

Relationship Between Lower Limb Explosive Power and Momtong Dollyo Chagi Kick Performance in Taekwondo Athletes at UNP Dojang

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ABSTRACT: This study was conducted to determine the relationship between lower limb explosive power and the ability to perform the *Momtong Dollyo Chagi* kick among Taekwondo athletes at UNP Dojang. The research employed a quantitative approach using a correlational method. The study population consisted of 58 Taekwondo athletes from UNP Dojang. The sample was selected using a purposive sampling technique based on several criteria, namely active participation in training, adolescent age category, and the ability to perform the *Momtong Dollyo Chagi* kick properly. The instruments used were the Standing Broad Jump test to measure lower limb explosive power and a 20-second *Momtong Dollyo Chagi* kicking test to assess kicking performance. The research sample comprised 20 male junior and senior athletes. Data were analyzed using correlation techniques. The results revealed a significant relationship between lower limb explosive power and the ability to perform the *Momtong Dollyo Chagi* kick among Taekwondo athletes at UNP Dojang. The findings indicated that lower limb explosive power was significantly associated with *Momtong Dollyo Chagi* kicking ability, as evidenced by a calculated value of 0.421 at a significance level of $\alpha = 0.05$. Therefore, the null hypothesis (H_0) was rejected, and the alternative hypothesis (H_a) was accepted.

KEYWORDS: Lower Limb Explosive Power; Momtong Dollyo Chagi Kick; Taekwondo Athletes

1. INTRODUCTION

Taekwondo is recognized as one of the modern martial arts originating from South Korea and has developed rapidly in many countries, including Indonesia (Purnomo, 2020). The distinctive characteristic of this sport lies in the dominance of kicking techniques that are fast, powerful, and accurate. In taekwondo competitions, kicking ability is an essential factor in gaining points while simultaneously defending against opponents' attacks (Kiram et al., 2023). The term *Taekwondo* was first introduced in 1954 as the result of the development and refinement of various traditional Korean martial arts styles. Etymologically, the word consists of three elements: *tae*, meaning foot or kicking techniques; *kwon*, meaning hand techniques used for attack and defense; and *do*, meaning the way, art, or discipline of self-cultivation (Soniawan & Irawan, 2018).

One of the most frequently used kicking techniques in taekwondo is the *Momtong Dollyo Chagi*. This kick is directed toward the opponent's body by utilizing hip rotation and leg swing movements (Asnaldi et al., 2024). The successful execution of this technique is influenced by several physical fitness components, particularly lower limb explosive power. Lower limb explosive power refers to the ability of muscles to generate maximum force within a very short period of time (Setiawan et al., 2017).

Athletes who possess good lower limb explosive power tend to produce kicks that are faster, stronger, and more effective. Conversely, kicking performance may decrease when leg strength and movement speed are insufficient. Therefore, physical conditioning plays a crucial role in improving the quality of taekwondo kicking techniques. For novice athletes in particular, understanding basic kicking techniques is essential as a foundation for both offensive and defensive performance. Several kicking techniques (*chagi*) commonly practiced in taekwondo include *ap chagi*, *dollyo chagi*, *deol chagi*, *yeop chagi*, *dwi chagi*, *dwi hurigi*, *narae chagi*, and *dolke chagi* (Har, 2020).

The *Dollyo Chagi* kick is generally performed using the ball of the foot (*ap chuk*), although the instep (*baldeung*) is also frequently used in competition settings. This technique has several variations, including *Idan Dollyo Chagi*, which is executed with a sliding motion, and *Dolke Chagi*, which involves a full 360-degree body rotation. Furthermore, *Dollyo Chagi* is classified according to its target area, namely *Momtong Dollyo Chagi*, which targets the body, and *Eolgul Dollyo Chagi*, which targets the head (Nia et al., 2023).

UNP Dojang is one of the taekwondo training centers in Padang City that has participated in numerous regional and national championships. However, based on preliminary observations conducted by the researcher, several athletes were found to perform the *Momtong Dollyo Chagi* kick less effectively. Their kicks tended to lack power, were easily anticipated by opponents, and often failed to accurately reach the intended target (Bais et al., 2024).

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The *Dollyo Chagi* kick is one of the most dominant kicking techniques used in taekwondo competitions. This technique is capable of generating points because it targets several vital areas, such as the abdomen, ribs, solar plexus, and head (Setiawan, Amra, et al., 2018). In competitive situations, *Dollyo Chagi* is frequently selected by athletes because it is relatively easy to execute, delivers strong attacking power, and is highly effective in practical application (Apriliani et al., 2024). The power generated during the kick is not solely derived from knee extension but is also significantly influenced by hip rotation, which serves as a mechanism for transferring force generated by the entire body mass (Rusli et al., 2024).

