

Developing the Leg Power in Mea Geri (Front Kick) among the under 17 Karate Kumihe Players

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Abstract

The study identifies the effect of leg power of the under 17 Karate Kumihe players. The macrocycle was designed for twenty-four weeks, and the improvement was analyzed within the 11th to 18th weeks of the macrocycle. The training sessions contained three days per week with two and half hour practical. Four male kumihe players in the under 17 playes was selected with 2-3 years experience by using the purposive sampling method. Three tests were taken at the beginning, during training and the end of the training program as pre-test, mid test and post-test, respectively. Verticle Jump test and Maargaria – kelamen power test to test leg power. It was suggested that the leg power training program for karate kumihe players have significant impact on the development of leg power.

Keywords: Karate, Kumihe, Mea Geri, Macrocycle

1. Introduction

Karate is a Japanese martial art that focuses on the physical development of defensive and counter-attacking body movements. Karate training focuses on fighting and self-defense, but its mental and moral parts aim to better the individual as a whole. Kata and Kumite are the two parts of Karate. The karate player use hands and legs both to do Kata and Kumite. Front kick with thrust (Mae-geri kekomi), Side kick with thrust (Yoko-geri kekomi), Crescent kick (Mikazukigeri), Extensive roundhouse kick (Mawashi-geri) are the main kicks in karate. Standing Punch (Choku-Zuki), Lunching Punch (Oi-Zuki), Reverse Punch (Gyaku-zuki) are the three basic punches in Karate. Mainly players used punches. Other than that they used kicks.

Except for the groin kick, which employs the distal part of the foot, we use the ball of the foot for all kicks. It's worth noting that when using the ball of the foot, the toes are pulled back, which serves two purposes. The first is to guarantee that the toes are not injured, and the second is to ensure that the ball of the foot is in the strongest position possible for the force of the hit. The foot should ascend upwards and into the body with both the middle and higher kicks, beginning with the ball of the foot. The knee lift is also important. The height of the final kick is proportional to the height of the knee. Both strength and flexibility are required for this.

The foot must also be chambered prior to the technique, just like a punch, to allow for more speed and power. For the same reasons as while punching, the leg should always have a modest bend to guarantee that the knee does not hyperextend and that the leg may also act as a shock absorber for any returning energy.

In Karate front kick is performed by straightening the leg in front of the practitioner and striking the target region while keeping the foot and shin either hanging loosely or pulled to the hip. To avoid the opponent trying to grip the leg, retract the leg quickly after executing the kick and return to a stable fighting position. The front kick described is a standard karate front kick. The front kick, on the other hand, can be defined more broadly as a straight forward kick to the front, with multiple variations from other forms.

2. Iterature Review

Leg power is a fundamental physical component in martial arts, particularly in Karate, where explosive movements such as

the *Mae Geri* (*front kick*) are frequently used in competitive situations. Previous research highlights that muscular power, defined as the product of force and velocity, plays a critical role in the effectiveness of striking techniques. According to Donald A. Chu (1996), plyometric and explosive strength training significantly enhance lower limb power, which directly contributes to improved athletic performance in combat sports.

The development of leg power has been widely assessed using standardized tests such as the Vertical Jump Test and the Margaria-Kalamen Power Test. These tests are considered reliable indicators of anaerobic power and neuromuscular efficiency. Research by J. Kalamen (1968) emphasized that muscle power improvements occur gradually and require consistent and progressive overload training. This aligns with findings from strength training literature, which suggest that short-term interventions may produce measurable but limited gains in power output. Further studies by Perrin D.H. (1993) and Magee D.J. (1986) indicate that repetition schemes, training intensity, and biomechanical positioning significantly influence muscle performance outcomes. In martial arts contexts, proper technique execution combined with physical conditioning enhances both efficiency and injury prevention. Additionally, research on functional training by Bean J.F. (2004) demonstrates that power-based training improves mobility and performance across various populations, supporting its relevance in youth athletic development.

