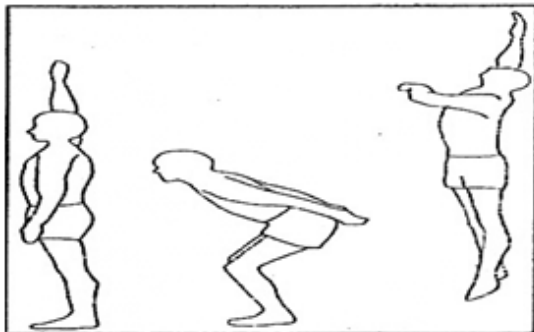
Population in this research was volleyball male athletes of Universitas Islam Riau amounted to 20 people. The sampling was determined using the total sampling technique so the sample was amounted to 20 people.

### Leg Muscle Explosive Power Test

According to Arsil (2009: 98) to determine the ability of leg muscle explosive power is by measuring the vertical jump between the reaching distance in the end of jump reduced by the reaching distance in the stand position. The tools used were wall, the meter to measure the height (350 cm), lime powder, assessment paper and stationery.

Implementation :

1. On a wall perpendicular to the floor and was made up to 350 cm in height.
2. Before measuring the height of the testee, dip one of the hands on the lime box provided.
3. Then the testee stood sideways with the right/ left legs close to the wall.
4. The calcareous right hand/ left is stretched up high and touched at the height.
5. Next the testee jumped as high as possible with the help of both arms swings. While jumping, touch the calculated hand fingers to a high size. For more details can be seen in **Figure 5**.



**Figure 5.** Vertical jump Test Source : Arsil (2009:100)

Assessment:

1. Score was obtained from the difference between final jumping and standing
2. The testees were given three chances, the highest result would be used as the score.

### Han-Eye Coordination Test

Eye-hand coordination was measured using a ballwerfen und-fungen test instrument.

The tools used were gymnastics ball, the wall where the target is tossed, lime, stopwatch,

meter, rating mark, and stationery.

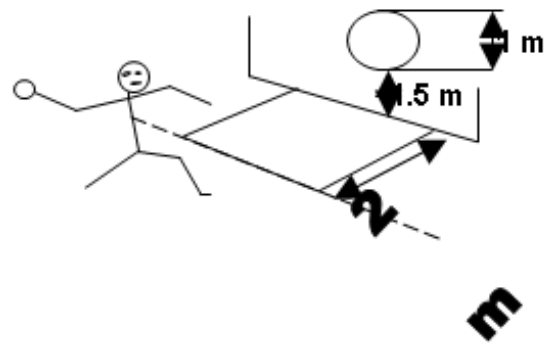
Implementation :

Testee stood perpendicularly to the target wall with the distance was being determined by holding the ball in hand.

After the signal, the testee threw the target wall, then caught it back after the ball bounced.

The throw was done within 15 seconds. When doing a throw, the ball should not be out of the target wall boundary, if it happened then it was declared failed.

Scores were derived from the number of throws obtained within 15 seconds. In this exercise each participant got 3 chances, the best result was used as score or testee value. For more details the implementation of the test can be seen Figure 6 below.



**Figure 6.** ballwerfen und-fungen test condition. Source : Hagg and Dassel (1981:42)

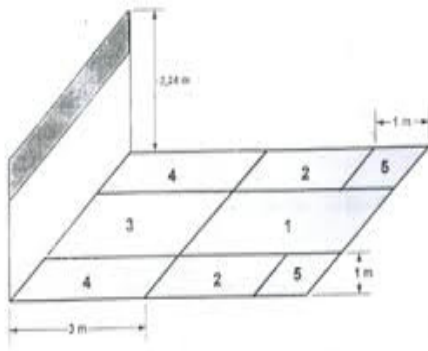
### Volleyball Smash Test, (Nurhasan, 2001; 172)

Goal: This test aimed to measure the skill to spike and smash for fast and targeted attacks.

Equipment: volleyball field that has been given points or numbers. Net and pole net, 3 volleyball pieces, stopwatch.

Implementation: Testee was in the field on the position of the area to smash. The ball was hoisted or fed near the net toward the testee. With the prefix or without the prefix, the testee jumped and hit the ball over the net into the field opposite, across which there were targets with numbers. The stopwatch runs at the time the ball was touched by the hands of the testee, and was stopped when the ball touched the floor. The highest value were taken as the final score.

