The Effect of Combined Hypertrophy-Neural Training Methods and Neural Training Methods on The Improvement of Maximum Strength in The Lower Limbs of Muay Thai Athletes

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Abstract

Strength is very important for achieving optimal performance in sports, serving to develop other biomotor components. A lack of maximum strength will have an impact on the decline of biomotor components and increase the risk. The purpose of this study was to determine whether there was an effect of the combination of hypertrophy-neural training and neural training methods on the increase in maximum leg muscle strength in Muay Thai athletes. This study employed an experimental method with a quantitative approach, using a two-group pre-test post-test design. It involved 30 Muay Thai athletes at Ares Fighting Camp, and the sample selection used total sampling. The treatment consisted of 18 sessions at the beginning and end of the sample period, with a Leg Dynamometer test administered to determine the components of leg muscle strength in the sample. After the data was obtained, the Mann-Whitney hypothesis test yielded a statistical Sig value (2-tailed) of 0.360, which was greater than the probability value of 0.05. Therefore, it can be concluded that there was no difference in the effect of the combination of neural hypertrophy training and neural training methods on increasing the maximum leg muscle strength of Muay Thai athletes. It is recommended that coaches and athletes increase maximum leg muscle strength using the neural hypertrophy combination training method because it targets the desired physiological adaptation by combining two training phases: the hypertrophy phase to increase muscle volume/strength and the neural phase to increase nerve activation efficiency and compact the body so that strength can be increased while adding muscle volume.

How to Cite

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INTRODUCTION

Strength is essential in sports activities to achieve optimal performance, as strength is a very important component for improving overall physical condition. According to Harsono in (Aryuanto & Widodo, 2016), "Strength is a very important component for improving overall physical condition." In order to achieve optimal performance, strength must be improved as the foundation for the formation of other biomotor components. Strength is divided into three types: maximum strength, power, and strength endurance.

Maximum strength is the greatest force that can be exerted by the neuromuscular system when the body performs maximum contraction. According to (Samsudin, 2023) "The ability of muscles to contract maximally and to resist or hold a maximum load. Maximum strength is the ability to lift a load with 1 repetition." For example, if someone can perform a squat with a weight of 180 kg only once, their 1RM is 180 kg. According to (Beaudart et al., 2019), "Maximum strength is measured through 1RM (1 repetition maximum resistance), where the evaluation is conducted at the highest resistance that can be performed by the subject once." According to (Tudor O. Bompa, 2009), "maximum strength can enhance other components of physical condition." This ability is a combination of the complex cross-sectional area required by each individual through muscle-building exercises and the development of intramuscular coordination.

The hypertrophy method is the growth of muscle fibers to increase muscle size/volume and can also increase muscle strength. According to (Putu et al., 2022) "Muscle hypertrophy occurs due to an increase in the number of actin and myosin filaments in each muscle fiber, causing the muscle fibers to grow larger." This method is commonly used by athletes, bodybuilders, or individuals who want to improve their biomotor abilities, physical condition, body appearance, or overall fitness, as well as muscle fuel storage, namely ATP (Adenosine Triphosphate), in accordance with the needs of the sport. According to (Suharjana, 2018), "The purpose of the hypertrophy training method is to increase muscle diameter and strength." The hypertrophy method has specific characteristics, according to the book Physical Conditioning Training (Sidik, Dikdik Zafar, 2019) : "The characteristics of the hypertrophy method are: Intensity: 30%-60%, Repetitions: many (8 to 12), Rest/interval: 1-2 minutes, Rhythm/Contraction: slow/gradual."

The Neural Method is a method to improve intramuscular coordination and compact the body. Additionally, this exercise will enhance rapid movement ability and increase significant strength in a short time. According to (Di Domenico & Raiola, 2021), "The ability of muscle fibers that form a muscle to contract efficiently." Intramuscular coordination involves how various muscle fibers within a single muscle work together to produce optimal strength. According to (Puiu, 2014), "the key factor underlying an athlete's ability to achieve maximum strength is the quality of muscle activity coordination by the nervous system, which forms the basis of intramuscular and intermuscular coordination during contraction." Essentially, the neural/intramuscular coordination method describes how the nervous system can activate more muscle fibers within a single muscle more efficiently and effectively. According to (Waibel & Jones, 2016) ,"The neural/intramuscular coordination method is optimized through intensive stimulation of the sensory system, enhancing whole-body coordination." The purpose of the neural method, according to (Sidik, 2017), is that "the neural method has the following characteristics: High Intensity 80%-100%, Few Repetitions: 1-4 Reps, Movement/Contraction Rhythm: Fast."