In the context of karate kumite players, explosive leg power is essential for rapid kicking, stability, and recovery during combat. Studies consistently show that structured

3.2 Sampling Method

The purposive sampling method was utilized for this study. The samples were selected from the target population of

training programs, particularly

those incorporating plyometrics and sport-specific drills, can significantly improve performance metrics. However, the rate of improvement is influenced by factors such as training duration, athlete experience, and individual physiological characteristics.

Overall, the literature supports the findings of this study, confirming that targeted training interventions can enhance leg power in young karate athletes, although longer training periods may yield more substantial improvements.

3. Methodology

3.1 Research Design

The study uses a pre-test post-test experimental research design. This study will be conducted to analyze conditioning performance increment among under 17 Karate kumite players (n = 04) by applying pre-arranged training sessions. At the beginning of the training it is supposed to conduct a pre-test for players and apply the treatment; training plan to selected treatment group. At the mid of the period of training plan, there was a another mid test to check whether the performance has an increment by using the standardized tests and comparison between pre and mid tests. If there was not an increment, training plan changed and do it until the end of proposed time period. But there was a increasment, previous training plan continued until the proposed time period. Finally again it is supposed to conduct post-test as same as previous pre-test. Finally, the results of pre-test , mid-period test and the post-test will be compared to evaluate whether the treatment of training has made a significant effect on the performance among selected group of player

Ibbagamuwa Central Collage. Only four samples selected who was available at this time.

Profile of the samples

Name	Training age	Weight (Kg)	Biological age	Gender	Training period	Level (School)
A	2 yaers	53	16.9 yaers	Male	2020- 2022	Province
B	1 yaers	60	15.7 yaers	Male	2020-2021	Province
C	1 yaers	55	16.2 yaers	Male	2021-2022	No
D	3 yaers	52.3	16 yaers	Male	2019-2022	National

3.3Statistical Analysis

The physical assessments were used to analyze the performance level and performance increment. Therefore, physical assessments were used at the beginning and end of the training plan to assess the performance.

Moreover, these three tests were taken repeatedly as pre and post tests, and the theoretical framework is shown in (Figure 2. 1)

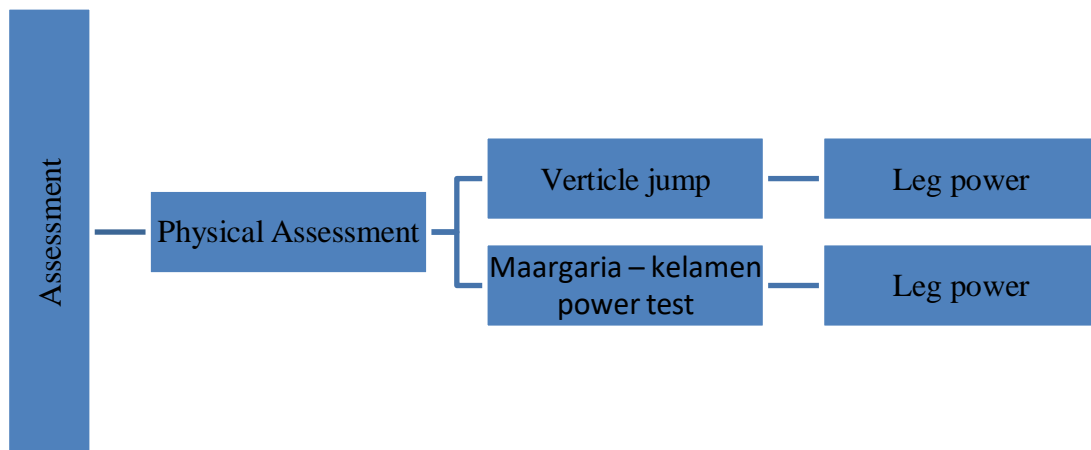


Figure 2. 1: Framework of assessments
The performance of the pre,mid and post

physical fitness test results were compared with the normative values.

3.3.1Hypothesis

The hypothesis of this study is,
H0 – There is no significant difference between results. HA- There is a significant difference between results

H0; n2- n1 = 0

HA; n2- n1 ≠ 0

233.2Data**Analysis**

Before applying the training plan, a pre-test was conducted to test the leg power of the athlete. The training plan was conducted through eight weeks, and the same tests were conducted as the

mid test and post-test. The results of attempts in each test was considered as the measurement and compared. The results were presented in tables and bar charts.

