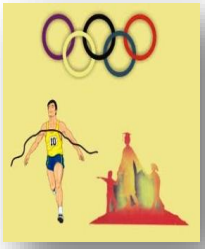
Sport Science: Jurnal Sains Olahraga dan Pendidikan Jasmani
ISSN 114-562X (Cetak),
ISSN 2722-7030 (Online)
Volume 26 Nomor 1 Edisi Januari Tahun 2026
Url: http://sportscience.ppj.unp.ac.id/index.php/jss/index
Doi: 10.24036



Resistance Band Training Improves Gyaku Stuki Punch Speed In Karate Athletes

Muhammad Rafif Sukman[1], Nur Subekti[2], Agam Akhmad Syaukani[3]
[1.3]faculty of Teacher Training and Education, University of Muhammadiyah Surakarta, Indonesia.
. E-mail: a810220027@student.ums.ac.id[1] , nur.subekti@ums.ac.id[2] , aas622@ums.ac.id[3]

Abstract

This study aimed to investigate the effects of resistance band training on the execution speed of the *gyaku-tsuki* strike among karate athletes from the FORKI Dojo in Surakarta. A quantitative approach was adopted, employing a quasi-experimental one-group pretest-posttest design. The sample population consisted of 13 athletes recruited as the main participants. The intervention was carried out through a resistance band training program over six weeks, with three sessions per week. Data were measured via *gyaku-tsuki* punch speed tests at the initial (pre-test) and final (post-test) stages. Descriptive analysis indicated a pre-test mean of 44.31 (standard deviation 5.808), which subsequently increased to 71.00 (standard deviation 8.593) at the post-test. A paired-sample t-test yielded a p-value of 0.000 (<0.05), indicating a significant effect of resistance band training on improving *gyaku-tsuki* strike speed. This study provides practical evidence for integrating elastic resistance training into karate-specific conditioning programs. Therefore, resistance band training is recommended as an effective supplementary training strategy to optimize the striking performance of karate athletes.
Keywords*:* resistance band, punch speed, *gyaku-tsuki*, karate

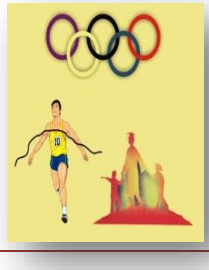
INTRODUCTION

Sport plays a crucial role in maintaining physical fitness, improving health, and developing personal character. In the realm of education and achievement, sport serves not merely as a recreational activity but also as a means of developing physical and psychological capabilities, as well as motor coordination (Febriani et al., 2023). Among the various sports that have seen significant development and high competitiveness is karate. Karate is known as a Japanese martial art, the name of which is etymologically translated as 'empty hand', as its techniques do not rely on the use of weapons (Sihite, 2024).

Karate emphasizes mastery of the fundamental techniques—including *kihon*, kata, and kumite—as key elements in the process of learning and developing competitive performance(Yusup, 2024). In kumite, the precise and agile execution of attacking techniques is a key factor in an athlete's ability to accumulate points (Fendrian, 2016). Among the various striking techniques frequently employed, the *gyaku-tsuki* stands out as a straight jab delivered with the rear-dominant hand, enhanced by hip rotation, a thrust from the rear leg, and synchronized explosive body movement. This technique is considered superior as it offers optimal reach, superior stability, and biomechanical efficiency in delivering the impact of the strike (Hudain & Ishak, 2020).

The speed of execution of the *gyaku-tsuki* strike is a crucial element in a karate athlete's performance, as it is closely linked to the effectiveness of attacks during competition (Fitriani, 2022). Participants with superior strike speed gain a greater advantage in scoring points before their opponents can react. A study by Loturco et al., (2016), indicates that athletes demonstrating elevated punch acceleration tend to have a higher attack success rate in close-range exchanges

Sport Science: Jurnal Sains Olahraga dan Pendidikan Jasmani
ISSN 114-562X (Cetak),
ISSN 2722-7030 (Online)
Volume 26 Nomor 1 Edisi Januari Tahun 2026
Url: http://sportscience.ppj.unp.ac.id/index.php/jss/index
Doi: 10.24036



Nevertheless, in the development of karate athletes, optimizing punch speed is often not adequately achieved. Based on observations of the training program for athletes at the FORKI Surakarta Dojo, the dominant approach still emphasizes repetition of fundamental techniques and conventional physical conditioning, whilst specific interventions aimed at improving the speed of muscular contraction in line with the kinematic patterns of strikes have not been fully maximized. This situation has resulted in an improvement in striking performance, but it has not reached the expected optimal level.