The leg muscles are a group of muscles located in the combined area of the upper thigh and lower leg muscles. According to Setiadi in (Hasanuddin, 2020) "The leg muscles are muscles located in both legs, including the lower leg muscles: the tibialis anterior, extensor digitorum longus, peroneus longus, gastrocnemius, and soleus, while the upper leg muscles are: the tensor fascia lata, abductor sartorius, rectus femoris, vastus lateralis, and vastus medialis." These muscles play an important role in body movement functions, such as standing, walking, running, jumping, and maintaining stability and balance.

Muay Thai is a martial art originating from the Land of the White Elephant, or Thailand. Literally, the word muay means battle. According to (Vail, 2014), Muay Thai is Thailand's national sport and one of its main cultural exports. Academics have paid little attention to Muay Thai in its role as a national sport or the cultural politics that accompany it. Muay comes from the Sanskrit word "mavya," which means martial arts boxing. Meanwhile, Thai is a tribe in the Kingdom of Thailand known for the art of 8 limbs (punches, elbows, knees, kicks). According to (Phosawat Saengsawang et al., 2015) "Muay Thai is a tactic and martial art that is a cultural heritage of Thai martial arts passed down from ancestors for

a long time."

Based on the researcher's observations, Muay Thai athletes tend to perform repetitive technical exercises and power training without training for maximum strength. Maximum strength is a stage of building power to be more optimal. In addition, maximum strength can improve biomotor components and also prevent the risk of injury, especially to the leg muscles. According to (Suchomel, 2025), "The relationship between absolute and relative maximum strength with various general performances (jumping, sprinting, and changing direction) and specific sports performances." Considering that Muay Thai is a martial art, these physical aspects must also be considered.

In a previous study titled "Exercise-Induced Myofibrillar Hypertrophy is a Contributory Cause of Gains in Muscle Strength" conducted by (Taber et al., 2019) stated that "hypertrophy increases strength." Previous research entitled "The effect of neural activation training methods on increasing the muscle strength of the legs and arms of downhill cyclists" conducted by (Nugraha, 2019) stated that "Neural activation training has a significant effect on increasing maximum leg muscle strength." This shows that in this study, hypertrophy and neural methods can increase maximum strength.

Based on the explanations discussed, the researcher wants to conduct a study entitled "The Effect of Combined Hypertrophy-Neural Training Methods and Neural Training Methods on Increasing Maximum Leg Muscle Strength in Muay Thai Athletes." Regarding this topic, the research questions that arise are: Is there a significant effect of the combined hypertrophy-neural training method on the increase in maximum leg muscle strength in Muay Thai athletes? Is there a significant effect of the neural training method on increasing the maximum strength of the leg muscles in Muay Thai athletes? Which method is better at increasing the maximum strength of the leg muscles, the combination of hypertrophy and neural training methods or the neural training method alone? In relation to these issues, the proposed research objectives are: To determine the significant effect of the combination of hypertrophy and neural training methods on increasing the maximum strength of the leg muscles in Muay Thai athletes; To determine the significant effect of neural training methods on increasing the maximum strength of the leg muscles in Muay Thai athletes; To determine which method is more effective in improving maximum leg muscle strength in Muay Thai athletes: the com-

bined hypertrophy-neural training method or the neural training method.

This study, there is a novelty regarding hypertrophy training methods and neural methods for increasing maximum strength using a sample of Muay Thai athletes to increase maximum leg muscle strength.

METHODS

The method used in this study was experimental research with a true experimental design using a quantitative approach. In the study, a pre-test was conducted to measure leg muscle strength before the treatment was given to the sample, which was divided into two groups using the A-B-B-A (Ordinal Pairing) formula. According to (Husain & Adil, 2024), the sample was divided into two groups. Group A was given a combination of hypertrophy-neural training methods, and group B was given neural training methods.