4.Results

Table 1: Pre-test results

Test type	Player A	Player B	Player C	Player D
Verticle jump	25.60W	27.75W	26.28W	24.96W
Maargaria kelamen	23.40W	25.95W	33.27W	28.40W

Table 2: Mid-test results

Test type	Player A	Player B	Player C	Player D
Verticle jump	25.80W	28.87W	27.64W	25.43W
Maargaria kelamen	30.96W	39.38W	42.69W	31.30W

Table 3: Post-test results

Test type	Player A	Player B	Player C	Player D
Verticle jump	26.79W	29.55W	28.53W	29.52W
Maargaria kelamen	33.12W	41.12W	43.48W	35.36W

Table 4:

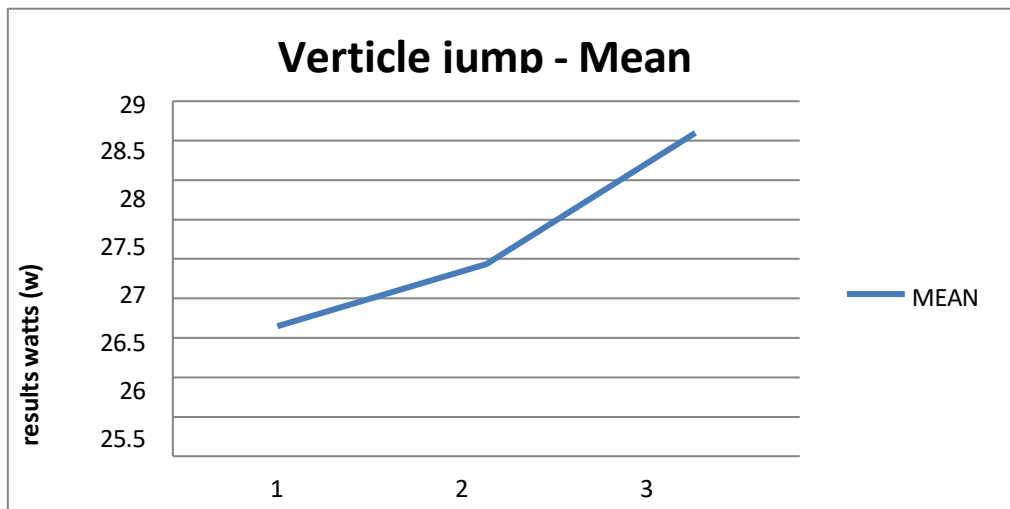


Table 5: verticle jump test

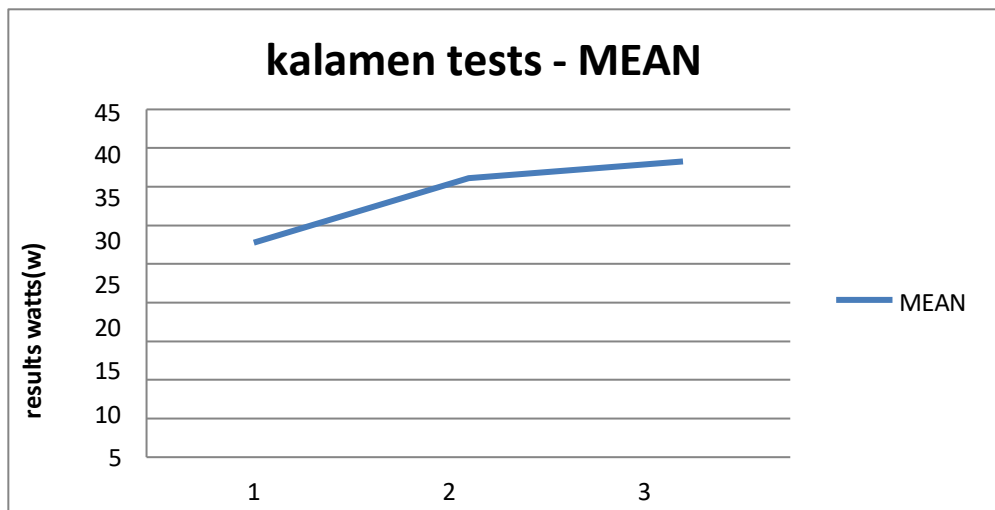


Table 6: Kalamen

According to the results of mean value **pre test** < **mid test** < **post test**

