



Examination of Leg Power and Core Muscle Strength on Linear Kick Velocity in Pencak Silat among Tapak Suci Putera Muhammadiyah 181 Athletes, Majene Regency

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Abstract

Objectives. In this study, Tapak Suci Putera Muhammadiyah 181 athletes from Majene Regency will demonstrate how leg power and abdominal muscular strength affect the speed of straight kicks during pencak silat.

Materials and Methods. Twenty athletes from Tapak Suci Putera Muhammadiyah 181 Majene Regency made up the study's population. Twenty athletes made up the sample size, which was obtained utilizing Saturated Samples. The survey approach was utilized to obtain the data, which included testing and measurements using devices that measured the pencak silat's straight kick speed, leg power, and abdominal muscular strength. Descriptive analysis, product moment correlation analysis, and regression using the normality and linearity precondition tests were all employed in the data analysis methodology.

Results. The study's findings show that: 1) Leg power significantly influences the speed of straight kicks in pencak silat among athletes from Tapak Suci Putera Muhammadiyah 181 Majene Regency, with a contribution of 75.3% and a R value of 0.867 and a probability value of 0.000 <0.05. 2) With a R value of 0.646 and a Probability value of 0.002 <0.05, the power of the abdominal muscles significantly contributes 41.8% to the speed of straight kicks in pencak silat among athletes from Tapak Suci Putera Muhammadiyah 181 Majene Regency. 3) With a R value of 0.891 and a Probability value of 0.000 <0.05, the speed of straight kicks in pencak silat among athletes from Tapak Suci Putera Muhammadiyah 181 Majene Regency is significantly influenced by both leg power and abdominal muscle strength at the same time, accounting for 79.3% of the total.

Conclusion. The study's findings indicate that, with respective contributions of 75.3% and 41.8%, leg power and abdominal muscular strength significantly influence the speed of straight kicks in pencak silat among Tapak Suci Putera Muhammadiyah 181 participants from Majene Regency. Leg strength and abdominal muscular strength together accounted for 79.3% of the straight kick speed.

Keywords : Leg Power, Abdominal Muscle Strength, Straight Kick, Pencak Silat

Introduction

Sports play an important role in maintaining physical fitness and health, as well as improving physical fitness. Along with the increasing public interest in sports, this activity has become a means to maintain health, recreation, fill free time, and achieve achievements (Kuswoyo, 2018) . According to Sukirno (Kuswoyo & Betaubun, 2019) sports have a very large impact on the formation of physical fitness, which in turn contributes to improving the

quality of life. In addition to being an effort to improve fitness, sports are also a way for individuals to achieve achievements through routine training that focuses on improving physical, technical, tactical, and mental. Sports can be used as a means to achieve these goals if carried out in a structured, consistent, and planned manner (Herdiman et al., 2022) .

One of the sports that supports achievement is Pencak Silat, a martial art that requires adequate physical strength (Herdiman et al., 2022) . Pencak Silat is a sport that not only relies on physical strength, but also skills in carrying out complex basic techniques. According to Ibrahim (Islamiyah, 2021) , Pencak Silat has aspects that include techniques, tactics, physical strength, and mentality that must be considered by an athlete. Pencak Silat has developed rapidly and become part of Indonesian culture. The Indonesian Pencak Silat Organization (IPSI) was founded in 1948 and now Pencak Silat is competed in international events such as PON, SEA Games, and Asian Games, so that this sport has become a symbol of national unity and a tool to make Indonesia's name famous on the world stage (Kholis, 2016)

Pencak Silat has various basic techniques that need to be mastered by athletes, including punching, kicking, sweeping, slamming and locking techniques. Straight kick is one of the techniques that is often used in matches because it can produce quite a lot of points if executed correctly. (Khunaefi, 2015) straight kicks in pencak silat are a technique that is easy to do and effective in combat, because this attack provides advantages in terms of speed and strength.

Speed and physical strength greatly affect the effectiveness of straight kicks in pencak silat. According to (Khunaefi, 2015) power or muscle strength is the ability of muscles to produce maximum force in a short time, which greatly affects the quality of the kick. Leg muscle power is very important in determining how strong and fast a kick can be launched. In addition, abdominal muscle strength also plays an important role in providing additional stability and power when kicking. Abdominal muscle strength can affect body posture and control when kicking (Mulyana, 2017) . Therefore, the basic technique of straight kicks must be accompanied by good physical condition, especially leg muscle and abdominal muscle strength, so that the resulting kick can reach maximum speed and produce points. (Mustakim et al., 2021) . In addition to leg muscle power and abdominal muscle strength, other factors such as leg muscle explosiveness, endurance, body flexibility, and balance also play a role in the success of the kick. (Kuswoyo, 2017) . According to Gabbett (Kuswoyo & Donggoran, 2019) leg muscle explosiveness refers to the ability of the muscles to produce force in a short time which will result in a fast and powerful kick. Body balance is also very important in pencak silat, because good balance allows the athlete to maintain control of the kicking

movement and avoid injury (Rahman et al., 2021) . Therefore, athletes need to do routine training that not only focuses on kicking techniques, but also on strengthening the body's muscles to support the quality of the kick.