In this study, measurements were taken using a leg dynamometer after treatment was administered. A leg dynamometer is a measuring device used to determine leg muscle strength, with a unit of measurement of kilograms (kg). The validity of this instrument is 0.601 and it has a reliability of 0.651(Rahadiawan, 2020). The population in this study consisted of 30 Muay Thai athletes from Ares Fight Camp. The sample used in this study consisted of 30 athletes from Ares Fight Camp, and the sampling technique used in this study was total sampling. The research design used was a two-group pre-test post-test design. approaches, models and procedures of research, and his other

The technique for dividing the sample groups in this study was done by sorting the pre-test results, then pairing them with the A-B-B-A pattern (ordinal pairing). In this study, the data collected came from quantitative data generated from the pretest and posttest results. The data was then processed using (SPSS) 21, namely using the paired sample t-test. This test examines whether there are differences or influences, data descriptions, normality tests (Shapiro-Wilk), and hypothesis significance tests using a parametric approach will use the Paired Sample Test.

RESULTS AND DISCUSSION

In this study, special treatment will be arranged in a training program that has been adjusted based on different intensities, different volumes, the same number of repetitions and

sets. This treatment will be carried out over several weeks with a frequency of 3 times per week for a total of 6 weeks and 18 sessions. Based on the data obtained from the hypertrophy-neural combination training treatment group and the neural method control group, which is raw data, data processing is required to obtain standardized data. Therefore, this data must be processed and analyzed using SPSS version 21.

Table 1. Descriptive Statistics Test of Descriptive Statistics Test of the combined neural hypertrophy training method Group and Descriptive Statistics of Control Group neural training method

Group	Min	Max	Mean	Std.D
Pre-test the combined neural hypertrophy training method	45	65	55	4,9
Post-test the combined neural hypertrophy training method	56	90	74	10,9
Pre-test neural training method	35	85	63	13
Post-test neural training method	47	139	81	21

In the **Table 1** obtained data on the experimental group the combined neural hypertrophy training method there is a minimum value of 45 for the initial test (pretest) and 56 for the final test (post test). And the maximum result of the data is 65 for the initial test (pretest) and 90 for the final test (post test). With an average on the pretest obtained 55 and for the posttest 74. with a standard deviation of 4,9 for the pretest and for the post-test obtained 10,9. In addition, data was also obtained for the control group with neural training method which obtained a minimum value of 35 for pretest and for postest 47, then for a maximum value of 85 for pretest and 139 for postest. Then the average value of the pretest 63 for the postest obtained a value of 81. then the results were obtained for the standard devia-tion value with a value of 13 for the pretest then for the postest obtained 21. And then the author calculates the normality test using shapiro-wilk and obtained data in the For instance as follows.

Two treatment groups with the combined neural hypertrophy training method and neural training method obtained statistical values. Based on Table 2, the sig values (0.992, 0.187, 0.862, 0.218) ≥ 0.05 were obtained, so HO was accepted, and it can be concluded that all data were normally distributed. In these results, the author used a

parametric approach for each group. In addition, the author conducted a hypothesis test, which can be seen in the following table. The results of the hypothesis test show that the treatment group using the combined neural hypertrophy training method had a sig value (two tails) of <0.01 and the neural training method group had a sig value of <0.01. Then, a comparison was made between the combined neural hypertrophy training method and the neural training method in terms of the increase in maximum leg muscle strength in Muay Thai athletes. With the result obtained, the Sig. value (0.360) ≥ 0.05, HO is accepted, so it can be concluded that there is no difference in the effect of the combined Neural Hypertrophy training method and the Neural training method on the increase in maximum leg muscle strength in Muay Thai athletes. And based on the average value, it can be concluded that the combined neural hypertrophy training method group had a more significant effect than the control group that was given the neural training method treatment.
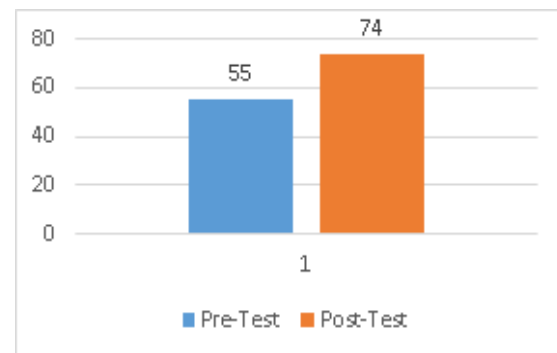

Figure 1. Graph showing the increase in the average pretest-posttest scores for the hypertrophy-neural combination training method group

Figure 1 shows an increase from 55 to 74, which means there was an increase in maximum strength. An increase of 55 indicates an increase in maximum strength after treatment. When calculated using the maximum strength increase percentage formula, the result is 76%, which indicates an increase in maximum strength after treatment with the combined hypertrophy-neural training method.