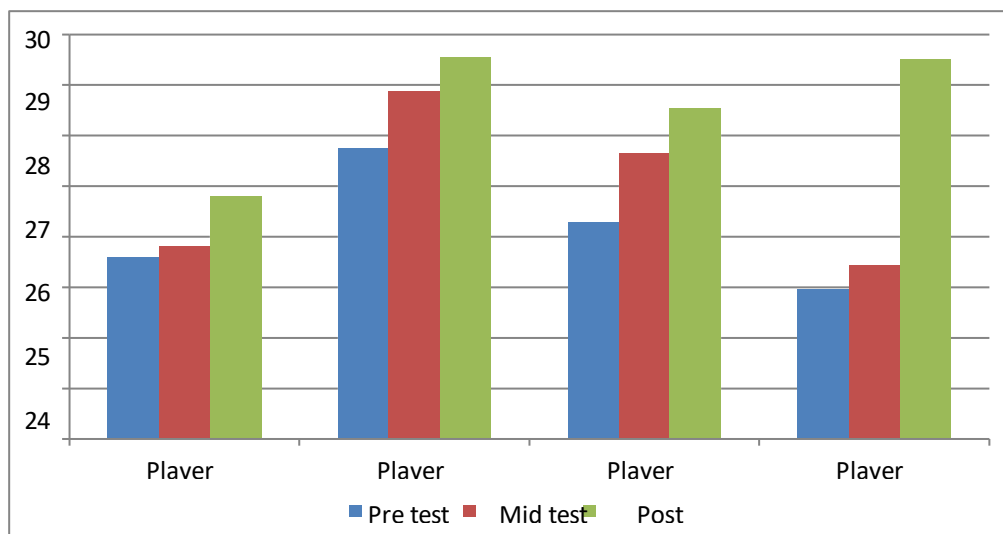


Figure 3. 1: Vericle Jump Test - Comparison of pre, mid and post tests
(Measured by Watt-W)

