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The Effect Of Strength Training On Oi Tsuki Chudan's Punch Ability In Karate Athletes

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Abstact

Study purpose. The purpose of this study was to determine the effect of strength training on the oi tsuki chudan punching ability of Karate Athletes.
Materials and Procedures. This study employs an experimental design, with one experimental group receiving therapy on purpose. The One Group Pretest-Postest Design is the method used in this investigation. Twenty junior karate athletes were selected from a total sampling.
Results. According to the data analysis results for the first test, which had a sample size of 20 individuals, the variance was 64.41, the average score was 60.25, the standard deviation was 8.03, and the total score was 1305. With a sample size of 20 individuals, the final test results showed a total score of 1510, an average score of 78.5, a standard deviation of 9.30, and a variance of 86.58. Because the final test Lo (0.1793) < Ltable (0.190) and the initial test Lo (0.1212) < Ltable (0.190), the data from both tests show a normal distribution for the normality test Lo < Ltable. Price comparison between t count and percentile values in the t-distribution table, with degrees of freedom (dk) = (n - 1) = 19 and a genuine level of α = 0.05, yielded t count (11.1048) > t table (1.7291). This indicates that Ho is disproved and Ha is accepted. With t count > t table, it can be inferred that junior karate athletes in Sarolangun Regency have an impact on their punching skill as a result of resistance band training.
Conclusion. Strength training has an impact on the punching power of oi tsuki chudan karate athletes, it can be determined.

Keyword: Streingth Training, Punching Ability, Karate Athlete.
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Introduction

Sports activities are an inseparable part of human life and have a major influence on physical, spiritual, and social development (Heliza & Fetiloka, 2023). Along with the development of the times, sports not only function as a means of recreation, but also as a medium for education, improving physical fitness, and achieving achievements. According to Law No. 11 of 2022 concerning Sports, sports are all activities that involve the mind, soul, and body in an integrated and systematic manner to encourage, foster, and develop physical,

spiritual, social, and cultural potential (Heliza & Fetiloka, 2023). One of the sports that continues to develop and emphasizes physical ability and technique is karate. Karate is a martial art that relies on muscle strength, speed, and precise punching and kicking techniques. In karate, one of the basic techniques that is important to master is the oi tsuki chudan punch, which is a straight punch to the middle of the opponent's body which is done with a forward movement. The effectiveness of this technique is highly dependent on muscle strength, coordination, and speed of movement.

To improve the ability of the punching technique, it requires training that is not only technical, but also specific physical training, such as strength training. Strength training is a form of training that aims to increase muscle strength through certain loads or resistances. This training is believed to be able to increase the strength of the body's muscles which play an important role in producing strong, fast, and effective punches. To improve sports achievements, there needs to be coaching starting from seeding, because maximum achievement is greatly influenced by superior seeds. Achieving peak performance is highly desired by all parties, including athletes, coaches, sponsors, sports coaches, relevant sports clubs and the government. Achieving peak performance requires support from various disciplines and is influenced by various factors, including hereditary, biological, psychological, and other supporting aspects (Akbar et al., 2022). The existence of several factors is not enough to achieve maximum performance. This means that other factors are still needed, such as systematic, measurable, planned and sustainable training. The peak achievement desired by all parties must be supported and requires great attention, especially the physical aspect in addition to the psychological. Coaching and development of achievement sports are implemented and directed to achieve sports achievements at the regional, national and international levels. Coaching is carried out by the parent organization of the sports branch both at the regional and central levels, especially the martial arts sport of karate. Coaching is also carried out by empowering sports associations, developing national and regional sports coaching centers, and holding competitions in a tiered and sustainable manner Law Number 3 of 2005:16