This study offers a new perspective in understanding the relationship between abdominal muscle strength and leg power with straight kick speed in pencak silat, especially in athletes of Tapak Suci Putera Muhammadiyah 181 Majene Regency. The novelty of this study lies in its approach that combines two very important physical factors—leg power and abdominal muscle strength—in analyzing kick speed, which has not been widely discussed in previous studies in the context of pencak silat. This study also provides a new contribution in identifying specific factors that affect athlete performance in kicking techniques, which can help develop more targeted and effective training methods for pencak silat athletes, especially at the local level. In addition, this study can be a basis for further research that enriches the literature on the influence of physical strength on techniques in martial arts sports.

The urgency of this research is very high considering that pencak silat is a sport that requires speed, accuracy, and strength in every movement, especially in performing straight kicks. Understanding the influence of abdominal muscle strength and leg power on kicking speed is very important to improve the quality of athlete performance. This study provides useful information for coaches and administrators of the Tapak Suci organization in designing more specific training programs that are in accordance with the physical needs of athletes. In addition, by mapping the factors that affect kick speed, this study has the potential to improve athlete performance at both local and national levels, as well as contribute to the development of more efficient and effective pencak silat techniques. The findings of this study can be implemented to optimize physical training and improve movement quality, which in turn will have an impact on competition results and the overall development of pencak silat.

However, based on observations at the Majene Regional Leadership Pencak Silat Athlete GOR, many silat athletes still have difficulty in executing straight kicks optimally, especially in terms of speed and strength. Lack of technique training focused on strengthening body muscles, as well as unstructured training, has the potential to reduce the effectiveness of straight kicks. This is in line with Alamsyah's statement (Hudaya et al., 2019) which explains that without a structured and specific training program, the development of athletes' physical abilities will be hampered, including the ability to perform kicking techniques.

Therefore, this study aims to analyze the effect of leg power and abdominal muscle strength on straight kick speed in pencak silat in Tapak Suci Putera Muhammadiyah 181 athletes, Majene Regency. This study is expected to contribute to improving understanding of the factors that influence straight kicks and provide recommendations for more effective training programs for pencak silat athletes.

Materials and Methods

Study Participants.

(Sugiyono, 2017) The population used in this study was all athletes of Tapak Suci Putera Muhammadiyah 181 Majene Regency as many as 20 people. The number of samples was taken by Saturated Sampling with a sample of 20 athletes.

Study organization.

(Sugiyono, 2012) This study uses a descriptive method with a quantitative approach, as well as a correlational research type. (Gazali, 2016) Descriptive research aims to describe phenomena that occur currently or in the past, without any treatment or manipulation of existing variables. According to Furchan (Silalahi, 2015) (2004:54), the characteristics of descriptive research include describing phenomena objectively in a systematic and thorough manner, and prioritizing objectivity in presenting data. In addition, in this study, no treatment or control was carried out on the variables studied, and no trials were applied. The variables studied in this study consisted of leg power, which was measured using the standing long jump test (X1), and abdominal muscle strength measured using the sit-up test (X2) as independent variables. Meanwhile, straight kick speed (Y) was used as the dependent variable that would be analyzed to see the influence of the two independent variables.

Statistical analysis.

Data analysis in this study was conducted after data from respondents were collected. In accordance with Sugiyono's opinion (Arikunto, 2010) data analysis aims to process the data obtained in order to draw conclusions. In this study, data analysis used the SPSS 16 computer program. The analysis method used is descriptive, by calculating the relative frequency percentage using the formula proposed by Sudjono (2009:193), namely:

$$p = \frac{F}{N} \times 100\%$$

Where P is the percentage (relative frequency), F is the frequency whose percentage is sought, and N is the number of respondents.

Results

This study aims to test the relationship between two independent variables, namely leg power (X1) and abdominal muscle strength (X2), on straight kick speed in pencak silat

(Y). The description of the collected data shows the statistical values for each variable. For leg

| Statistics | Leg power | Abdominal muscle strength | Straight kick speed |
|----------------|-----------|---------------------------|---------------------|
| N | 20 | 20 | 20 |
| Mean | 2.31 | 29.80 | 23.15 |
| Median | 2.34 | 30.00 | 23.50 |
| Mode | 2.10 | 29 | 24 |
| Std, Deviation | 0.157 | 3,665 | 2,368 |
| Minimum | 2.03 | 23 | 19 |

power, the lowest score was 2.03 meters and the highest was 2.53 meters with an average of 2.31 meters. The abdominal muscle strength has a minimum score of 23 times and a maximum of 35 times, with an average of 29.80 times. Meanwhile, for the speed of the straight kick, the minimum score is 19 times and a maximum of 27 times, with an average of 23.15 times.

| | | | |
|---------|------|----|----|
| Maximum | 2.53 | 35 | 27 |
|---------|------|----|----|

Table 1. Descriptive Statistical Analysis of Leg Power and Abdominal Muscle Strength Against

In addition, descriptive analysis shows that leg power is mostly in the moderate category, abdominal muscle strength is also mostly in the moderate category, and straight kick speed is mostly in the moderate category as well. This analysis is done using frequency distribution and histogram graphs to provide a clearer visual picture.