One promising training strategy for developing sport-specific movement speed is the use of resistance bands. Resistance bands are defined as elastic devices that provide progressive resistance throughout the range of motion, thereby triggering more intensive muscle activation during the contraction phase (Same, 2021). The use of resistance bands facilitates more targeted training, as the resistance vector can be adjusted to match the kinematic trajectory of the sporting technique being focused on in training (Persadanta, 2020).

From a physiological perspective, training with resistance bands is effective in enhancing neuromuscular recruitment, muscle strength, and the capacity of fast-twitch muscle fibers, all of which contribute to increased muscle power (Sa'diah, 2024). Bompa, (2009) explains that training with elastic resistance can trigger structural adaptations in muscle fibers, thereby improving the muscle's ability to generate force rapidly. Furthermore, each resistance level on a resistance band provides a different amount of resistance when stretched, thereby allowing for the measured application of the principle of progressive overload(Bompa, 1999). Light-level resistance bands are generally used for beginners, injury rehabilitation, or low-load mobility exercises, whilst medium-level bands are used to improve basic strength and neuromuscular coordination (Stanković et al., 2025). Heavy-to-very-heavy levels, meanwhile, focus on improving maximum strength, explosive power, and muscle stability in athletes with training experience.

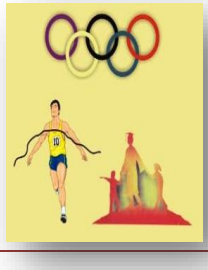
Various previous studies have also confirmed the benefits of resistance bands in martial arts. Pasaribu et al., (2020), concluded that resistance band training had a significant impact on improvements in the speed of *gyaku-tsuki* and kizami-tsuki strikes among karateka at the Rajawali Dojo. Furthermore,Sihite & Siahan, (2024), documented an increase in the execution speed of the *gyaku-tsuki* following the implementation of a resistance band training program among karate athletes. However, limited studies have specifically examined the effect of resistance band training on strike speed in karate using controlled intervention protocols

Based on the above discussion, this study was conducted to analyze the impact of resistance band training on the speed of the *gyaku-tsuki* strike among karate athletes at the FORKI Surakarta Dojo, in the hope that the findings will contribute to the development of more precise and efficient training strategies for enhancing the performance of karate athletes.

METHODS

This study employed a quantitative quasi-experimental one-group pretest-posttest design. This design was used to examine the impact of resistance band training on gyaku-tsuki punch speed by comparing pre- and post-intervention measurements within a single, identical group of subjects. A schematic representation of this research design is O_1–X–O_2, where O_1 denotes the pre-intervention measurement (pre-test), X denotes the resistance band training intervention, and O_2 denotes the post-intervention measurement (post-test). However, the absence of a control group is acknowledged as a

Sport Science: Jurnal Sains Olahraga dan Pendidikan Jasmani
ISSN 114-562X (Cetak),
ISSN 2722-7030 (Online)
Volume 26 Nomor 1 Edisi Januari Tahun 2026
Url: http://sportscience.ppj.unp.ac.id/index.php/jss/index
Doi: 10.24036



limitation of this study, which may affect the ability to fully attribute the observed changes solely to the intervention.

This study was conducted at the FORKI Surakarta Dojo, located at the Manahan Stadium in Surakarta, over six weeks with a training schedule of three sessions per week, specifically on Tuesdays, Thursdays, and Saturdays. athletes who regularly participated in the dojo's training program; they were recruited using total sampling, as all members of the population meeting the inclusion criteria were included. The sample was selected based on the assumption of homogeneous training characteristics among the athletes and their involvement in a uniform training program. The small sample size reflects the limited population available in the training setting, as all eligible athletes were included in this study.

