

**Correlation Between Arm Muscle Power and Badminton Smash Skill****Myrza Akbari^{1✉}, Johaidah Mistar², Rahmati Ismail³, Razali Ismail⁴**

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Abstract

Based on theoretical studies, the variable arm muscle power is an important factor of physical condition in supporting badminton smash skills. This study aims to determine the correlation between arm muscle power and badminton smash skills. This research uses a quantitative approach with correlational research type. The research sample consisted of 73 people who were selected from physical Serambi Mekkah University, Banda Aceh. The research instruments used for each variable were: arm muscle power using the shot put test instrument, while for badminton smash skills using a process and result test developed by the author himself, the data analysis stages consisted of calculating the mean, standard deviation.. The stages of data analysis carried out were the calculation of the average, standard deviation, determination of the t score, calculation of the correlation and the t test to determine the significance of the correlation between variables. Based on the analysis of research data, The correlation between arm muscle power and badminton smash skills is ($r = 0.88$. which means that there is a significant correlation between arm muscle power and badminton smash skills. Based on the calculation of the coefficient of determination, it was also found that arm muscle power contributed 78.68% to badminton smash skills.

How to Cite

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INTRODUCTION

In badminton, a player / athlete is required to have elements of physical condition such as power, coordination and flexibility and excellent physical endurance. Badminton players must also have mental attributes, because it is no secret that the psychological element is currently an important factor in supporting sports skills..

In badminton, strokes technique is a fundamental thing. strokes technique is a way of making a shot with the aim of directing a shuttlecock to the opponent's field. strokes technique in badminton is composed of several basic movements that are systematically arranged from the start to the end, so that the position taken when each stroke can affect the quality of the shot on the shuttlecock.

Smash is a type of stroke that is usually used to kill opponents and to gain points. There are two types of smash, forehand smash and backhand smash. Forehand smashes are considered more "deadly" than backhand smashes so badminton players often use this smash technique to collect point by point, forehand smash practice can increase the smash skill of a badminton player (Vernando et al., 2017). In badminton matches and training, the smash is a dominating shot, Li in his research journal states that one of the dominant skills in badminton is the forehand overhead smash, in a smash technique there are more than half of the attacks during the match (Li et al., 2017). Smash skills occur because of a systematic series of movements. Smash as an offensive attack is considered as one of the most important attacks during a match and where a player can make points and increase the chance to score points (El-Gizawy & AKI, 2014).

Power is very important for athletes because of the maximum contraction, time to react and the ability to use full strength to move at the highest frequency and in the shortest period of time are the abilities needed to be mastered and the main factors for an athlete to achieve the ability to be physically fit. at a high level. Power is very popular among athletes, especially for top athletes, especially badminton, who have very dynamic movements and high speed to hit the shuttlecock as fast and as hard as possible so that the shuttlecock is right on target and earns points.

From this description, the badminton smash movement is much influenced by the shoulder joint and elbow joint, because the smash movement is identical to the throwing or swinging motion, throwing or swinging a racket occurs because of the coordination of the movements of

the upper and lower arms that move in flexion and extension. so that arm muscle power supports good smash skills, Power is the key to the final quality of a smash (Zhang et al., 2016). So that someone who has good arm muscle power is thought to have an effect on his smash skills.

Power is very important to athletes because of maximum contraction, time to react and the ability to use full force. Power is the ability to fight resistance or loads with fast and explosive movements. This limitation refers to the ability to perform movements quickly so that if the prisoner at hand is unable to move quickly, the power of speed will turn into explosive force (Luminturso, 2013).

The characteristics of the smash have a very dynamic movement and high power to hit the shuttlecock as fast as possible so that the shuttlecock reaches the opponent's area of the field. To move at the highest frequency and in the shortest period of time is the ability required to be mastered and a major factor for an athlete to achieve high levels of physical conditioning. Power is defined as the level of motion performance which is the product of force and displacement. Another way to define power is the amount of force generated during an activity at a certain speed (Mcguiga, 2017).

It is clear that explosive power has two components, namely strength and speed, so power can be manipulated or increased by increasing muscle strength without neglecting speed or vice versa, this kind of approach is usually by training both together to produce good explosive power. The upper body is very effective in providing strength when punching with the hands (Dougherty, 2013) and this is in accordance with the characteristics of badminton..

Talking about smash skills, smash is defined as hitting a forehand or backhand shuttlecock that is very hard and fast, because it is accompanied by all the existing power, and more importantly by jumping which aims to suppress the opponent until the opponent's game dies (Usman, 2011). The smash is said to be a fast, powerful down, and dive, the smash in badminton can only be done overhead. In addition, the smash is also a stroke that is identical to the attacking stroke, this is an overhead blow that is directed under the opponent's playing area which is carried out with full power.

Smash prioritizes arm strength and speed and wrist resuscitation so that the shuttlecock glides sharply and dives (Mike, 2011). Physically, a smash can be interpreted as maximizing transfer momentum on impact (Kwan & Rasmussen,

2010). This can be obtained by speeding the racket with the ball. This stroke requires aspects of good physical condition, namely agility, muscle endurance, cardiovascular endurance, strength, power, speed, flexibility and body composition (Kunta, 2010).

Based on the background of these problems, the problem formulation in this study is how the relationship between arm muscle power and badminton smash skills. The purpose of this study was to determine how the relationship between arm muscle power and badminton smash skills.