Figure 2 shows an increase from 63 to 81, which means there was an increase in maximum strength. An increase of 63 indicates an increase in maximum strength after treatment. When calculated using the formula for the percentage increase in maximum strength, the result is 66%, which indicates an increase in maximum strength after treatment using the neural training method.
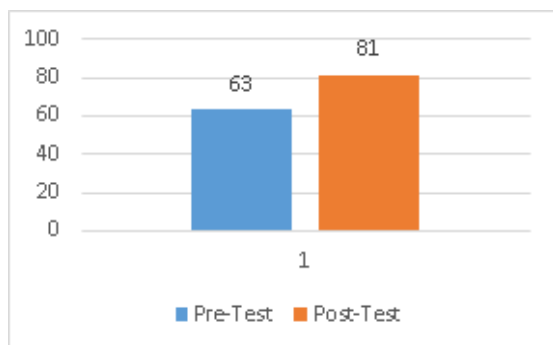
Figure 2. Graph showing the increase in the average pretest-posttest scores for the neural training method group

This study aims to compare the effectiveness of the Hypertrophy-Neural combination training method and the Neural training method. The results of this study show no difference in the effect on the increase in maximum leg muscle strength in Muay Thai athletes. Based on the results of the study, there was a significant increase in both methods because according to (Grgic & Schoenfeld, 2018) "For training 1, 2, 3, and 4+ times per week, the results of this systematic review and meta-analysis show a significant effect of RT frequency because higher training frequency translates into greater muscle strength gains." Researchers assume that the combined hypertrophy training method is superior to the neural method because, according to (Sander et al., 2013), "Strength training is performed periodically with hypertrophy and intramuscular coordination. There is a significantly better effect than STG on 1RM." The experimental group targeted the intended physiological adaptations by combining two training phases: a hypertrophy phase to increase muscle volume/strength and a neural phase to improve neural activation efficiency and compact the body, thereby achieving both strength gains and muscle volume increases. The intensity for

The experimental group started with 30%-60% intensity at a slow pace, 14-8 repetitions, then 80%-100% intensity at a fast pace, 4-1 repetitions. According to (Goto et al., 2004) "The results show that a combination of low- and high-intensity training programs is effective for optimizing muscle strength adaptation in periodized training programs." This is evidenced in the study by (Hedayatpour & Falla, 2015) "This is evidenced by greater muscle hypertrophy, higher nerve activity, and greater strength production after eccentric training." According to research (Burnie, 2020) "The amount of strength that can be generated in the context of a particular movement is not only determined by intramuscular factors such as muscle fiber size and type, pennation angle, and neural drive, but also by the effectiveness of intermuscular coordination." In practice, the neural-hypertrophy method yields higher volume compared to the neural method. For example, in athletes of the same class, the neural-hypertrophy group had a daily volume of 680 kg for the back squat, 680 kg for the box squat, 680 kg for the barbell calf raise, and 680 kg for the hip thrust, while the neural method had a volume of 432 kg for the back squat, box squat 432 kg, barbell calf raise 432 kg, and hip thrust 432 kg, with a total volume over 6 weeks for the combined hypertrophy-neural group of 39,552 tons, while the neural group had 22,464 tons. Due to the duration of only 18 sessions, the hypertrophy phase did not contribute sufficient strength before entering the neural phase, and the activities were not fully carried out by the sample. It is recommended that researchers comply with research ethics so that they remain within the scope of experimentation.

This training program may be constrained by attendance. Attendance should be taken at the beginning of the research ethics meeting as part of the standard procedure preceding the implementation of research activities. The limited number of barbells available at the camp means that researchers need to spend a considerable amount of time implementing the program. Meanwhile, the control group aimed to improve muscle group cooperation or intramuscular coordination without increasing muscle mass. Neural training is more specific to maximum strength. Because neural training directly targets the nervous system and intramuscular coordination, its effects on maximum strength tend to appear faster than high-intensity combination training methods of 80%-100% with a fast rhythm and 4-1 repetitions.

According to (Ilham et al., 2020), this study discusses hypertrophy methods in strength training programs and neural methods to increase maximum strength in downhill athletes. In practice, this method involves holding heavy weights but does not increase strength due to a lack of recovery and nutrition, which prevents the muscles from contracting maximally because they experience fatigue during the training program. According to (Harsono, 2017), "Athlete development depends on adequate rest following bodily regeneration, and the effects of training can be maximized. The duration of recovery depends on the fatigue felt by the athlete due to previous training." The neural method is highly dependent on the initial training status of experienced ath-

letes, who demonstrate faster and more specific neuromuscular responses. Therefore, neural programs must be individually tailored, considering the periodization phase, recovery, and injury risk.