UNP Dojang, located in Padang City, West Sumatra, was established in 2010 and began experiencing significant development in 2016. Since then, its athletes have actively participated in numerous regional and national competitions. Over the past five years, UNP Dojang athletes have achieved various accomplishments. In 2018, several athletes reached the quarterfinal stage of the West Sumatra Provincial Sports Week (*PORPROV*) held in Pariaman. In 2019, nearly all UNP Dojang athletes achieved championship titles at a regional competition in Solok City. During 2020 and 2021, taekwondo competitions were suspended due to the COVID19 pandemic. Following the pandemic, UNP Dojang resumed participation in the Provincial Championship (*Kejurprov*) held in Sijunjung in 2023. Most recently, in the National Taekwondo Championship, the *Sahabat Indonesia Taekwondo Championship 2025*, held at the Sports Hall of Universitas Negeri Padang from February 21–23, 2025, a total of 53 male and female athletes from UNP Dojang participated.

Through discussions with the coaching staff, the researcher identified several challenges in the training process. Training programs had largely remained unchanged over time, and limited coaching experience in taekwondo-specific conditioning and technical development hindered the implementation of more effective and varied training methods.

Field observations further revealed that athletes at UNP Dojang were still unable to perform *Dollyo Chagi* kicks optimally. As a result, they experienced difficulties in scoring points during competitions, while their kicks were often easily blocked by opponents due to insufficient kicking power, low explosive strength, and suboptimal kicking technique. These limitations may negatively affect concentration, overall physical condition, and athletic performance. Physical fitness is a fundamental component of athletic success, as inadequate physical conditioning prevents athletes from performing optimally and fully benefiting from structured training programs. Common technical errors observed among athletes included insufficient knee lift, limited hip flexibility, inaccurate targeting, and improper foot contact during kick execution.

Based on these observations, it can be concluded that lower limb explosive power is an important factor influencing the effectiveness of the *Momtong Dollyo Chagi* kick and should therefore be developed through structured and systematic training. The researcher's interest in investigating this relationship stems from the belief that improvements in kicking performance can be achieved not only through conventional technical training but also by enhancing the physical components that support the movement. Such improvements are expected to increase kicking effectiveness and help athletes score points more successfully during competitions. Therefore, this study entitled "The Relationship Between Lower Limb Explosive Power and Momtong Dollyo Chagi Kicking Ability Among West Sumatra PU Taekwondo Athletes" was conducted to examine the relationship between lower limb explosive power and *Momtong Dollyo Chagi* performance. The findings are expected to provide valuable information regarding the current kicking abilities and technical performance of athletes, thereby supporting the development of more structured, measurable, and effective training programs within the West Sumatra PU Taekwondo training system.

2. METHODS

This study employed a correlational research design aimed at determining whether there is a relationship between lower limb explosive power and the ability to perform the *Momtong Dollyo Chagi* kick among UNP Taekwondo athletes. The relationship between variables was examined using a correlational approach. Correlational research is designed to analyze the association between two or more variables (Yadi et al., 2025).

According to Rusli et al. (2024), a population refers to the entire group of research subjects. Based on this definition, the population of the present study consisted of 58 UNP Taekwondo athletes, including 35 male athletes and 23 female athletes.

The sampling technique employed in this study was purposive sampling. Ardi et al. (2024) explained that purposive sampling is used based on specific considerations aligned with the objectives of the research. The inclusion criteria for sample selection were as follows: (1) athletes who actively participated in Taekwondo training at UNP Dojang, (2) athletes classified within the adolescent age category, and (3) athletes who were capable of performing the *Momtong Dollyo Chagi* kick properly.

The research instruments consisted of the Standing Broad Jump test to measure lower limb explosive power and the *Momtong Dollyo Chagi* kicking test performed for 20 seconds to assess kicking ability. Based on these criteria, the final sample comprised 20 male athletes from both junior and senior categories.

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3. RESULTS

Table 1. Assessment Norms for Lower Limb Explosive Power

No.	Category	Distance (m)	Frequency	Percentage (%)
1	Excellent	> 2.25	0	0%
2	Good	2.25–2.14	2	10%
3	Fair	2.13–2.03	1	5%
4	Poor	2.02–1.71	14	70%
5	Very Poor	< 1.70	3	15%
	Total		20	100%

Based on Table 1, among the 20 athletes included in the study, none demonstrated excellent lower limb explosive power. Two athletes (10%) were categorized as having good lower limb explosive power, one athlete (5%) was classified as fair, fourteen athletes (70%) were categorized as poor, and three athletes (15%) were classified as very poor. To provide a clearer illustration of the distribution of lower limb explosive power among the athletes, the results are presented in the histogram shown in Figure 1.