The measurement instrument used in this study was a 30-second gyaku-tsuki strike speed test(Loturco et al., 2016) Each participant was instructed to perform as many gyaku-tsuki strikes as possible within the allotted time, and the number of strikes that met the validity criteria was recorded as the test score. Measurements were taken twice: pre-intervention to obtain pretest data and post-training program to obtain posttest data. This instrument was selected based on its ability to directly represent hand movement speed in the karate striking technique that was the focus of the study.

The main intervention in this study was a resistance band training program based on the principle of progressive overload. Training sessions began with a 15-minute warm-up, comprising light jogging, dynamic stretching, and simulated *gyaku-tsuki* strikes without equipment. In the main phase, participants performed resistance-band-based *gyaku-tsuki* strikes in three sets, with a gradual increase in intensity from 70% to 80% to 90% over six weeks (Subekti et al., 2021). The resistance bands used in this study were medium to heavy levels (black), with progressive adjustments applied throughout the training period, starting with moderate resistance in the initial weeks and gradually increasing to higher resistance in the final weeks in accordance with the athlete's strength adaptation. The work-to-rest ratio used was 1:2, with a two-minute rest interval between sets. The movement was executed from a *zenkutsu-dachi* stance, with the rear hand holding the resistance band, followed by hip rotation and explosive arm extension in accordance with standard *gyaku-tsuki* technique. The session concluded with a cool-down comprising light walking and static stretching.

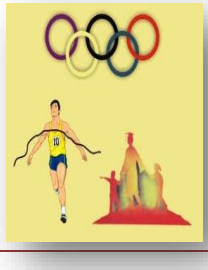
The analysis of the data from this study involved both descriptive and inferential statistics. Assumptions of normality were tested using the Shapiro-Wilk test, given that the sample size was less than 30 participants. Once the data were verified as normally distributed, a paired-samples t-test was applied to detect significant differences between pre-test and post-test scores. The decision threshold was set at $\alpha = 0.05$, such that p-values below 0.05 indicate that resistance band training has a significant effect on the speed of the *gyaku-tsuki* strike in athletes.

RESULTS AND DISCUSSION

Research Findings

This study aims to investigate the effect of resistance band training on the speed of the gyaku-tsuki strike in karate athletes. Data were collected through measurements at the pre-test and post-test stages and subsequently analyzed using both descriptive and inferential statistical methods.

Sport Science: Jurnal Sains Olahraga dan Pendidikan Jasmani
ISSN 114-562X (Cetak),
ISSN 2722-7030 (Online)
Volume 26 Nomor 1 Edisi Januari Tahun 2026
Url: http://sportscience.ppj.unp.ac.id/index.php/jss/index
Doi: 10.24036



To provide a more detailed picture of performance changes for each athlete, the pre-test and post-test data are presented individually, along with the percentage improvement, as shown in Table 1.

Table 1. *Pretest and Posttest Results for Athletes*

No	Athlete	Pretest	Posttest	Increase	Percentage
1.	Angga	32	75	43	134,38%
2.	Aly	39	70	31	79,49%
3.	Naura	38	64	26	68,42%
4.	Tiara	40	70	30	75,00%
5.	Ridho	48	59	11	22,92%
6.	Luvena	47	84	37	78,72%
7.	Kayla	43	65	22	51,16%
8.	Nafan	42	72	30	71,43%
9.	Galih	49	68	19	38,78%
10.	Ega	49	70	21	42,86%
11.	Shyla	52	60	8	15,38%
12.	Marcel	49	78	29	59,18%
13.	Adit	48	88	40	83,33%

As shown in Table 1, all athletes improved their gyaku-tsuki punch performance following the implementation of the resistance band training intervention. The most significant improvement was recorded by Angga, at 134.38%, whilst the smallest improvement was observed in Shyla, at 15.38%. These findings indicate variations in individual responses to the training program, which are thought to be influenced by factors such as baseline physical condition, training experience, and each athlete's level of biological adaptation.

In addition to individual analyses, improvements in athletes' overall performance can also be observed through descriptive statistics summarising mean values and data distribution, as shown in Table 2.