Karate is a martial art that demands a lot of skill and techniques and high self-confidence, in order to be able to display a good and consistent game in a match. Thus, a coach or trainer is needed who clearly understands his duties and profession (Fajar Ramadhan, 2023). Karate is a science of self-defense with bare hands or without weapons (Romiya Heliza, 2023). However, karate should not only be viewed as a fighting technique skill, because in essence karate has a meaning far beyond just a self-defense technique. Karate is a way of living life whose goal is to provide an opportunity for someone to be able to realize their potential. A person who pursues this karate sport is called a karateka (Akbar et al., 2022). According to (Collantes González, 2024) Karate consists of kihon, kata and kumite training. Kihon involves basic techniques, while kata and kumite are two types of competition. This means that karate consists of kihon, kata, and kumite training. Kihon involves basic techniques, while kata and kumite are two types of competition. Karate techniques that are learned and controlled well according to the wishes of the karate-ka are carried out by moving directly to the goal or target precisely. Karate can be interpreted as a branch of martial arts that is classified as a hard school using physical techniques that include punches, kicks and blocks with a solid stance (Andibowo et al., 2022). elf-defense is one of the arts that has existed for a long time and has developed over time and is used to defend or defend oneself. The goals of karate self-defense according to the karate oath are 5, namely being able to maintain personality, being able to obey honesty, being able to increase achievement, being able to maintain good manners, and being able to control oneself.

Mastery of basic techniques must be considered when developing karate martial arts. Good mastery of techniques is very beneficial for athletes, especially those who will compete for a long time because it can save energy (Khoirul & Setiawan, 2022). Punching techniques

really require speed and accuracy in doing it. Speed and accuracy in punching are the main elements that must be considered when carrying out an attack with the aim of not being easily hit or cut by the opponent (Loturco et al., 2014). Based on the results of observations by researchers during kumite matches, the most frequently used technique is the punching technique (tsuki). This is because attacks using punches are easier to get points than kicks. Power is one of the elements in physical Power is the ability of muscle reactions characterized by changes between contraction and relaxation to reach maximum frequency (Safitri & Sariul, 2022). Hitting in karate must have good Power, because with faster punches is a very determining factor in getting points/values. Including the oi tsuki chudan punch, the Power of this punch will be assisted by explosive (exploding in a movement) arm muscles (Fajar Ramadhan, 2023).

(Akbar et al., 2022) states power as the ability of a muscle or a group of muscles to overcome resistance as a load at high speed in a complete movement. Based on the above limitations, it can be concluded that power is basically a person's ability to exert maximum strength in the shortest or briefest time. Strength is the ability of muscles to generate tension/force against a resistance (Grimby & Thomeé, 2003). Through strength, a karateka can do something optimally. Good strength will produce good or excellent Oi tsuki chudan punching ability (Hudain & Ishak, 2020). When performing kumite, it is clear that some karateka still show some weaknesses in oi tsuki chudan punches, including: 1) Punches are delivered in a way that is not jerked; 2) Punches do not hit the target; 3) Punches are not immediately pulled back; 4) Punches are done with fists that are too stiff, not relaxed. Seeing this condition, it is important for coaches and athletes to understand the effectiveness of the training methods used in increasing arm muscle power. By knowing the effectiveness of training techniques on the results achieved, coaches can apply more effective methods to increase arm muscle power.

Karate athletes at the Dojo of SMA Negeri 6 Kerinci showed that athletes still face several obstacles in performing oi tsuki chudan punches, such as weak basic technique skills (kihon) and the ease with which this punch is read by the opponent, so that the opponent can easily catch and counter the attack. In fact, compared to other punches, oi tsuki chudan has advantages in ease, speed, and real impact on the target. The cause of the above problems is due to their lack of punching technique skills, kihon or basic techniques are also important factors that need to be improved. The lack of good kihon mastery among athletes is often caused by a lack of understanding of the right technique and a lack of systematic training (Johan et al., 2023) . Therefore, the integration of good kihon training and strength training is expected to increase muscle strength that supports technical performance, including in oi tsuki chudan punches (Johan et al., 2023). This exercise helps build muscle endurance, increase power, and improve muscle control so that punches become stronger, faster, and more precise. In addition, Strength training can strengthen body stability, which allows athletes to maintain better balance when punching, making it more difficult for opponents to read or block attacks (Hidayat & Munandar, 2022).