When the exercises were performed three times a week, there was an increase in maximum strength. This is because both methods equally increased maximum strength in the leg muscles. Research by (Taber et al., 2019) states, "Hypertrophy can increase strength, and long-term strength is enhanced by hypertrophy, providing evidence of mechanical and molecular factors." Additionally, research by(Nugraha, 2019), "Neural activation training has a significant effect on increasing maximum leg muscle strength." This proves that both the Hypertrophy-Neural combination training method and the Neural training method increase maximum strength.

The results of data indicating that the combined hypertrophy-neural training method has a significant effect on increasing the maximum strength of the leg muscles in Muay Thai athletes. The results of data indicating that the neural training method has a significant effect on increasing the maximum strength of the leg muscles in Muay Thai athletes. In this study, both training methods had a significant effect on increasing the maximum strength of the leg muscles in Muay Thai athletes. However, the researcher assumes that the combined hypertrophy-neural training method is better than the neural method based on Figure 1, which shows that the combined hypertrophy training method yields better results than the neural method.

CONCLUSION

There is a effect of the Neural Hypertrophy combination training method on increasing maximum leg muscle strength in Muay Thai athletes. The Neural Hypertrophy combination training method is a method for increasing maximum strength by increasing muscle mass and improving the coordination between intramuscular muscle groups, thereby increasing maximum strength and muscle mass. There is a effect of the Neural training method on increasing maximum leg muscle strength in Muay Thai athletes. The Neural training method is a method for increasing maximum strength by improving the coordination system between intramuscular muscle groups without increasing muscle mass.There is no difference in the effect of the Neural Hypertrophy combination training method and the Neural training method on increasing the maximum strength of the leg muscles in Muay Thai athletes.

Based on the conclusions and research results obtained, the authors have suggestions including: For coaches, can use Combined Hypertrophy-Neural Training Methods the Neural is more effective than the Neural method because the combined hypertrophy-neural training method targets physiological adaptations by combining two training phases: the hypertrophy phase to increase muscle volume/strength and the neural phase to increase the efficiency of nerve activation and compact the body so that there is an increase in strength as well as an increase in muscle volume.

REFERENCES

Aryuanto, R., & Widodo, A. (2016). Pengaruh Latihan Rope Jump Selama 20 Detik Dengan Metode Interval Training 1 : 5 Terhadap Kekuatan Otot Tungkai Kekuatan merupakan salah satu bentuk kondisi fisik yang digunakan untuk menunjang performa atlet . Tujuan penelitian ini adalah untuk mengetahu. Jurnal Kesehatan Olahraga Vol .06 No.2 Edisi Oktober 2016 Hal 495 - 503, 2.

Beaudart, C., Rolland, Y., Cruz-Jentoft, A. J., Bauer, J. M., Sieber, C., Cooper, C., Al-Daghri, N., Araujo de Carvalho, I., Bautmans, I., Bernabei, R., Bruyère, O., Cesari, M., Cherubini, A., Dawson-Hughes, B., Kanis, J. A., Kaufman, J. M., Landi, F., Maggi, S., McCloskey, E., … Fielding, R. A. (2019). Assessment of Muscle Function and Physical Performance in Daily Clinical Practice: A position paper endorsed by the European Society for Clinical and Economic Aspects of Osteoporosis, Osteoarthritis and Musculoskeletal Diseases (ESCEO). Calcified Tissue International, 105(1). https://doi.org/10.1007/s00223-019-00545-w

Burnie, L. (2020). The effects of strength training on intermuscular coordination during maximal cycling.

Di Domenico, F., & Raiola, G. (2021). Muscle strength and the complexity of human movement. Journal of Human Sport and Exercise, 16(Proc3), S1481–S1490. https://doi.org/10.14198/jhse.2021.16.Proc3.64

GOto, K. A. G., Agasawa, M. A. N., Anagisawa, O. S. Y., & Izuka, T. O. K. (2004). Muscular adaptations To Combinations of High- And Low-Intensity Resistance Exercises. 18(4), 730–737.

