Journal of Physical Education Innovation
Publisher: Sekolah Tinggi Olahraga dan Kesehatan Bina Guna
Journal Homepage: https://jurnal.stokbinaguna.ac.id/index.php/JoPEI/index
e-ISSN: 3063-0312

The Effect of Ankle Weight Training on The Speed of Mawashi Geri Kicking Dojo Ikhlas Pekanbaru

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Received: 09-06-2025 Revised: 20-06-2025 Accepted: 30-06-2025

Abstract: This study aims to analyze the effect of Continuous Running training on cardiovascular endurance in badminton extracurricular athletes at SMP Negeri 48 Pekanbaru. The research method used is an experiment with a pre-test and post-test design. Cardiovascular endurance measurements were carried out using the Multistage Fitness Test (MFT) before and after being given Continuous Running training treatment for several weeks. The results showed that there was a significant increase in cardiovascular endurance after being given the training, which was indicated by an increase in the participants' VO2max values. The statistical tests conducted proved that Continuous Running training had a positive effect on increasing aerobic capacity, so it can be recommended as an effective training method for athletes to increase cardiovascular endurance. Based on the research results, it can be concluded that the results of the pre-test with the post-test were analyzed using the t-test, the t-results on the sample using ankle weight load were Tcount 3.571> Ttable 1.943 then H1 was accepted, at level (a) 0.05. This means that there is an effect of ankle weight training on increasing the speed of the Dojo Ikhlas Pekanbaru athlete's mawashi geri kick.

Keywords: Continuous Running; Cardiovascular Endurance; VO2max; Multistage Fitness Test

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INTRODUCTION

In the world of sports, speed is one of the main components that determines an athlete's performance, especially in sports that involve kicking such as karate. One of the kicking techniques often used in matches is Mawashi Geri, which requires a combination of speed, strength, and good coordination. To increase the speed of this kick, various training methods have been developed, one of which is the use of ankle weights. This exercise is believed to increase leg muscle strength and kick speed through the principles of overload and muscle adaptation. Several previous studies have proven the effectiveness of training using ankle weights in increasing kick speed. For example, research by (Permana et al. 2023) showed that training with ankle weights had a significant effect on increasing the speed of front kicks in extracurricular pencak silat students. Similar results were also found by (Hadjrati et al. 2022), who compared the effectiveness of ankle weights with rubber resistance in increasing the speed of Mawashi Geri kicks, where ankle weights showed a greater increase. In addition, a study by (Faturrohman et al. 2023) also supports this finding by stating that the use of ankle weights contributes to increasing the explosive power of leg muscles, which has direct

implications for kick speed. Although various studies have been conducted, there are still limitations in previous studies, such as variations in training methods, limited sample populations, and the lack of research that specifically examines the impact of ankle weight training on adolescent karate athletes. Therefore, this study aims to examine the effect of ankle weight training on the speed of Mawashi Geri kicks in Dojo Ikhlas Pekanbaru athletes. Thus, the results of this study are expected to provide a more specific scientific contribution in the field of sports training, as well as being a reference for coaches and athletes in improving their kicking performance.

Mawashi Geri is one of the fundamental kicking techniques in karate, playing a crucial role in offensive strategies. This technique involves a circular motion using the instep or the top of the foot as the main point of contact with the target (Simbolon, 2014). In modern karate competitions, the effectiveness of Mawashi Geri largely depends on key factors such as physical conditioning, biomechanics, and execution speed (Zhang et al., 2023). As a dominant striking technique, Mawashi Geri requires proper coordination of strength, flexibility, and speed to be executed optimally (Kim et al., 2023). Speed is a key factor in the effectiveness of Mawashi Geri, as this technique relies on an athlete's ability to perform explosive movements within a short timeframe. Hariri and Sadeghi (2018) emphasized that knee acceleration and minimizing foot-ground contact time significantly influence the efficiency of the kick. This finding aligns with recent research, which highlights that improving neuromuscular response and lower limb explosiveness can enhance Mawashi Geri speed (Rodriguez et al., 2024). Therefore, training programs focusing on increasing muscle contraction speed are essential for optimizing kick performance (Lee et al., 2023).