The strength training used in this workout includes push-ups, dumbbells, and resistance bands, each of which has specific benefits for increasing the muscle strength needed for oi tsuki chudan punches. 1) Push-ups: This exercise helps strengthen the chest, shoulder, and triceps muscles, which play a vital role in generating power when punching. Push-ups also improve upper body endurance and core muscle stability, which supports posture and balance when punching (Hassan, 2018). 2) Dumbbells: Exercises with dumbbells focus on increasing arm and shoulder muscle strength. With additional weight, the muscles involved in the punch will get used to exerting greater force, so that the punch can become stronger and more targeted (Hidayat & Munandar, 2022). 3) Resistance bands: Resistance bands are great for training muscle speed and elasticity, especially in pulling and pushing movements. They help athletes

improve their explosive power and punching accuracy because they apply increasing pressure throughout the movement, which encourages muscles to adapt and recover faster (Fajar Ramadhan, 2023).

This study presents a novelty in the application of an integrated strength training method to improve the oi tsuki chudan punching ability of high school karate athletes. Unlike previous studies that generally only focus on one type of strength training, this study systematically combines three types of strength training exercises, namely weight training, plyometric training, and muscle endurance training. Another novelty lies in the context of the application, namely in karate athletes at the Dojo of SMA Negeri 6 Kerinci, which has not been widely studied before. With this approach, the study provides a practical contribution to the development of a more effective and measurable training program to improve muscle explosive power and oi tsuki chudan punching performance specifically, so that it can help athletes achieve optimal points in matches..

Materials and Methods

Study participants

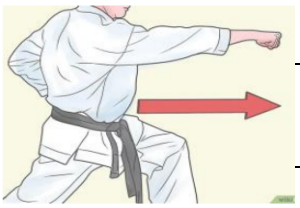
This research was conducted on February 4 to March 8, 2025 at the Dojo of SMA Negeri 6 Kerinci. According to Heliza & Fetiloka, (2023) Population is a certain group of something (people, objects, events, and so on) selected by researchers whose study or research results can be generalized to the group. In this study, the population used was Karate Athletes at the Dojo of SMA Negeri 6 Kerinci, totaling 20 Athletes. The sampling technique in this study was total sampling. The total sampling technique is a sampling determination technique when the entire population is used as a sample (Subhaktiyasa, 2024). Based on the description above, the sample in this study was all junior karate athletes at the Dojo of SMA Negeri 6 Kerinci, totaling 20 athletes aged 16-17 years.

Study organization

In accordance with the objectives of the study, this study uses an experimental method, in order to determine the Effect of Strength Training on Oi Tsuki Chudan Punching Ability. The research instrument used in data collection in this study was to use the Oi Tsuki Chudan punching ability test. Akbar et al., (2022) The test was carried out to determine the basic abilities of the sample. The instrument in this study used a punching ability test (tsuki) to the target. Oi Tsuki Chudan punching ability measurement test. The ability test procedure is as follows: The tools used are, Hall or training place, curved bow or punching bag, hand protector (if needed), dumbbell, resistance band, and research form for filling in the results that have been done. The testee with the initial position of geidan barai forward with the Oi Tsuki Chudan punching movement forward hitting the target, namely the solar plexus or stomach, with a heavy horse stance forward or zen-kutsu-dachi, done 3-5 times in a row.