Assessment: Score was consisted of two inseparable parts, the target number plus the time of the speed of the ball. Score time in seconds until the tenth. A ball that touched the target, was calculated to have entered a target with a larger number. The largest number of three executions was taken. For more details, see the figure below:



**Figure 7.** Smash Volleyball Test, Nurhasan (2001 : 172)

Hypotheses 1 and 2 were processed using the product moment formula as presented in Riduwan (2010 : 228)

$$r_{xy} = \frac{n \sum XY - (\sum X)(\sum Y)}{\sqrt{\{(n \sum X^2) - (\sum X)^2\} \{(n \sum Y^2) - (\sum Y)^2\}}}$$

Whereas :

- $r_{xy}$  = correlation coefficient
- $\sum XY$  = number of data x and y
- $\sum X$  = data x total
- $\sum Y$  = data y total
- $X^2$  = square of variable value of X
- $Y^2$  = square of variable value of Y
- $n$  = data total

Hypothesis 3 using a double correlation formula:

$$R_{y.12} = \sqrt{\frac{r^2_{y1} + r^2_{y2} - 2r_{y1}r_{y2}r_{12}}{1 - r^2_{12}}}$$

To calculate the amount of contribution of leg muscle explosive power and eye-hand coordination to smash accuracy of volleyball athletes of Universitas Islam Riau was determined by coefficient of determination with formula :

$$k = r^2 \times 100 \%$$

Whereas :

- $k$  = contribution coefficient
- $r$  = correlation coefficient

## RESULT AND DISCUSSION

The first finding was the contribution of leg muscle explosive power to the smash accuracy of volleyball athletes of Universitas Islam Riau. The amount of contribution by leg muscle explosive power variable (X1) to smash precision (Y) was  $0.5962 \times 100\% = 35.52\%$ . From this calculation result, it was clear that the leg muscle power contributed to the accuracy of smash. Leg muscle explosive power is the explosive force of the leg muscles used to jump easily to see the opponent's

area during the match. Explosive power is required to jump when doing smash, so the ball is hit more directed the desired target. The better the explosive muscle strength of a person's legs, the better the accuracy of the resulting smash.

The second finding was the contribution of eye-hand coordination to the smash accuracy of volleyball athletes of Universitas Islam Riau. The amount of contribution of eye-hand coordination (X2) to the smash accuracy of Universitas Islam Riau (Y) was  $0.4562 \times 100\% = 20.79\%$ . Thus, it was clear that eye-hand coordination contributes to the accuracy of an athlete smash. Eye-hand coordination is the integration between the eye as the main holder, and the hand as the holder of a function that performs a certain movement, in this case, the eyes will tell when the ball is at a point so that the hand instantly swings to do the right punch. From the measurements of 20 athletes, there were only 6 athletes who had eye-hand coordination above the average. Practicing is certainly necessary to improve eye-hand coordination such as throwing and catching the ball to the wall, throwing the ball in pairs hands and so on because the better the eye-hand coordination of a person it will be easier to smash or hit the ball when the area is empty so that can later create points to gain victory.

The third finding was the contribution of both leg muscle explosive power and eye-hand coordination to the smash accuracy of volleyball athlete of Universitas Islam Riau. The magnitude of the contribution by variable leg muscle explosive power (X1) and eye-hand coordination (X2) simultaneously to smash accuracy (Y) was  $0.6382 \times 100\% = 40.70\%$ . According to Mahendra (2007: 38) in Saputra's journal, explained that hand-eye coordination associated with the ability to choose an object and coordinate it is one of the coordinated motion abilities. Then Saputra (2016) stated that leg muscle explosive power is a process undertaken by a person at the time of doing leap, running etc.

From the explanation above, it was concluded that leg muscle explosive power and eye-hand coordination were two important factors that affected the accuracy of smash in volleyball game, especially for volleyball athletes of Universitas Islam Riau. Smash is the main technique to attack the opponent team, while accuracy is the ability of a person to direct the motion in certain target area. Smash can also be said of a complex movement that begins with the initial step, then doing a repulsion to jump, and landed again after hitting the ball. To produce repulsions as high as possible upward, while hitting the ball at an

appropriate point with the hand position above the net and being able to aim the ball at the desired target is needed. This is the importance of leg muscle explosive power and eye-hand coordination. When we look at the findings of smash accuracy by athletes, there were only 11 athletes who had high smash accuracy.

Although leg muscle explosive power and hand eye coordination contribute to the smash accuracy of volleyball athletes of Universitas Islam Riau, the accuracy of the smash can also be influenced by other factors such as muscular arm power, body shape when in the air to hit the ball near the net, arm swing, mastery of smash techniques and emotional athletes at the time of smash in a volleyball play situation, and timing in hitting the ball. In addition, to win a match or game, it requires not only physical preparation but also need to improve technical elements, tactics, mental maturity, cooperation and compactness during the match, and continuously programmed training.

## CONCLUSION

Based on the results of the analysis and discussion that had been described in the previous section, then in this chapter was drawn conclusions and suggestions that were as follows: 1) Leg muscle explosive power contributed to the smash accuracy of volleyball athletes of Universitas Islam Riau by 35.52%; 2) Eye-hand coordination contributed to the smash accuracy of volleyball athletes of Universitas Islam Riau by 20.79%; 3)

Leg muscle explosive (X1) and eye-hand coordination (X2) together contributed to the smash accuracy of volleyball athletes of Universitas Islam Riau by 40.70%

Based on the conclusions in this study, it was suggested to: 1) Coaches should provide the leg muscle explosive power and eye-hand coordination training to improve smash accuracy in volleyball; 2) Athletes should be more diligent to practice, both physical and technical training to master volleyball techniques, especially smash techniques; 3) The other researchers are encouraged to examine other factors related to smash accuracy in volleyball, so it would be known many other factors that could affect the accuracy of smash .

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