Additionally, the biomechanics of Mawashi Geri indicate that the coordination between hip flexibility, body balance, and core strength plays a significant role in improving both the speed and accuracy of the kick (Yamada et al., 2024). Studies have shown that implementing specific training methods such as plyometric and resistance training effectively enhances the speed of explosive movements in karate kicks (Fujimoto et al., 2023). Consequently, a well-structured training approach can enhance kick efficiency, providing athletes with a competitive advantage in matches. In the context of kumite (sparring), speed is not only crucial for executing attacks but also for responding to an opponent's movements. According to Purba (2019), Mawashi Geri falls under the category of acyclic movements, where only specific body parts move explosively in a short duration.

Recent studies suggest that combining visual reaction drills with explosive training can significantly improve kicking execution speed (González-Ravé et al., 2024). Thus, in modern training strategies, integrating biomechanical, explosive, and sensory-motor response training is essential for optimizing the effectiveness of Mawashi Geri. Given the theoretical foundations and empirical studies mentioned, coaches and athletes must design training programs that emphasize speed, strength, and coordination in Mawashi Geri. Implementing a training model based on modern biomechanics and neuromuscular principles will significantly enhance kick performance and effectiveness in karate competitions.

Previous research on improving the speed of karate kicks has been conducted using skipping exercises, which found that skipping training increases the speed of upper kicks in karate athletes (Ahmad Yanuar Syauki et al., 2021). Another study aimed at improving the speed of the Mawashi Geri kick used the drill technique, resulting in an 18.6% increase (Sasmita et al., 2022). Furthermore, research on the use of resistance bands in karate training demonstrated significant improvements in Mawashi Geri speed,

particularly in Dojo Balitan athletes (Mulyati Murza et al., 2021). Additionally, a study comparing ankle weight and rubber resistance training showed that both methods effectively enhanced Mawashi Geri speed, with rubber resistance yielding slightly better results (Hartono Hadjarati et al., 2022; Ramadhan, S., Putranto, D., & Oktarina, O, 2024). The latest research highlights the effectiveness of ladder drills in developing Mawashi Geri speed among karate students, emphasizing the importance of agility training in enhancing kicking performance (Cahya Zulfikar Akbar et al., 2024).

METHOD

This study used an experimental research design with a one-group pretest-posttest design approach. This design allows for measurements before and after the intervention is carried out, so that changes that occur due to treatment can be observed more clearly. This study was conducted at Dojo Ikhlas Pekanbaru within a predetermined time frame. The selection of the location was based on the availability of research subjects that met the established criteria. The population in this study were karate athletes at Dojo Ikhlas Pekanbaru. The total sampling technique was used in determining the sample, so that all athletes who met the inclusion criteria became research subjects. Data were collected through the Mawashi Geri kick speed measurement technique using a digital stopwatch. Each athlete kicked three times, and the fastest time obtained was used as the main data in this study. Data analysis was carried out using a normality test to ensure data distribution, and a t-test to measure the significance of differences before and after treatment. Statistical calculations were carried out using data analysis software to ensure the accuracy of the research results.

RESULT AND DISCUSSION

Result

The data obtained from this study consists of qualitative data collected through pre-test and post-test measurements to assess the effect of ankle weight training on the kicking speed of Mawashi Geri among athletes at Dojo Ikhlas Pekanbaru. This study includes one independent variable: kicking training using ankle weights, represented by X, and one dependent variable: the speed of Mawashi Geri kicks, represented by Y.

Results of Mawashi Geri Kicking Speed Before implementing the ankle weight training method, an initial test was conducted to measure the kicking speed of Mawashi Geri. The pre-test results provide baseline data for further analysis, detailing the effects of ankle weight usage on kicking speed. The analysis of pre-test data is presented as follows:

Table 1. Analisys pretest take ankle weight

No.	Data *Statistic*	*Pretest*
1	Sample	8
2	Mean	3,34
3	Std.Deviation	0,16
4	Varians	0,03
5	Minimum	3,16
6	Maximum	3,6
7	Sum	**26,75**

Based on the analysis of the pre-test data using ankle weights, the following conclusions can be drawn: the total sample size is 8, with a mean of 3.34, a standard deviation of 0.16, a variance of 0.03, the lowest score of 3.16, the highest score of 3.6, and a total sum of 26.73. The data analysis in the frequency distribution is as follows:

Table 2. Pre-Test Norm Results Using Ankle Weights

No.	***Class Interval***	Frekuensi	
		Absolut	Frekuensi
1	3,16-3,27	3	37,5%
2	3,28-3,39	2	25%
3	3,40-3,51	2	25%
4	3,52-3,63	1	12,5%
	Sum	**8**	
	Max	**3,16**	
	Min	**3,60**	
	Mean	**3,34**	