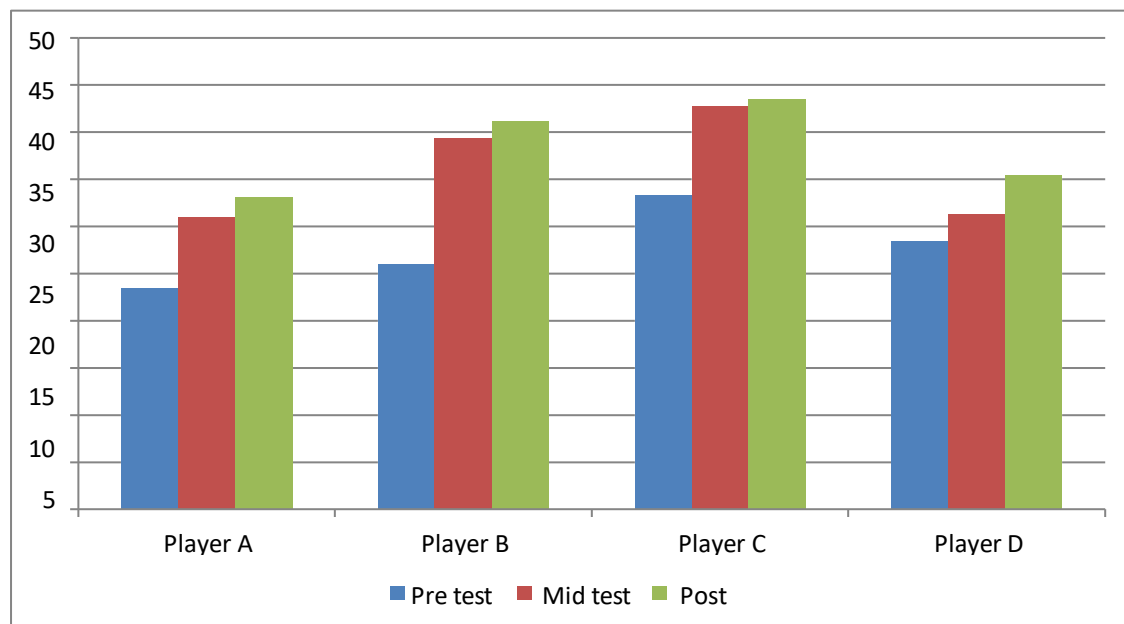


Figure 3. 2: Margarian Kalamen Power Test- Comparison of pre, mid and post tests
(Measured by Watt-W)

Discussion

This study attempts Karate Kumithe players to improve a selected physical fitness component of leg power. According to the result, the leg powe significantly developed. According to the verticle jump test, Player A improved 1.2 W, Player B 1.8 W, Player C 2.25 W and Player D

4.56 W by compairing pre and post test results. That upgraded very good. According to the Margarian Kalamen power test Player A 9.72 W, Playe B 15.17 W, Player C 10.21 W and Player D 6.96 W. also measured by Watts (W).

By compairing the mean values of verticle jump pre,mid and post tests 26.1475W < 26.935W <

28.597W the results was improved. As well as by comparing mean values of Kalamen tests, 27.755W < 36.082W < 38.27W. the improvent swon in Table 5 and 6. In the verticle jump test mean values of pre test was 26.147W. After the mid test it imprve 26.935W with 0.788W defferences, in the post test the mean value improved to 28.597W with 1.622W defferences. In the kalamen test the mean value

of pre test was 27.755W. After the four weeks te mid test conducted. The mean value of mid test improved 8.327W defferences. In the post test the mean value improved 38.27W with 2.188W differences.

According to the results, the training program improves the athletes leg power with in eight weeks. Acoording to the (CHU D.A,1968) use power training to improve the leg power in Martial arts. According to the previous studies reported the leg power more effective to the martial arts, fox and Mathews, 1974 shows the Watt (W) more accurate to calculate the leg power than norm tables. Using two equations to calculate leg power by Watts (W).

Leg power (Watts) = $\sqrt{4.9 \times \text{body mass (kg)} \times \text{jump-reach score (m)} \times 9.81}$ for verticle jump test and Leg power = $(w \times h)/t$ for Margaria-Kalamen power test (height if stairs- h = 1.7 inch).

According to the results, the results shows less improvement after the implementing the program. The previous studies (J. Kalamen, 1968) shows the muscle power not improved rapidly in Martial arts. The training program done in eight weeks. That is the reason to the results show less improvemenet.

Conclusion

The leg power training series of training sessions

that practiced with in eight weeks and three days per week.. This program helps to improve their leg power of Mae Geri. Therefore, this research concludes that a training program improves Mae Geri leg power.

7. Conclusion

Based on the findings of this study and supporting literature, several recommendations can be made for improving leg power development among under-17 karate kumite players:

1. Extend Training Duration:

The eight-week training program showed improvements; however, longer training cycles (12–24 weeks) are recommended to achieve more significant and sustained gains in leg power.

2. Incorporate Plyometric Training:

Coaches should include plyometric exercises such as jump squats, bounding, and box jumps to enhance explosive and neuromuscular coordination.

3. Use Periodized Training Programs:

Structured periodization (macrocycle, mesocycle, microcycle) should be implemented to optimize performance and prevent overtraining.

4. Increase Sample Size in Future Research:

Future studies should include a larger and more diverse sample to improve the generalizability and statistical strength of findings.

5. Integrate Technical and Physical Training:

Combining strength training with sport-specific kicking drills (e.g., Mae Geri practice) will improve functional performance in real competition scenarios.

6. Regular Monitoring and Testing:

Continuous assessment using reliable tests like vertical jump and Margaria-Kalamen should be conducted to track progress and adjust training programs.

7. Focus on Individual Differences:

Training programs should be tailored based on athletes' age, experience, and physical condition to maximize effectiveness.

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