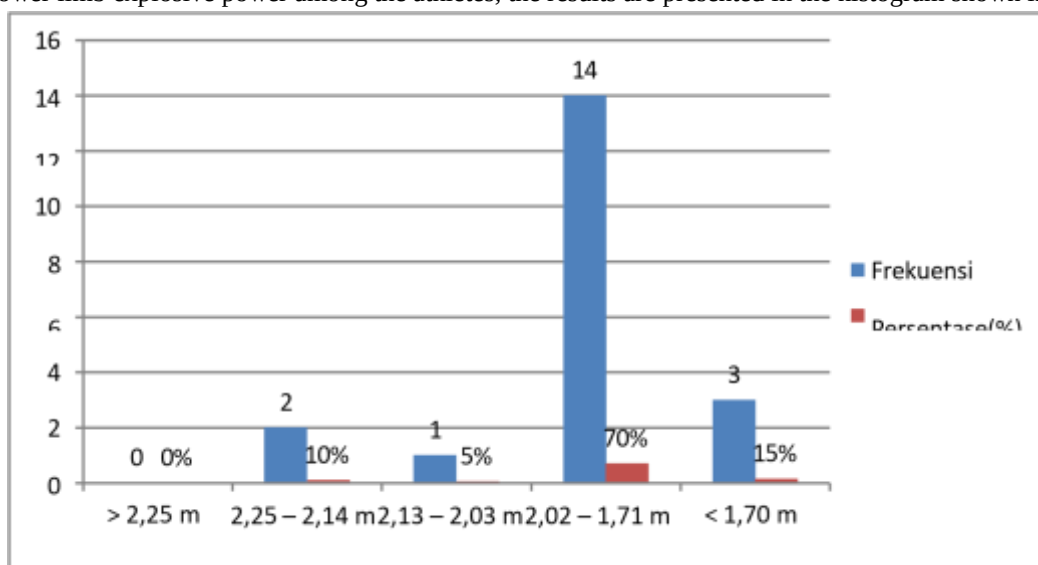


Figure 1. Histogram of Lower Limb Explosive Power Assessment Norms

A. 2. Momtong Dollyo Chagi Kicking Ability

Table 2. Assessment Norms for Momtong Dollyo Chagi Kicking Ability

No.	Category	Score	Frequency	Percentage (%)
1	Excellent	> 35	1	5%
2	Good	30–34	6	30%
3	Moderate	25–29	13	65%

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4	Poor	20–24	0	0%
5	Very Poor	< 19	0	0%
	Total		20	100%

Based on Table 2, among the 20 athletes who participated in the study, one athlete (5%) demonstrated excellent *Momtong Dollyo Chagi* kicking ability. Furthermore, six athletes (30%) were classified in the good category, while thirteen athletes (65%) were categorized as moderate. No athletes were classified as poor or very poor. To provide a clearer representation of the athletes' *Momtong Dollyo Chagi* kicking ability, the data are presented in the histogram shown in Figure 2.