METHODS

This study uses a quantitative approach with correlational research that aims to determine the relationship between the variables to be studied. The size of the relationship is stated in the correlation coefficient. The research constellation can be seen in **Figure 1**:

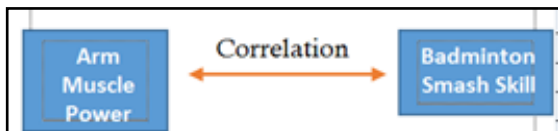


Figure 1. The research constellation

The research sample was identified by selecting badminton smash skills which were assessed by 3 badminton experts, so that 73 samples were identified for the research data collection. The data collection instrument used for each variable was the power of the arm muscles using the Shot-Put test instrument (Widiastuti, 2011). while for badminton smash skills using instruments developed by the author after going through validation and reliability tests.

Analysis of research data using the product moment correlation formula which aims to find out the correlation coefficient between the two variables, the product moment correlation formula can be seen in **Figure 2**.

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

Figure 2. product moment Formula

RESULTS AND DISCUSSION

After identifying the value of arm muscle power (X), then proceed with compiling a frequency distribution with a range value of 3.79. Furthermore, the average value is 50, and the standard deviation is 1.222.

Based on the research data on arm muscle power (X), the frequency distribution can be arranged as in **Tabel 1**.

Tabel 1. Frequency distribution of arm muscle power values

Interval	Absolute Frequency	Relative frequency (%)
33,71 - 36,71	13	17,81
36,72 - 39,72	9	12,33
39,73 - 42,73	2	2,74
42,74 - 45,74	1	1,37
45,75 - 48,75	1	1,37
48,76 - 51,76	4	5,48
51,77 - 54,77	7	9,59
54,78 - 57,78	18	24,66
57,79 - 60,79	11	15,07
60,8 - 63,8	4	5,48
63,81 - 66,81	3	4,11
Total	73	100

Based on the frequency distribution **Tabel 1**, the histogram graph of the arm muscle power data distribution is as shown in **Figure 3**.

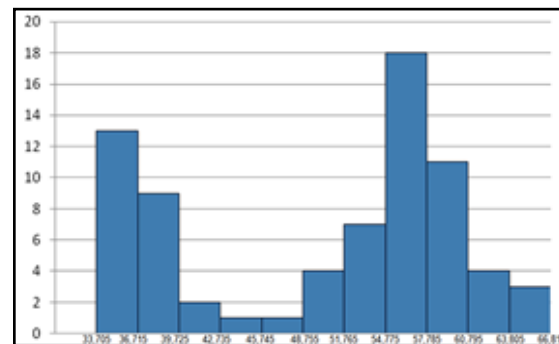


Figure 3. The histogram graph of the arm muscle power data

Based on the Badminton Smash skill value (Y) obtained a range of 39.13. Furthermore, the average value is obtained at 50.

Based on the research data on the badminton smash skills (Y), the frequency distribution is arranged as in **Table 2**.

Table 2. Frequency Distribution of Badminton Smash Skills Scores.

Interval	Absolute Frequency	Relative frequency (%)
31,18 - 35,18	5	6,85
35,19 - 39,19	8	10,96
39,2 - 43,2	6	8,22
43,21 - 47,21	10	13,70
47,22 - 51,22	10	13,70
51,23 - 55,23	7	9,59
55,24 - 59,24	13	17,81
59,25 - 63,25	7	9,59
63,26 - 67,26	5	6,85
67,27 - 71,27	2	2,74
total	73	100

Based on the frequency distribution **Tabel 2**, the histogram graph of the Badminton Smash Skills data distribution is as shown in **Figure 4**.

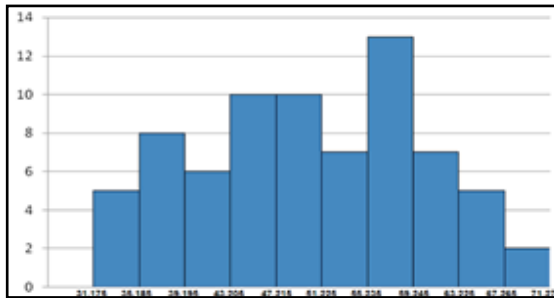


Figure 4. The histogram graph of the Badminton Smash Skills data

The next step is the calculation of the correlation using the product moment formula. The significant value between arm muscle power and badminton smash skills is ($r = 0.88$ which means there is a significant relationship between arm muscle power and badminton smash skills..

Furthermore, based on the calculation of the correlation, the writer carried out the calculation of determination to determine the percentage of contribution between variables $KP = r^2 \times 100\% = 0.882 \times 100\% = 78.68\%$. So this shows that arm muscle power contributed 78.68% to

badminton smash skills. The results of this study are in accordance with Myrza's findings which state that arm muscle power affects badminton smash skills (Myrza et al, 2018). Besides that, Zao stated that Power is the main key to the final quality of a smash smash (Zhang et al., 2016). Power is an important indicator of physical condition for each individual which is closely related to the achievement of the quality of movement skills. Smash skills are very important in badminton. smash skills determine the badminton performance of an athlete (Seth, 2016). Power is an individual capacity to perform mobile tasks quickly and powerfully. In the game badminton requires a variety of very complex and dynamic movement activities, especially in the smash which demands strength and speed, of course, requires athletes to have good arm muscle power abilities. Good arm muscle power will make the arm movement during the smash move explosively so that the speed of the shuttlecock will also slide quickly and can kill the opponent's game. Bompa stated that power is very important for a sport that takes advantage of its explosiveness in every movement (Bompa & Buzichelli, 2015). Apart from that, physical exercise of badminton players is also very important during competition, and this can help improve their appearance. To become a badminton player who has complex abilities, an athlete needs good physical training, good technical training, and the right tactical approach (Milon & Milon, 2019).

CONCLUSION

Based on the results of hypothesis testing and discussion, it can be concluded that there is a significant relationship between arm muscle power and badminton smash skills with a value ($r = 0.88$, arm muscle power contributes 78.68% to badminton smash skills.

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