Table 2. *Descriptive Statistics* of Pre-test and Post-test Results

Data	N	Minimum	Maximum	Mean	Std.Deviation
Pretest	13	32	52	44,31	5,808
Posttest	13	59	88	71,00	8,593

Sport Science: Jurnal Sains Olahraga dan Pendidikan Jasmani
ISSN 114-562X (Cetak),
ISSN 2722-7030 (Online)
Volume 26 Nomor 1 Edisi Januari Tahun 2026
Url: http://sportscience.ppj.unp.ac.id/index.php/jss/index
Doi: 10.24036

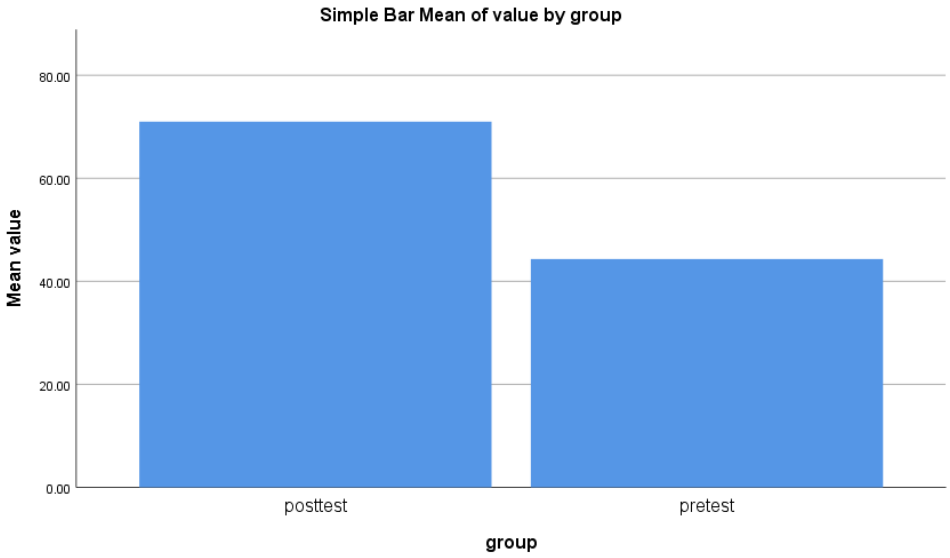


Figure 1. *Comparison of Average Pretest and Posttest Scores*

Table 2 shows that the mean pretest score was 44.31, with a minimum score of 32 and a maximum of 52. Following the resistance band training program, the mean posttest score increased to 71.00, with a minimum score of 59 and a maximum of 88. This increase in the mean score indicates an improvement in the athletes' ability to perform the gyaku-tsuki strike following the intervention. Furthermore, the increase in the maximum score indicates that some athletes experienced a significant improvement in performance following the training program.

Prior to conducting the hypothesis test, a normality test was performed as a prerequisite for parametric analysis. The Shapiro–Wilk test was used to assess normality, given that the sample size was less than 30. The results of the normality test are presented in Table 3.

Table 3. *Results of the Normality Test*

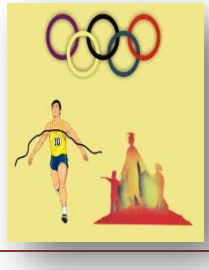
Data	Statistic	Sig
Pretest	0,916	0,220
Posttest	0,952	0,630

The results of the normality test showed that the significance values for the pre-test and post-test were 0.220 and 0.630, respectively. As both significance values were greater than 0.05, the research data were deemed to be normally distributed and therefore met the criteria for conducting a paired-sample t-test.

Next, Levene's test was conducted to assess the homogeneity of variance in the research data. The results of the homogeneity test are presented in Table 4.

Table 4. *Homogeneity Test Results*

Sport Science: Jurnal Sains Olahraga dan Pendidikan Jasmani
ISSN 114-562X (Cetak),
ISSN 2722-7030 (Online)
Volume 26 Nomor 1 Edisi Januari Tahun 2026
Url: http://sportscience.ppj.unp.ac.id/index.php/jss/index
Doi: 10.24036



Data	Lavene Statistic	Sig
Value	0,873	0,359

The p-value of 0.359 is greater than 0.05, so the research data is deemed homogeneous. As the assumptions of normality and homogeneity have been met, hypothesis testing can proceed using a paired t-test.

The following table presents the results of the paired-sample t-test assessing whether there was a significant difference between pre- and post-test scores following resistance band training.