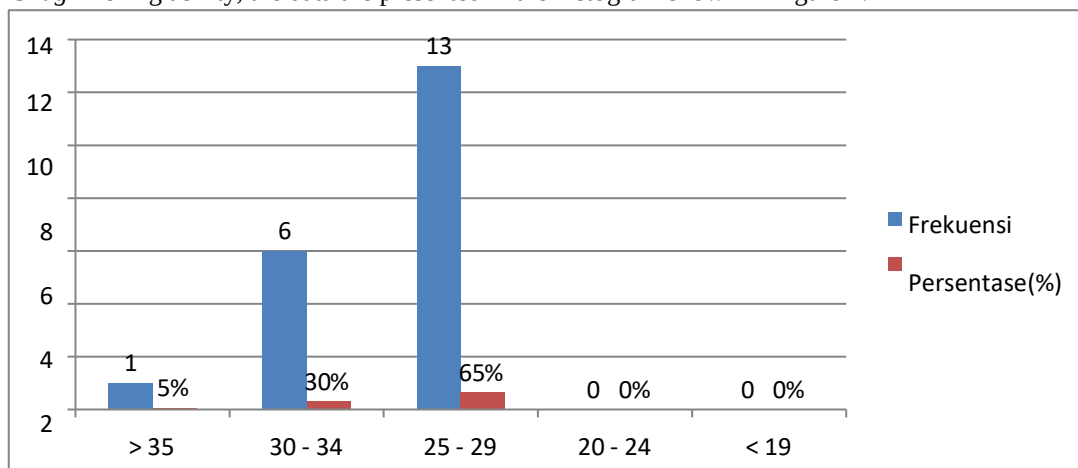


Figure 2. Histogram of Momtong Dollyo Chagi Kicking Ability Assessment Norms

B. A. Normality Test

Table 3. Results of the Data Normality Test

No.	Variable	N	Lcalculated	Ltable	Distribution
1	Lower Limb Explosive Power (X)	20	0.1571	0.1981	Normal
2	Momtong Dollyo Chagi Kicking Ability (Y)	20	0.1678	0.1981	Normal

Based on the results of the Kolmogorov–Smirnov normality test presented in Table 3, the lower limb explosive power variable (X) obtained an Lcalculated value of 0.1571 with a sample size of 20 athletes. The critical value (Ltable) at a significance level of $\alpha = 0.05$ was 0.1981. Since the calculated value was smaller than the critical value ($0.1571 < 0.1981$), the lower limb explosive power data were considered normally distributed.

Similarly, the normality test conducted on the *Momtong Dollyo Chagi* kicking ability variable (Y) yielded an Lcalculated value of 0.1678 with a sample size of 20 athletes. The corresponding Ltable value at $\alpha = 0.05$ was 0.1981. Because the calculated value was lower than the critical value ($0.1678 < 0.1981$), the kicking ability data were also found to be normally distributed.

Therefore, based on the normality test results for both research variables, it can be concluded that all data met the assumption of normality. This was evidenced by the fact that the Lcalculated values for both variables were lower than the corresponding Ltable values at the 0.05 significance level, indicating that the sample data were drawn from normally distributed populations.

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C. B. Hypothesis Testing

Table 4. Results of Hypothesis Testing

Variable	N	Correlation Coefficient (r)
Lower Limb Explosive Power	20	0.421
Momtong Dollyo Chagi Kicking Ability	20	
Conclusion		There is a significant relationship between X and Y

Based on the results of the Pearson Product-Moment correlation analysis, a correlation coefficient (r) of 0.421 was obtained. The statistical analysis indicated that the significance criterion was met, and therefore the research hypothesis was accepted.

Consequently, the null hypothesis (H_0) was rejected and the alternative hypothesis (H_1) was accepted, indicating a significant relationship between lower limb explosive power and *Momtong Dollyo Chagi* kicking ability among UNP Dojang Taekwondo athletes.

These findings suggest that athletes with higher levels of lower limb explosive power tend to demonstrate better *Momtong Dollyo Chagi* kicking performance. Therefore, it can be concluded that there is a positive relationship between the independent variable, lower limb explosive power, and the dependent variable, *Momtong Dollyo Chagi* kicking ability.

4. DISCUSSION

The results of this study indicate that lower limb explosive power (X) has a significant relationship with *Momtong Dollyo Chagi* kicking ability (Y) among Taekwondo athletes at UNP Dojang. The analysis yielded a correlation coefficient of 0.421 at a significance level of $\alpha = 0.05$. Therefore, the null hypothesis (H_0) was rejected, and the alternative hypothesis (H_1) was accepted. These findings demonstrate that there is a significant relationship between lower limb explosive power and *Momtong Dollyo Chagi* kicking ability among UNP Dojang Taekwondo athletes.

The findings suggest that athletes with greater lower limb explosive power tend to exhibit better performance in executing the *Momtong Dollyo Chagi* kick. In other words, improvements in lower limb explosive power are associated with enhanced kicking performance.

Dollyo Chagi is one of the fundamental kicking techniques taught in Taekwondo (Zulman et al., 2021). This technique is performed by rotating the leg laterally before striking a target, either the body (*Momtong*) or the head (*Eolgul*). The effectiveness of this kick largely depends on hip rotation, which contributes significantly to generating greater speed and force during execution (Setiawan, Sodikoen, et al., 2018a).

From a biomechanical perspective, *Momtong Dollyo Chagi* is a rotational kicking movement characterized by a curved trajectory toward the side of the target. Successful execution requires a combination of speed, strength, and coordination of the lower limb musculature (Wojtaś et al., 2007). The movement begins with hip rotation, followed by a powerful push-off from the supporting leg to generate rotational momentum. Lower limb explosive power, particularly involving the quadriceps femoris, hamstrings, gluteus maximus, and gastrocnemius muscles, plays a critical role in producing the explosive force transferred from the ground to the kicking leg (Sousa et al., 2024). Without adequate explosive strength, rotational speed decreases, resulting in weaker kicking force and reduced accuracy when striking the target (Dandi et al., 2023).

