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Contribution of Leg Muscle Power, Leg Flexibility and Balance to Kedeng Smash Ability Sepaktakraw Game

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Abstract---The purpose of this study was to analyze the contribution of leg muscle power, leg shape, and balance with the ability to smash into the game of *sepaktakraw* in Student education and training Center, at Riau Province. This study uses regression and correlational method with SPSS 20. The subjects in this study were 76 athletes. The results of this study are: (1) contribution of leg muscle power was 13.18%, (2) contribution of leg flexibility was 9.42%, (3) the balance contribution was 7.78%, (4) contribution of leg muscle power and leg flexibility was 24.5%, (5) contribution of leg muscle power and balance were 17.14%, (6) contribution of leg shape and balance was 13.63%, (7) contribution of leg muscle power, leg size and balance were 27.6%. Leg muscle power, leg shape, and balance are interrelated bio-motor abilities. The four variables are correlated, but the contribution is not significant. Leg muscle power related to Kedeng smash has never been studied. Therefore this research is useful in the type of exercise that will provide.

Keywords: Kedeng smash, leg flexibility, balance, leg muscle power, sepaktakraw

I. INTRODUCTION

The *Sepaktakraw* game aims to return the ball in such a way that it can fall on the opponent's field or cause the opponent to make mistakes or violations [1]. Game rules allow players to make contact with the ball three times in a row [2].

One of the basic techniques that must be mastered in *sepaktakraw* is a smash, *kedeng* or salto. According to Sulaiman, it is an attack or a hard smash and sharp blow to the opponent's field [3]. *Kedeng* smash is a smashing punch by sticking out the foot to chase the ball, with the body rotation (salto) in the air. The smash aims to turn off the ball in the opponent's area and then allow the server player to do the service [4].

Kedeng smash has a relatively high level of difficulty. According to Piyasak, *Kedeng* smash movement on *sepaktakraw* involves aspects that affect physical conditions, including power, motor performance, namely strength, flexibility, speed, and balance. The components of the physical most influential condition to do a smash in sepaktakraw are on the foot of the pedestal and leg muscle strength is more dominant than the other physical condition components [5]. Power is an essential factor in determining the success of various sports. Widiastuti said that power is a series of working elements of muscle motion which produces explosive power [6].

Determination of one component to support body movements widely requires the flexibility that involves the movement of joints both when serving, hitting, blocking, or smash. Body movement on serving, hitting, blocking, or smashing, requires flexibility that involves joint movement. [7]. The movement in the game *sepaktakraw* must be agile and fast, then the flexibility is needed [8]. Flexibility is a person's ability to carry out movements with a full amplitude [9].

Balance is the ability of a person to be able to maintain a posture consistently both during movement and when silent [10]. Prasetyo said that balance is the body's ability to maintain a position in various movements [11]. Balance is essential during the prefix and when jumping. So balance can be interpreted as a person's ability to control his body's instruments in maintaining a balanced [12].

Some of the opinions above suggest that Muscle Leg Power, Leg Flexibility and Balance are needed in Kedeng smash ability, but there has been no research on the contribution of these three variables to the Kedeng smash skills. The purpose of this study was to analyze the contribution of leg muscle power, leg shape, and balance with the ability to smash into the game of *sepaktakraw* in PPLP-D athletes.

II. METHODS

This research used regression and correlation or contribution of four variables, namely leg muscle power, leg shape, balance, and *kedeng* smash in *sepaktakraw* game. The independent variables were leg muscle power, leg shape, and balance and the dependent variable (Y) was *kedeng* smash ability of *sepaktakraw* game. The subjects in this study were 76 athletes Student education and training Center.

The research design used is correlational design Regretion with SPSS 20, which describes a contribution, estimate, and test based on existing theories. The data collection method in this study was 4 types of tests, namely (1) a test of measuring leg muscle power using vertical jump, (2) a test of legged limb measurement using front splits, (3) a balance measurement test using a modified bass dynamic balance test, (4) a *kedeng* smash test uses the *Kedeng* smash ability test.