This research is validated by the trainer in the research is very important to ensure that the instruments used can truly measure the athlete's ability accurately and in accordance with the applicable standards in karate. The data collection technique is a method or provision carried out in the implementation of the test through stages and performing punches (tsuki) both in the initial test and the final test. The provisions for implementing the test are as follows: The steps taken to obtain an assessment of the ability of punches (tsuki) chudan can be seen in table 1 below:

Table 1. Punching Ability Test Instrument

	Picture	Information	Mark	
			Correct	**Wrong**
			5	0
Preparation	1. position in front stance 	1. see the front knee the sole of the foot is blocked by the knee		
		2. ready attitude with full balance		
		3. protective hand is in front		
		4. hand behind the back with a fist		
Implementation	2. move forward to hit 	5. Don't move		
		6. head height always remains the same		
		7. keep clenched fists in the same place		
		8. advanced the protective fist		
		9. slide the back leg forward, the foot does not move from the floor		
		10. the back legs do not move straight forward		
		11. feet to the middle moving towards your body		
	3. lunge forward towards the target 	12. make sure both legs are bent smoothly		
		13. don't tense up		
		14. focus on the target		

	4. view to target 	15. tighten muscles while hitting
		16. The back legs should be extended straight and all muscles tightened.
		17. front leg Return to shoulder width distance to land in a strong position
Suffix	5. Return to the front stance or starting position 	18. ready attitude with full balance
		19. protective hand is in front
		20. hand behind the back with a fist

He punching ability research instrument has 5 assessment test techniques, and 20 assessment indicators, with 5 assessment points on Each indicator is a method for evaluating performance or quality in a structured and detailed manner.
Each indicator has a scale of 0 & 5, with the following meanings:
1) 0: if you do not do the punching movement properly and correctly
2) 5: if you do it correctly when doing the punching movement
Total score calculation:

With 20 indicators assessed each on a scale of 0 & 5, the total score that can be obtained is 100 if all indicators get the maximum value (5 x 20 = 100). Each indicator contributes 5% of the total score

With this method, the total score provides a comprehensive picture of performance or achievement in 20 indicators, so that the evaluation is more accurate and balanced. With these criteria, the punching ability norms can be seen in table 2 below.

Table 2. Punching Ability Norms

No	criteria	Skor
1	Very good	76-100
2	Good	51-75
3	Enough	26-50
4	Not enough	0

Statistical analysis

According to (Scheel et al., 2021) Before testing the hypothesis, a prerequisite test needs to be carried out. Testing the measurement data related to the research results aims to help the analysis to be better. For this reason, this study will test the normality and homogeneity of the data.

The normality test aims to see whether the data is normally distributed or not, using the Liliefors test proposed by (Agustina, 2017) as follows:

a. Find the standard score with the formula, $z_i = \frac{x_i - \bar{x}}{s}$

Describtion:

Zi = Standar score, X1 = Result score, X = Avarage result, S = Standar deviation

b. For each of these standard numbers, and using a standard normal distribution list, then calculate the probability with the formula: = P(Z<Zi)

c. Calculate the proportion of Z1, Z2, ... Zn which is smaller than or equal to Zi. If this proportion is stated as S (Zi) then,

$$s(z_i) = \frac{z_{1,}{}^{z_{2,\cdots}} zn \leq zi}{n}$$

Describtion:
n = Amount athlete 20

Calculate the difference F(Zi) – S (Zi) then determine the absolute value Take the largest value, call it L0. Compare L0 with the critical value L in the table with α = 0.05 If L0 <L means the result score is normally distributed and vice versa If L0 > L means the result score is not normally distributed

Akbar et al., (2022) To test the hypothesis, a statistical test is used. The hypothesis test uses the t-test. Hypothesis testing uses the t-test at a 95% confidence level or α = 0.05 using the following formula:

$$t - \frac{-M\,d}{\sqrt{\frac{\Sigma x^2 d}{N(N-1)}}}$$

Information:
Md = Mean of the difference between pre-test and post-test, Xd = Deviation of each subject (d-Md), ∑ X2 d = Sum of squares of deviations, N = Number of samples, d.b = Determined by N – 1
Based on the data obtained, the calculated t value is then compared with the t table (0.05) with df = n-1 =, the t table is obtained. Thus, the calculated t> table is accepted or there is an effect. In analyzing data or in normality tests and hypothesis tests, it is assisted by the Microsoft Excel application.