Physiologically, the *Momtong Dollyo Chagi* kick requires both movement speed and explosive muscular strength to produce a fast and powerful strike (Setiawan, Amra, et al., 2018). Lower limb explosive power represents the integration of muscular strength and contraction speed in generating force rapidly. Athletes with higher levels of explosive power are capable of producing faster pushoffs and leg swings, thereby increasing the velocity of the kicking motion toward the target (Fadila et al., 2023).

The findings of the present study are consistent with previous research conducted by Cahyadi et al. (2020), which reported a significant relationship between lower limb explosive power and kicking ability among youth Taekwondo athletes. These findings reinforce the notion that one of the primary determinants of effective kicking performance is the ability of the lower limb muscles to generate force within a short period of time.

In addition to muscular power, coordination and technical proficiency also play important roles in producing effective kicks (Mathunjwa, 2019). The *Momtong Dollyo Chagi* technique requires precise synchronization among the hip, knee, and ankle joints. Athletes with superior movement coordination are better able to transfer energy efficiently from the lower body to the kicking limb, thereby generating greater kicking momentum (Setiawan & Soniawan, 2021). However, coordination alone is insufficient to produce optimal kicking speed without adequate lower limb explosive power (Gusnelia et al., 2022).

Lower limb explosive power itself is defined as the ability of the leg muscles to generate maximal force in a very short period of time. Juliandra and Yendrizal (2018) explained that muscular power is the result of the interaction between strength and speed. In the context of Taekwondo kicking performance, particularly *Momtong Dollyo Chagi*, muscular strength contributes to the generation of large propulsive forces, while contraction speed determines how quickly the leg can rotate and strike the target. Therefore, greater

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lower limb explosive power results in a higher impulse force upon contact with the target, ultimately enhancing the effectiveness and efficiency of the kick (Nofendri et al., 2023).

Improvements in lower limb explosive power are directly associated with increases in kicking speed in Taekwondo. This finding suggests that lower limb explosive power is a dominant physical component supporting athletes in producing fast and powerful kicks (Mathunjwa, 2019).

When examining the movement characteristics of *Momtong Dollyo Chagi*, two primary phases rely heavily on lower limb explosive power: the support phase and the swing phase. During the support phase, the muscles of the supporting leg contract forcefully and rapidly to stabilize the body while generating the initial propulsion. During the swing phase, the muscles of the kicking leg contract explosively to accelerate the leg toward the target. Athletes with superior lower limb explosive power can minimize the transition time between these phases, resulting in higher kicking velocity and shorter contact times with the target.

Furthermore, increased lower limb explosive power contributes to improved body stability during rotational movements. Athletes with strong and explosive lower limb muscles are better able to maintain balance both during and after executing a kick. This is particularly important in Taekwondo competition, where loss of balance following a kick may create opportunities for opponents to launch counterattacks. Therefore, lower limb explosive power influences not only kicking force but also movement efficiency and overall body control (Setiawan, Sodikoen, et al., 2018b).

Although lower limb explosive power contributes substantially to kicking performance, the findings of this study also indicate that other factors influence *Momtong Dollyo Chagi* performance. Optimal kicking ability results from the interaction of strength, speed, flexibility, and coordination. Additional contributing factors include breathing techniques, hip joint flexibility, upper- and lowerbody coordination, and reaction time to the target. Effective kicking performance is determined not only by muscular strength but also by the athlete's ability to regulate timing and coordinate body segments harmoniously (Febriani et al., 2023).

In conclusion, the findings of this study confirm that lower limb explosive power is a crucial physical fitness component supporting *Momtong Dollyo Chagi* kicking ability. Athletes with greater lower limb explosive power demonstrate faster leg swing velocity, stronger impact force, and superior body stability during rotational movements (Dewi & Jonni, 2022). Therefore, training programs designed to improve lower limb explosive power should be prioritized to enhance kicking performance among Taekwondo athletes.

5. CONCLUSION

The results of this study indicate that lower limb explosive power has a significant relationship with *Momtong Dollyo Chagi* kicking ability among Taekwondo athletes at UNP Dojang. The analysis yielded a correlation value of 0.421 at a significance level of $\alpha = 0.05$. Therefore, the null hypothesis (H_0) was rejected, and the alternative hypothesis (H_1) was accepted. It can thus be concluded that there is a significant relationship between lower limb explosive power and *Momtong Dollyo Chagi* kicking ability among Taekwondo athletes at UNP Dojang.

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