Table 5. *Results of the Paired Sample t-test*

Data	Mean Difference	t	df	Sig. (2-tailed)
Pretest – Posttest	-26,69	-9,230	12	0,000

Based on the results of the paired-sample t-test, a significance value of 0.000 was obtained. As this value is less than 0.05, it can be concluded that there is a significant effect of resistance band training on the speed of the gyaku-tsuki strike among karate athletes at the FORKI Dojo in Surakarta. The mean difference of 26.69 indicates a considerable improvement in performance following the implementation of the training program. The effect size analysis showed a very large effect (Cohen's d = 3.63), indicating a substantial practical impact of resistance band training on gyaku-tsuki punch speed.

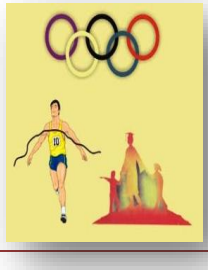
Discussion

The findings of this study reveal that training with resistance bands significantly increases the speed of the gyaku-tsuki punch. The average increase from 44.31 in the pre-test to 71.00 in the post-test demonstrates that the training program successfully increased the athletes' punch speed within the same measurement period. This improvement can be attributed to enhanced explosive muscle power and intermuscular coordination, particularly the synchronization among the upper limbs, core muscles, and hip rotation during the execution of the gyaku-tsuki technique. This indicates that the training intervention provided optimal stimulation of the athletes' explosive movement capabilities, particularly in striking techniques that demand agile coordination among the arms, shoulders, and hips, as well as overall body stability.

From a physiological perspective, resistance band training provides elastic resistance that prompts the muscles to work more intensely during the contraction phase, thereby enhancing neuromuscular activation (Persadanta, 2020) When athletes perform the gyaku-tsuki movement with this elastic resistance, the arm and shoulder muscles adapt to generate faster, more efficient contractions. This adaptation contributes to increased punch speed after six weeks of consistent training.

In the gyaku-tsuki technique, hip rotation plays a crucial role in accelerating the strike (Venkatraman & Nasiriavanaki, 2019). The use of resistance bands ensures that the direction of the technique's movement is maintained, so that the pattern of muscle contraction aligns with the essence of the karate strike(Lamusu & Lamusu, 2023). This approach makes the training more specific than conventional strength training, as the elastic resistance follows the natural movement path of the

Sport Science: Jurnal Sains Olahraga dan Pendidikan Jasmani
ISSN 114-562X (Cetak),
ISSN 2722-7030 (Online)
Volume 26 Nomor 1 Edisi Januari Tahun 2026
Url: http://sportscience.ppj.unp.ac.id/index.php/jss/index
Doi: 10.24036



technique (Ramadhan et al., 2023). Consequently, the athlete's motor adaptation occurs more rapidly, resulting in increasingly agile and stable strikes.

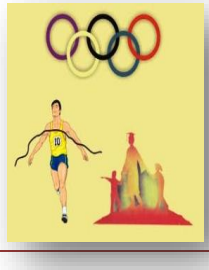
The findings of this study are consistent with previous research. This similarity may be attributed to the use of elastic resistance, which consistently enhances muscle activation and movement-specific strength. However, the magnitude of improvement observed in this study appears greater, which may be attributable to differences in training duration, intensity progression, and participant characteristics. demonstrating that resistance band training is highly effective in improving the speed of the gyaku-tsuki strike in karate athletes (Kartika, 2023) These results are further supported by other research confirming that the use of elastic resistance in training successfully optimizes punch performance through the application of progressive loads tailored to the dynamics of martial arts techniques (Pasaribu et al., 2020). Furthermore, the use of elastic resistance training has also been shown to improve movement performance through increased muscle activation and the application of appropriate training principles (Abriyanto, 2025).

In addition to physiological factors, the performance improvement observed in this study was also driven by the consistency of a training schedule comprising three sessions per week over a six-week period. The structured program facilitated gradual technical adaptation, making the athletes' movements increasingly efficient. Nevertheless, the variation in standard deviation of the post-test results indicates that the rate of progress varied among athletes, influenced by baseline physical condition, training experience, and individual adaptive capacity. Overall, resistance band training has proven to be a reliable supplementary method for developing karate athletes, particularly for optimizing the speed of the gyaku-tsuki strike. From a practical perspective, coaches are recommended to integrate resistance band exercises into karate training programs, particularly 2–3 times per week, to effectively enhance punch speed and overall striking performance. However, this study has several limitations, including a small sample size, the absence of a control group, and a relatively short intervention duration, which may limit the generalizability of the findings.