Result

Based on the description that has been collected previously, this chapter will conduct an analysis of the discussion obtained in this study. The results of the study will be described in accordance with the objectives and hypotheses proposed previously. An overview of the data in the group can be seen in the following description: The following is a table of explicit research results seen in table 3 below:

Table 3. Description of initial and final test data

Data	N	∑	Mean	Sd	Varian
Pretest	20	1.305	65,25	10,45	109,14
Postest	20	1.510	75,5	9,30	86,49

From the table above, it can be explained that for the initial test with a sample size of 20 people, the total value was 1,305 with an average value of 65.25 and a standard deviation of 10.45, while the variance was 109.14. For the final test data with a sample size of 20 people, the total value was 1,510, with an average value of 75.5 and a standard deviation of 9.30, while the variance was 86.49.

The description of the data on the initial sample test obtained from the research results is then described as in the following table 4:

Table 4. Description of initial test data

No	Kriteria	Fi	Persentase
1	Very good	2	10%
2	Good	14	70%
3	Enough	4	20%
4	Not enough	0	0%

From table 4 above, we get the initial test results diagram in figure 1 below:

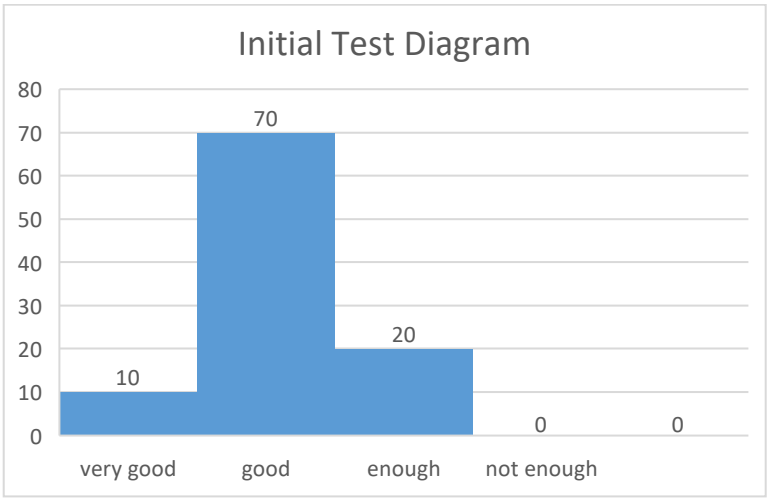


Figure 1. Initial test results diagram

Based on the diagram above, it is known that the initial test results of athletes with very good criteria are 2 people with a percentage of 10%. with good criteria there are 14 people with a percentage of 70% and with sufficient criteria there are 4 people with a percentage of 20%.

To obtain the following data description on the final test of the sample obtained from the results of the next study are described as in table 5 below:

Table 5. Description of final test data

No	Kriteria	Fi	Persentase
1	Very good	8	40%
2	Good	12	60%
3	Enough	0	0%
4	Not enough	0	0%

From table 5 above, we get a diagram of the final test results in figure 2 below:

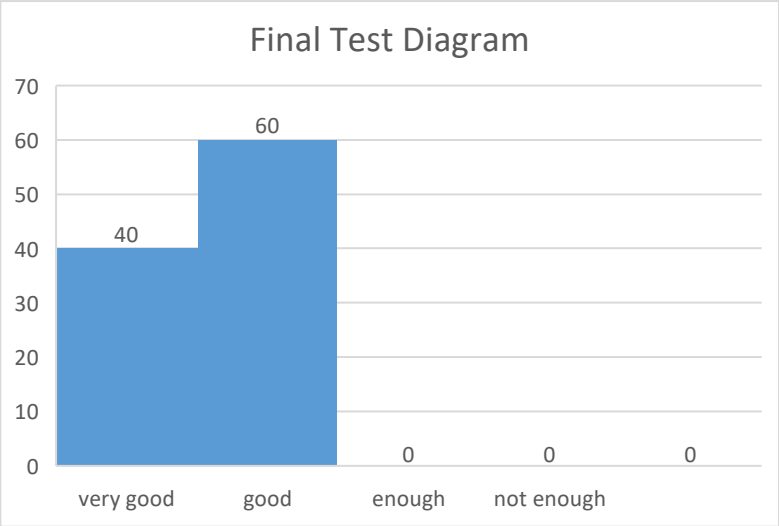


Figure 2. final test results diagram

Based on the diagram above, it is known that the initial test results of athletes with very good criteria are 8 people with a percentage of 40%. with good criteria there are 12 people with a percentage of 60%.

Before conducting a hypothesis test to see the contribution of the variables, a normality test of the two data must first be carried out, so the data normality test can be described in table 6 as follows:

Table 6. normality test

Data	N	Lo	Ltabel	Describtion
Preliminary test results	20	1,1212	0,190	Normal
Final test results	20	1,1793	O,190	Normal

For the normality test Lo < Ltable, then the data from the initial test and the final test have a normal data distribution because, for the initial test Lo (1.1212) < Ltable (0.190), the final test Lo (1.1793) < Ltable (0.190), then all have met the requirements for conducting a hypothesis test. After conducting a normality test, a hypothesis test was conducted to see the

effect of strength training on the punching ability of oi tsuki chudan karate athletes at the SMAN 6 Kerinci dojo with the following hypotheses:

a. Ho: X1 = X2 (there is no influence of strength training on the oi tsuki chudan punching ability of karate athletes at the SMAN 6 Kerinci dojo)

b. Ha: X1 ≠ X2 (there is an influence of strength training on the oi tsuki chudan punching ability of karate athletes at the SMAN 6 Kerinci dojo)

The results of the data analysis obtained from the t-test using Statistics calculations show the data in table 7 as follows:

Table 7. Hypothesis testing

No	Pretest (X)	Postest (X)	Difference (d)	Xd (Md-d)	X^2d
1	50	65	5	-5,25	27,5625
2	75	80	15	4,75	22,5625
3	75	85	10	-0,25	0,0625
4	50	60	10	-0,25	0,0625
5	55	75	20	9,75	95,0625
6	65	75	10	-0,25	0,0625
7	70	75	5	-5,25	27,5625
8	55	70	15	4,75	22,5625
9	60	70	10	-0,25	0,0625
10	75	80	5	-5,25	27,5625
11	75	85	10	-0,25	0,0625
12	70	80	10	-0,25	0,0625
13	65	75	10	-0,25	0,0625
14	70	80	10	-0,25	0,0625
15	50	60	10	-0,25	0,0625
16	70	75	5	-5,25	27,5625
17	50	65	15	4,75	22,5625
18	65	70	5	-5,25	27,5625
19	80	95	15	4,75	22,5625
20	80	90	10	-0,25	0,0625
amount			205		323,75
		Mean	10,25		

For information on the results of the hypothesis test, it is described in table 8 below:

Table 8. description of hypothesis test results

N	T qount	T table	Describtion
20	11,104803	1,7291	Signifikan

From the table above, it can be seen that with a sample size of 20, and a t count of 11.104803 to see whether the Ho hypothesis or the Ha hypothesis is accepted according to the explanation above, the t count value is compared with the t table value. Comparison of the value between t count and the percentile value in the t-distribution table, for a real level of α = 0.05 with degrees of freedom (dk) = (n - 1) = 19, t count (11.104803)> t table (1.7291) is obtained. This means that the Ha hypothesis is accepted and Ho is rejected. So it can be concluded that there is an effect of strength training on the ability of the oi tsuki chudan punch in karate athletes at the SMAN 6 Kerinci dojo with t count > t table.