This study also includes assumption tests, namely normality tests and linearity tests. The normality test using the Shapiro-Wilk test shows that the data from the three variables (leg power, abdominal muscle strength, and straight kick speed) are normally distributed because the significance value is greater than 0.05 . The linearity test is carried out to ensure whether there is a linear relationship between the independent variables and the dependent variables. The results showed that leg power and abdominal muscle strength had a significant linear relationship with straight kick speed.

Table 2. Summary of Normality Test Results

| No | Variables | Sig. count | df | Sig | Conclusion |
|----|---------------------------|------------|-----|------|------------|
| 1 | Leg power | 0 .141 | 20 | 0.05 | Normal |
| 2 | Abdominal muscle strength | 0 .197 | 2 0 | 0.05 | Normal |
| 3 | Straight kick speed | 0 .464 | 2 0 | 0.05 | Normal |

Furthermore, hypothesis testing was conducted using simple and multiple regression to test the contribution of each variable to the straight kick speed. The results of the regression test showed that leg power contributed significantly by 75.3 % to the straight kick speed, while abdominal muscle strength contributed by 41.8%. Multiple regression tests showed that the combination of these two independent variables explained 79.3 % of the variation in straight kick speed. Thus, this study concluded that there was a significant and positive contribution between leg power and abdominal muscle strength to the straight kick speed in pencak silat in Tapak Suci Putera Muhammadiyah 181 athletes, Majene Regency.

Table 3. Simple Regression Test Results for Leg Power Variables

| Regret it | R | Rsquare | t_o | Df | $t_t(\alpha = 0.05)$ | Conclusion |
|-----------|---|---------|-------|----|----------------------|------------|
|-----------|---|---------|-------|----|----------------------|------------|

| | | | | | | |
|--------|--------|-------|-------|----|--------|-------------|
| X 1 .Y | 0, 867 | 0.753 | 7,398 | 19 | 1, 725 | Significant |
|--------|--------|-------|-------|----|--------|-------------|

Discussion

Based on the results of calculations carried out in this study, it was found that there is a significant contribution between leg power and abdominal muscle strength to the speed of straight kicks in pencak silat. First, research shows that leg power has a significant contribution to straight kick speed. Leg muscle power, which is related to the strength and speed of dynamic and explosive muscle contractions, greatly influences kicking speed. The greater the power of the leg muscles, the more optimal the speed of the straight kick produced. In addition, good leg muscle explosive power also plays an important role in producing fast and strong straight kicks. According to Hanif (2017), muscle explosive power is the ability of muscles to overcome resistance at high speed, which also supports kicking power. This study shows that increasing leg muscle explosive power can have a positive effect on straight kicking ability.

Second, abdominal muscle strength also has a significant contribution to the speed of straight kicks in pencak silat. Athletes who have good abdominal muscle strength are able to execute straight kicks faster and more powerfully. Abdominal muscle strength plays an important role in supporting straight kick techniques, because the abdominal muscles function to support body movements, especially in producing the whip needed for kicking. As stated by Alvian and Nurudin (2019), strong abdominal muscles support pelvic and leg movements, which are important in executing effective kicks. Therefore, targeted training to increase abdominal muscle strength is crucial for pencak silat athletes in improving their straight kicking ability.

Third, simultaneous analysis showed a significant contribution between leg power and abdominal muscle strength to straight kick speed. This finding confirms that both variables interact with each other and contribute together to increasing straight kick speed. Thus, it can be concluded that both leg power and abdominal muscle strength have a very important role in achieving a fast and effective straight kick. Therefore, pencak silat athletes are expected to improve both physical aspects through a structured and disciplined training program, in order to achieve maximum results in straight kicking techniques.

Conclusions

Based on the results of the data analysis that has been carried out, hypothesis testing, and in-depth discussion, several important things can be concluded. First, there is a significant influence between leg strength and straight kick speed in pencak silat in Tapak Suci Putera Muhammadiyah 181 athletes, Majene Regency. Second, abdominal muscle strength also makes a significant contribution to straight kick speed in the same athletes . Third, when analyzed simultaneously, both leg strength and abdominal muscle strength have a significant contribution to straight kick speed in pencak silat in Tapak Suci Putera Muhammadiyah 181 athletes, Majene Regency.

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