Based on the frequency distribution table above, out of the 8 samples, 3 individuals (75%) fall within the interval range of 3.16-3.27, categorized as low. Additionally, 2 individuals (25%) fall within the interval range of 3.28-3.39, also categorized as low. Another 2 individuals (25%) are within the interval range of 3.40-3.51, still in the low category. Lastly, 1 individual (12.5%) falls within the interval range of 3.52-3.63, also categorized as low. For a clearer illustration, refer to the histogram below:

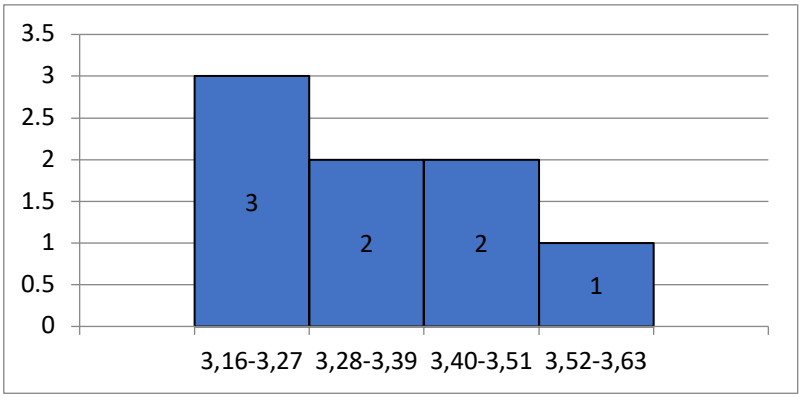

Figure 1. Histogram of the post-test using ankle weight

Meanwhile, the analysis of the Post-Test results using ankle weight resistance is as follows:

Tabel 4. Analysis postest take ankle weight

NO	**Data *Statystic***	***Postes***
1	Sampel	8
2	Mean	3,05
3	Std.Deviation	0,14
4	Varians	0,02
5	Minimum	2,8
6	Maximum	3,18
7	Sum	24,37

Based on the analysis of pre-test data without using ankle weights, the following conclusions can be drawn: the sample size is 8, the mean is 3.05, the standard deviation is 0.14, the variance is 0.02, the lowest score is 2.8, the highest score is 3.18, and the sum is 24.37. The data analysis in the frequency distribution is as follows.

Tabel 1. Result norma postest take ankle weight

No	Name	Result	Norma
1.	Shifa	2,8	Good
2.	Kintan	3,14	Good
3.	Nahdiatul	3,11	Good
4.	Nayla	3,02	Good
5	Faiza	2,85	Good
6	Wangi	3,12	Good
7	Delima	3,18	Good
8	Anindya	3,15	Good

Tabel 2. Distribusi frekuensi postest take ankle weight

No	Class Interval	Frequency	
		Absolute	Frequency
1	2,80-2,90	2	25%
2	2,91-3,01	0	0%
3	3,02-3,12	3	37,5%
4	3,13-3,23	3	37,5%
	Sum	9	
	Max	2,8	
	Min	3,18	
	Mean	3,05	

Based on the frequency distribution table above, there are 8 samples. It was found that 2 individuals (50%) fall within the interval range of 2.80–2.90, categorized as good. Additionally, 3 individuals (37.5%) fall within the interval range of 3.02–3.12, also categorized as good. Another 3 individuals (37.5%) fall within the interval range of 3.13–3.23, categorized as good. For further clarification, refer to the histogram below.