Discussion

Karate is also described as a martial art or self-defense method that contains various techniques, including dodging, defending, attacking, even destroying or knocking down. In the sport of karate there are three main techniques, namely: Kihon (basic technique), Kata (moves) and Kumite (fighting). In the sport of karate athletes must master basic techniques, including: horse stance techniques (dachi), blocking techniques (uke), punching techniques (tsuki), kicking techniques (geri). Before playing kata, these techniques must be practiced first until the form of the technique's movements is as good as possible. These basic movements are called kihon (Fandayani & Sagitarius, 2019).

In the research that was studied, namely punching ability, through strength training. Strength training is exercise that uses resistance bands, and dumbbells are tools and training methods that are very effective in increasing muscle strength and overall body fitness. Strength training is an exercise that involves the use of weights or resistance to stimulate muscles to develop and become stronger (Sucipto & Widiyanto, 2016). This exercise not only increases muscle mass, but also strengthens bones, improves posture, and helps improve balance and coordination. One common form of strength training is using tools such as dumbbells, barbells, or machines.

On the other hand, resistance bands are elastic tools that provide resistance when used for exercise. Resistance bands offer high flexibility because they can be used in various exercises, both to increase muscle strength, flexibility, and for injury rehabilitation. Another advantage of resistance bands is that they are easy to carry and use anywhere, making them very practical for training at home or on the go. With adjustable resistance according to the strength of the band, users can adjust the level of difficulty of the exercise very easily. (Setiawan & Wibisono, 2021). Dumbbells are bar-shaped exercise equipment with weights on both ends that are often used in strength training. The use of dumbbells allows for more focused training of specific muscles and provides the benefit of increased body balance because dumbbell exercises involve the stabilizer muscles that help maintain body balance during movement. Dumbbells can be used for a variety of exercises such as bench presses, squats, and deadlifts, which involve the upper, lower, and core muscles (Juntara, 2019). Although all three have their own advantages, a combination of strength training, resistance bands, and dumbbells can provide more varied and comprehensive training results, according to individual needs. Combining all three in a training program can help achieve more optimal fitness goals, from muscle building, increasing endurance, to injury recovery.

In this study, strength training was applied to karate athletes at the Dojo of SMAN 6 Kerinci to see its effect on the ability of the oi tsuki chudan punch. After carrying out the training program for several weeks, the results of the pre-test and post-test were compared to determine whether there was an increase in the athlete's performance in performing the punch. Based on the results of the study, strength training had a positive impact on the ability of the

oi tsuki chudan punch. This is indicated by an increase in the strength of the arm muscles, shoulders, and a more stable core, allowing athletes to produce faster and stronger punches.

From the results of statistical analysis, there is a significant difference between the results of the pre-test and post-test. This increase indicates that strength training has an important contribution in increasing the effectiveness of punches in karate. With a sample size of 20, and a t count of 11.1048 to see whether the hypothesis is accepted with degrees of freedom (dk) = (n – 1) = 19, it is obtained t count (11.1048) > t table (1.7291), it can be concluded that there is an effect of strength training on the ability of oi tsuku chudan punches in karate athletes at the Dojo SMAN 6 Kerinci.

Conclusions

Based on the research results, it can be concluded that there is an influence of strength training on the oi tsuku chudan punching ability of karate athletes at the SMAN 6 Kerinci Dojo. This study has several limitations. First, the number of samples is limited to karate athletes at the Dojo of SMA Negeri 6 Kerinci, so the results cannot be generalized to a wider population. Second, the duration of the strength training is relatively short, so the long-term effects of the training program cannot be seen. Third, the variables studied are only focused on the ability of the oi tsuki chudan punch, without considering other factors such as breathing techniques, agility, or the psychological condition of athletes which can also affect performance.

For further research, it is recommended to involve a larger and more diverse sample size from different dojos or educational levels to increase the generalizability of the results. Extend the duration of training to observe the long-term effects of strength training on athletes' physical and technical abilities. Add other variables such as coordination, flexibility, or mental aspects of athletes to gain a more comprehensive understanding of performance improvement in karate.

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Finally, I realize that this research still has shortcomings. Therefore, I am open to constructive criticism and suggestions for the improvement of this research in the future.

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