CONCLUSION

Based on the research results, it can be concluded that resistance band training significantly improves the speed of the gyaku-tsuki strike among karate athletes at the FORKI Surakarta Dojo. This is evidenced by the increase in mean pre-test and post-test scores, as well as the paired-sample t-test, which showed a p-value < 0.05. These findings indicate that training with elastic resistance can improve muscle contraction more effectively, thereby accelerating striking movements in karate athletes. Consequently, resistance band training can be considered a practical alternative for developing striking techniques, particularly to enhance gyaku-tsuki performance in karate athletes. In practice, resistance band training can be used as an effective method in karate training programs to enhance punching speed. Future studies are recommended to involve larger sample sizes, include control groups, and apply longer intervention durations to obtain more comprehensive findings.

Sport Science: Jurnal Sains Olahraga dan Pendidikan Jasmani
ISSN 114-562X (Cetak),
ISSN 2722-7030 (Online)
Volume 26 Nomor 1 Edisi Januari Tahun 2026
Url: http://sportscience.ppj.unp.ac.id/index.php/jss/index
Doi: 10.24036



REFERENCE LIST

Abriyanto, A. E. P. (2025). Pengaruh Metode Latihan Menggunakan Media Resistance Band Terhadap Peningkatan Kekuatan Pukulan Gyaku Tsuki Atlet Karate Inkai Kabupaten Bangkalan. *Ejournal.Unesa.Ac.Id*.

Bompa, T. O. . (1999). *Periodization training for sports*. Human Kinetics.

Bungaran Pasaribu, J. S., Welis, W., & Susanto, N. (2020). Pengaruh Latihan Resistance Band Terhadap Kecepatan Pukulan Gyaku-Tsuki Dan Kizami-Tsuki Pada Karateka Dojo Rajawali. *Jurnal Ilmu Keolahragaan*, *3*(3), 54–62. https://doi.org/10.21831/jk.vXiY.00001

Febriani, W., Yanuar Kiram, P., Rasyid, W., & Zarya, F. (2023). *Development of an E-Book-Based Flexibility Training Model for Karate*. https://doi.org/10.47191/ijmra/v6-i6-11

Ferry Fendrian, M. N. (2016). Efektivitas Teknik Serangan Pukulan Dan Teknik Serangan Tendangan Terhadap Perolehan Poin Dalam Pertandingan Kumite Cabang Olahraga Karate. *Jurnal Kepelatihan Olahraga, Volume 8, No. 2 Desember 2016*.

Fitriani. (2022). *Hubungan Kekuatan Otot Lengan dan Kecepatan Reaksi Lengan dengan Frekuensi Pukulan Chudan Tsuki Olahraga Karate* (Vol. 3). http://jurnal.icjambi.id/index.php/sprinter/index

Halimatus Sa'diah, E. W. D. E. P. I. (2024). Pengaruh Latihan Karet Ban Terhadap Kecepatan Pukulan Gyaku-Tsuki Pada Atlet Karate Dojo Polres Batola. *Jurnal Ilmiah STOK Bina Guna Medan*, *12*(2).

K Muhammad Adnan Hudain, & Ishak, M. (2020). Kontribusi Kecepatan Reaksi Tangan Dan Kekuatan Otot Lengan Terhadap Kecepatan Pukulan Gyaku Tsuki Chudan. *Journal of Physical Education, Sport and Recreation, 4 (1). Pp. 46-52. ISSN e-ISSN: 2597-7016 Dan p-ISSN: 2595-4055*.

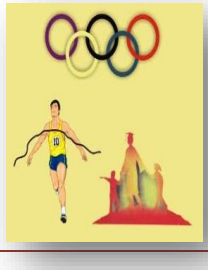
Lamusu, A., & Lamusu, Z. (2023). Arm Muscle Strength With Student Punching Speed Gyaku Tsuki Chudan Karate. *Jambura Journal of Sports Coaching*, *5*(1).