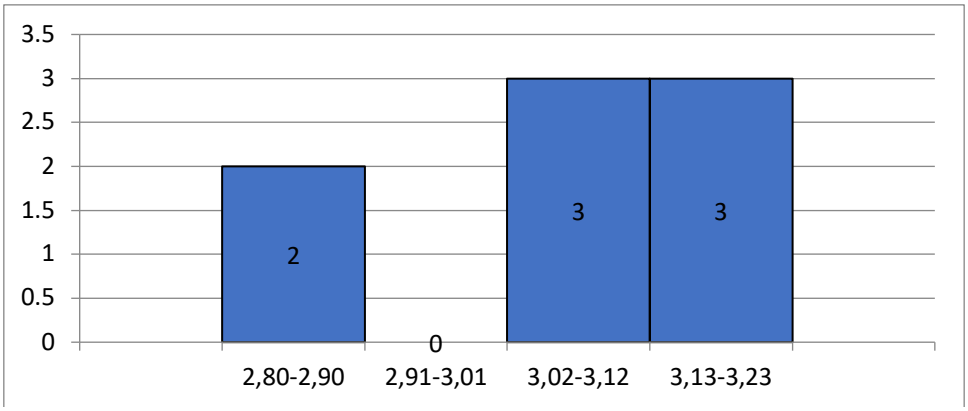

Figure 2. Histogram postest don,t take ankle weight

Normality testing was conducted using the Lilliefors test. The results of the normality test for the research variables, namely kicking training with ankle weight resistance (X) and Mawashi Geri kick speed (Y), as well as kicking training without ankle weight resistance (X) and Mawashi Geri kick speed (Y), can be seen in the following table:

Tabel 3. Normality Tes

Description	L_{hitung}	L_{tabel}	Desc
Pre-Test Results: Kick speed using ankle weights	0,166	0,285	Normal
Post-Test Results: Kick speed using ankle weights	0,258	0,285	Normal

From the table above, it can be seen that the pre-test kicking data, after calculation, resulted in an L_calculated value of 0.166 for the sample using ankle weights, with an L_table value of 0.285. This means that L_calculated is smaller than L_table, indicating that the pre-test kicking data is normally distributed. For the post-test kicking data, the calculation resulted in an L_calculated value of 0.258 for the sample using ankle weights, which is also smaller than the L_table value of 0.285. Therefore, it can be concluded that the post-test kicking data is normally distributed.

The data obtained were analyzed quantitatively using descriptive analysis. Subsequently, hypothesis testing was conducted based on the research problem, which states: *There is a significant effect of Mawashi Geri kick training using ankle weights (X) on the kicking speed of Mawashi Geri (Y).* Based on the t-test analysis, the calculated t-value **(**Thitung_hitung**)** was 3.571 for the sample using ankle weights. Referring to the t-table, where the critical t-value **(T**tabel_tabel**)** is 1.943, it can be concluded that Thitung_hitung **>** Ttabel_tabel. Therefore, H1_1 is accepted, confirming that Mawashi Geri kick training using ankle weights (X) has a significant effect on Mawashi Geri kicking speed (Y).

Tabel 4. T-Test

T-Test	T_{amount}	T_{table}	Deskription
Result analisys take *ankle weight*	3,571	1,943	H_a accepted

Discussion

The results of this study indicate that ankle weight training is effective in increasing the speed of mawashi geri kicks. This increase can be explained by the principle of overload training, where the use of additional weights on the ankles during training helps increase leg muscle strength. When the load is released, muscles that are accustomed to resistance will more easily produce faster and more explosive movements. The results of this study are also in line with previous studies which state that weight training can increase movement speed in martial arts. In addition, the discipline factor in carrying out the training program also contributes to improving athlete performance, where athletes who are more consistent in training show more significant development compared to those who are less disciplined. In addition, the increase in mawashi geri kick speed can also be associated with neuromuscular adaptations that occur due to weight training. Training using ankle weights triggers increased activation of type II (fast-twitch) muscle fibers, which play an important role in producing explosive and fast movements. This activation increases the efficiency of muscle contractions and coordination between body parts, so that kicks can be performed faster and more precisely. Thus, this training

method not only increases kick speed, but can also improve the overall quality of kicking technique. This shows that ankle weight training can be an effective training alternative for karate athletes to improve their performance in the competition arena.

Based on the discussion above, it can be concluded that ankle weight kicking training has a significant effect on Kumite Karate athletes at Dojo Ikhlas Pekanbaru at a 0.05 significance level with a 95% confidence interval. This confirms that the training positively influences both practice sessions and competition performance in karate championships. After conducting the pre-test and post-test, the collected data was analyzed using statistical formulas and processed with Excel to determine whether there was a significant effect.

CONCLUSION

Based on the research results, it can be concluded that the results of the pre-test with the post-test were analyzed using the t-test, the t-results on the sample using ankle weight load were Tcount 3.571> Ttable 1.943 then H1 was accepted, at level (a) 0.05. This means that there is an effect of ankle weight training on increasing the speed of the Dojo Ikhlas Pekanbaru athlete's mawashi geri kick.

ACKNOWLEDGEMENTS

Acknowledgments to Kumite Karate athletes at Dojo Ikhlas Pekanbaru helped conduct research.

CONFLICT OF INTEREST

Clearly explain whether there are any conflicts of interest related to the reported research.

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