III. RESULTS AND DISCUSSION

This study found that the correlation of leg muscle power coefficient on the ability of rxy kedeng smash = 0.363 with r_{value} = 0.363> r_{table} = 0.235, and interpreted that there is a significant relationship between the two variables. Thus, the hypothesis (Ha) is accepted. The correlation coefficient (r2) = 0.3632 = 0.1318. This means that the variable leg muscle strength contributes 13.18% to kedeng smash ability.

Correlation coefficient of leg shape with kedeng smash ability is rx^2y = 0.307 with r_{value} = 0.307> r_{table} = 0.235. This shows a significant relationship between the two variables. Based on the strength of the relationship with two variables, the value of the regression equation is Y = 1.91 + 1.811X2; thus, the proposed working hypothesis (Ha) is accepted. Correlation coefficient (r^2) = 0.3072 = 0.942, which is interpreted as the variable contribution of limb determination is 9.42% to the ability of kedeng smash. Movement in sepaktakraw games must be agile and fast, so to move fast and agile requires flexibility [8].

Balance correlation coefficient with kedeng smash ability rx^2y = 0.279 with rvalue = 0.279> rtable = 0.235 which states that there is a significant relationship between the two variables. The strength of the relationship between the two variables, the regression equation is Y = 17.35 + 0.197X3; thus, the proposed working hypothesis (Ha) is accepted. Furthermore the correlation coefficient (r^2) = 0.2792 = 0.778, meaning that the balance variable contributes 7.78% to kedeng smash ability. Players are always required to integrate various types of movements into a series of intact and harmonious movements.

Correlation analysis of leg muscle power variable and leg flexibility variable correlation is rx2y = 0.495 > r table = 0.235. Based on the strength of the relationship to the three variables, the regression is Y = 7.8 + 0.302X1 + 1.811X2, with Fvalue = 8.296 > Ftable = 3.33, it means that work hypothesis (Ha) is accepted. It shows a significant relationship between leg muscle power (X1) and leg flexibility (X2) towards the kedeng smash ability (Y). Furthermore, the coefficient of determination through the squared correlation coefficient (r2) = 0.4952 = 0.2450. It means that leg muscle power variables and leg flexibility as independent variables have a contribution of 24.50% to kedeng smash ability as a dependent variable. The jumping tests have shown correlation between variables of flexibility and power in handball athletes [13]. The results from the field study showed that the combination of leg muscle explosive power (X1) and flexibility (X2) have significant contributions to lay-up shoot skills (Y). With respect to leg muscle explosive power, thejoint flexibility of lay-up shoot skills is 0.934 [14].

The second multiple regression analysis, is the variable leg muscle power (X1) and balance (X3) on the *kedeng* smash ability. Both variables (X1 and X3) show that leg muscle power variables and balance variables have a significant relationship and contribute significantly to smash ability. In the table correlation analysis, variable correlation coefficient the leg muscle power is obtained, and the balance of the smash skills is $rx^{12}y$ = 0.414 > r_{table} =0.235. The relationship of three variables, the regression equation value can be described as follows Y = 1.91 + 0.302X1 + 1.197X2 , with F_{value} = 6.93 > F_{table} = 3.33. It means that work hypothesis (H_a) is accepted. It shows a significant relationship between leg muscle power (X1) and balance (X3) towards the *kedeng* smash ability (Y). A squared correlation coefficient (r^2) = 0.414^2 = 0.1714, means that leg muscle power and balance variables as independent variables have a contribution of 17.14% to *kedeng* smash ability. A high jump requires good leg muscle power to support the quality of the smash movement that is carried out when jumping and destroying, and the body must also move in harmony and harmony. In addition to high jumps, the role of balance is also significant when doing a smash because good balance will result in a perfect landing. The explosive power of the leg muscles to the ability on lofted kick [15].