Grgic, J., & Schoenfeld, B. J. (2018). Effect of Resistance Training Frequency on Gains in Muscular Strength: A Systematic Review and Meta-Analysis. Sports Med 48, 48. https://doi.org/10.1007/s40279-018-0872-x

Harsono. (2017). Periodisasi Program Pelatihan (P. Latifa (ed.)). PT Remaja Rosdakarya.

Hasanuddin, M. I. (2020). Kontribusi Panjang Tungkai dan Daya Ledak Otot Tungkai Terhadap

Lompat Jauh Gaya Jongkok pada Siswa MAN Kotabaru. Cendekia: Jurnal Ilmiah Pendidikan, 8(1), 44–54. https://doi.org/10.33659/cip.v8i1.149

Hedayatpour, N., & Falla, D. (2015). Physiological and Neural Adaptations to Eccentric Exercise: Mechanisms and Considerations for Training. BioMed Research International, 2015. https://doi.org/10.1155/2015/193741

Ilham, M., Rifki, M. S., Kesehatan, J., & Rekreasi, D. (2020). The effect of weight training on increasing arm muscle hypertrophy in rowing athletes. Jurnal Stamina, 3(6), 379–397.

Nugraha, Y. (2019). Pengaruh Metode Latihan Neural Activation Kekuatan Maksimal Otot Tungkai Dan Lengan Atlet Balap Sepeda Downhill. http://repository.upi.edu/48614/

Phosawat Saengsawang, Chairit Siladech, & Prapat Laxanaphisuth. (2015). The History and Development of Muaythai Boran. Journal of Sports Science, 3(3), 148–154. https://doi.org/10.17265/2332-7839/2015.03.007

Puiu, M. (2014). Training Methodology to Increase Strength Parameter Based on Improved Neuromuscular Control Case Study. Sport Science Review, 23(1–2), 23–38. https://doi.org/10.2478/ssr-2014-0002

Putu, I., Widhi Andika, H., Agama, S., & Singaraja, H. (2022). Pengaruh Metode Pelatihan Beban Medicine Ball Throw dan Panjang Lengan terhadap Power Otot Lengan Atlet Cricket Buleleng. Jurnal Pendidikan Kesehatan Rekreasi, 8(1), 1–15. https://ojs.mahadewa.ac.id/index.php/jpkr/article/view/1365

Rahadiawan, A. putra. (2020). Hubungan Antara Kekuatan Otot Tungkai, Daya Ledak Otot Tungkai dan Koordinasi Mata Kaki Terhadap Jauhnya Tendangan pada Tim Sepakbola SMPN 2 Pucanglaban Kabupaten Tulungagung.

Samsudin, S. (2023). Pengaruh Latihan Kekuatan Otot Lengan Terhadap Kemampuan Lempar Lembing Pada Siswa Putra Kelas IX SMAN I Monta Kabupten Bima. Jurnal Pendidikan Olahraga, 13(1), 13–20. https://doi.org/10.37630/jpo.v13i1.1010

Sander, A., Keiner, M., Wirth, K., & Schmidtbleicher, D. (2013). Influence of a 2-year strength training programme on power performance in elite youth soccer players. European Journal of Sport Science, 13(5), 445–451. https://doi.org/10.1080/17461391.2012.742572

Sidik, Dikdik Zafar. (2019). Pelatihan Kondisi Fisik.

Sidik, D. Z. (2017). Latihan Kekuatan. In Konfis. https://hellodoktor.com/kecergasan/kekuatan-fizikal/latihan-kekuatan/

Suchomel, T. J. (2025). Science and development of muscular strength. Human Kinetics. https://www.book2look.com/book/8lhpN43csR

Suharjana. Uny, F. I. K. (2018). Metode melatih kekuatan.

Taber, C. B., Vigotsky, A., Nuckols, G., & Haun, C. T. (2019). Exercise-Induced Myofibrillar Hypertrophy is a Contributory Cause of Gains in Muscle Strength. Sports Medicine, 49(7), 993–997. https://doi.org/10.1007/s40279-019-01107-8

Tudor O. Bompa. (2009). Theory Anda Methodology Of Training. In Jurnal Ilmu Pendidikan (Vol. 7, Issue 2).

Vail, P. (2014). Muay Thai: Inventing Tradition for a National Symbol. Journal of Social Issues in Southeast Asia, 29(3), 509.

Waibel, K., & Jones, H. (2016). Prevention of Injuries and Overuse in Sports. Prevention of Injuries and Overuse in Sports, 87–99. https://doi.org/10.1007/978-3-662-47706-9.