Loturco, I., Giannini Artioli, G., Kobal, R., Gil, S., & Franchini, E. (2016). *Predicting Punching Acceleration From Selected Strength And Power Variables In Elite Karate Athletes:Amultiple Regression Analysis*. www.nsca.com

Novandi Firdaus Yusup. (2024). Pengaruh Pemahaman Peraturan Pertandingan, Tingkat Stres, Dan Referee-Efficacy, Melalui Lisensi Wasit Terhadap Pengambilan Keputusan Wasit Pada Cabang Olahraga Karate. *Eprints.Uny.Ac.Id*.

Persadanta, S. , R. (2020). Pengaruh Resistance Band Exercise Terhadap Power Otot Atlet Muay Thai. In *Jurnal Olahraga & Kesehatan Indonesia* (Vol. 1, Number 1). https://jurnal.stokbinaguna.ac.id/index.php/jok

Sport Science: Jurnal Sains Olahraga dan Pendidikan Jasmani
ISSN 114-562X (Cetak),
ISSN 2722-7030 (Online)
Volume 26 Nomor 1 Edisi Januari Tahun 2026
Url: http://sportscience.ppj.unp.ac.id/index.php/jss/index
Doi: 10.24036



Ramadhan, Z. F., Sari, F., Rachman, F., Kunci, K., Pengaruh, :, Bance, R., Beban, L., & Lengan, O. (2023). Pengaruh Latihan Resistance Band Dan Latihan Beban (Barbel 1kg) Terhadap Power Otot Lengan Pada Atlet Taekwondo Pesawaran Provinsi Lampung. *Journal Penjaskesrek*, *10*(1), 38–48. https://ejournal.bbg.ac.id/penjaskesrek

Same, R. J. (2021). *Pengaruh Latihan Memukul Memakai Beban Karet Terhadap Kecepatan Pukulan Dalam Olahraga Karate (Survey dalam Pembelajaran Mata Kuliah Karate)*. *11*. http://ojs.unm.ac.id/index.php/

Sihite, A. E. D., & Siahan, D. (2024). The effect of bench press and resistance band exercises on increasing arm muscle power and gyaku tsuki's punching speed results. *Altius: Jurnal Ilmu Olahraga Dan Kesehatan*, *13*(2), 186–200. https://doi.org/10.36706/altius.v13i2.53

Silvia Ratna Kartika, Dr. W. M. P. (2023). Pengaruh Latihan Resistance Band Terhadap Kecepatan Pukulan Gyaku Tsuki Atlet Debi Martial Art Tuban. *Jurnal Prestasi Olahraga, Ejournal.Unesa.Ac.Id*.

Stanković, D., Lazić, A., Trajković, N., Okičić, M., Bubanj, A., Vencúrik, T., Gašić, T., & Bubanj, S. (2025). Effects of Elastic Band Training on Physical Performance in Team Sports: A Systematic Review and Meta-Analysis. *Journal of Functional Morphology and Kinesiology*, *10*(4), 402. https://doi.org/10.3390/jfmk10040402

Subekti, N., Nur Warthadi, A., Mujahid, H., & Abdullah Dani Arni Rayhan, A. (2021). Analisis Performa Speed dan Power Atlet Pencak Silat Level Elit. In *Jurnal Kepelatihan Olahraga SMART SPORT* (Vol. 18).

Tudor O. Bompa, G. G. H. (2009). *Periodization Theory and Methodology of Training Fifth Edition*.

Venkatraman, J., & Nasiriavanaki, M. (2019). Biomechanics of Kumite Style Gyaku tsuki in Karate. *BIOMEDICAL Journal of Scientific & Technical Research*. https://doi.org/10.26717.BJSTR.2019.14.002550

CONFESSION

The author would like to express gratitude to all who provided support during this research, particularly to the management and athletes of the FORKI Surakarta Dojo, who kindly agreed to participate as research subjects and assisted throughout the data collection process. Thanks are also extended to the supervising lecturer for the guidance, feedback, and supervision provided throughout the research process, enabling this article to be completed. In particular, the author would like to express his deepest gratitude to his parents, especially his mother, for their prayers, care, support, and motivation throughout the research process, which served as a vital source of strength in completing each stage of the study. Furthermore, appreciation is extended to all those who, directly or indirectly, have contributed to the smooth running of this research.