The third multiple analysis, that is between the variables of leg flexibility (X2) and balance (X3) on *kedeng* smash ability. The two variables (X2 and X3) show that the variable leg flexibility and balance variables have a significant relationship and contribute significantly tflexibilityo smash skills. In the table correlation analysis, the correlation coefficient of the leg variable is obtained, and the balance of the smash skills is $rx^{12}y$ = 0.369 > r_{table} = 0.235. Based on the strength of the relationship to the three variables, the regression equation value can be described as follows Y = 78.40 + 0.1811X2 + 0.197X3, with F_{value} = 6.40 > F_{table} = 3.33 means that the data is in a linear state, thus the proposed work hypothesis (H_a) is accepted. This shows a significant relationship between leg muscle power (X1) and balance (X3) together

towards the *kedeng* smash ability (Y). This shows that multiple linear regression of leg flexibility (X2) and balance (X3) determinations of *kedeng* smash ability is real; thus, the proposed hypothesis (Ha) is accepted. Furthermore, the coefficient of determination through squared correlation coefficients (r^2) = 0.369^2 = 0.1362 means that the two limb and balance variables as independent variables have a contribution of 13.62% to *kedeng* smash ability as dependent variable limb muscle power. When jumping to the maximum and before hitting the ball a good start is needed, the prefix in question is by flexing the leg to take the lead before hitting the ball so that when the ball is kicked the ball will be hard and sharp. To get a good quality of movement, a flexible and flexible limb is needed. Merging this movement can only be done well if it is supported by a good balance too.

For the third multiple analysis, tha is between of leg flexibility (X_2) and balance (X_3) on *kedeng* smash ability. The two variables (X_2 and X_3) show that the variable leg flexibility and balance variables have a significant relationship and contribute significantly to smash skills. In the table correlation analysis, the correlation coefficient of the leg muscle flexibilityvariable is obtained, and the balance of the smash skills is $rx^{12}y = 0.369 > r_{table} = 0.235$. Based on the strength of the relationship to the three variables, the regression equation value can be described as follows $Y = 78.40 + 0.1811X_2 + 0.197X_3$, with $F_{value} = 6.40 > F_{table} = 3.33$ meaning that the data is in a linear state. Thus the proposed work hypothesis (Ha) is accepted. This shows a significant relationship between leg muscle power (X_1) and balance (X_3) together towards the *kedeng* smash ability (Y). This indicates that multiple linear regression of leg flexibility (X_2) and balance (X_3) determinations of *kedeng* smash ability is real; thus, the proposed hypothesis (Ha) is accepted.

Furthermore, the coefficient of determination through squared correlation coefficients (r^2) = 0.369^2 = 0.1362, means that the two limb flexibility and balance variables as independent variables have a contribution of 13.62% to *kedeng* smash ability as dependent variable limb muscle power. Result the research is a contribution of leg strength, balance, and flexibility of leg muscles with the speed of front kick in pencak silat martial arts. Proven from the results of the analysis obtained the value of the contribution of 40.31% [16]. When jumping to the maximum and before hitting the ball a good start is needed, the prefix in question is by flexing the leg to take the lead before hitting the ball so that when the ball is kicked the ball will be hard and sharp. To get a good quality of movement, a flexible and flexible limb is needed. Merging this movement can only be done well if it is supported by a good balance too.

IV. CONCLUSION

Based on the results of data analysis and the discussion, it can be concluded as follows: (1) Power of leg muscles contributes to *kedeng* smash ability in sepaktakraw, which is 13.18%, (2) Leg determination contributes to *kedeng* smash ability, which is 9.42%, (3) The balance contributes to the ability of the smash *kedeng*, which is 7.78%, (4) Power of leg muscles and leg shape contributes to *kedeng* smash ability, which is 24.50%, (5) Power of leg muscles and balance contributes to *kedeng* smash ability, which is 17.14%, (6) Leg and balance determination contributed to the ability to smash *kedeng*, which is 13.63%, (7) Leg muscle power, leg shape, and balance contribute to *kedeng* smash ability of 27.6%.

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