COMPETITOR:
JURNAL PENDIDIKAN KEPELATIHAN OLAHRAGA
e-ISSN: 2657-0734 & p-ISSN: 2085-5389 ‖ Volume 17, Number 2, 2025 ‖ P.1199-1211

The Effect of Depth Jump Training and Single Leg Bound Training on Increasing Leg Muscle Power of Male Athletes at Tapak Suci Tarbiyah Deli Serdang School in 2025

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ABSTRACT

This study was motivated by the lack of leg muscle power ability of athletes, resulting in weak kicks. This study aims to determine whether there is an effect of depth jump and single-leg bound training on increasing leg muscle power of male athletes at Tapak Suci Tarbiyah School, Deli Serdang Regency. This study uses an experimental method with a one-group pre-test post-test design. The population in this study were male athletes at Tapak Suci Tarbiyah School, Deli Serdang, totalling 10 people. The research sampling technique used was purposive sampling. Purposive sampling is a sampling technique with several considerations. In this study, the sample was 8 athletes. The data collection technique used was by taking a pre-test, treatment and post-test. From the analysis of vertical jump data that has been carried out, it is known that the t_count hypothesis value is obtained at 21.531 and t_table 1.894, then (t_count 21.531> t_table 1.894), so that there is an effect of depth jump training and single leg bound training on increasing the leg muscle power of male athletes at the Tapak Suci Tarbiyah Deli Serdang School in 2025. The novelty of this study lies in the combination of depth jump and single-leg bound training in one structured training program aimed at increasing the leg muscle power of pencak silat athletes, which has not been widely studied, especially in athletes at the Tapak Suci Tarbiyah Deli Serdang School.

ARTICLE HISTORY
Received: 2025/06/11
Accepted: 2025/06/19
Published: 2025/06/25

KEYWORDS
Training;
Depth Jump;
Single Leg Bound;
Leg Muscle Power;
Tapak Suci.

AUTHORS' CONTRIBUTION
A. Conception and design of the study;
B. Acquisition of data;
C. Analysis and interpretation of data;
D. Manuscript preparation;
E. Obtaining funding

Cites this Article : Purba, Masro Saputra; Nurkadri, N.; Damanik, Yudika Syah Putri; Pasaribu, Veronika Anjelina; Claudia, Miranda Bintang; Siahaan, Abbel Antolin; Togatorop, Riantri Jojor. (2025). The Effect of Depth Jump Training and Single Leg Bound Training on Increasing Leg Muscle Power of Male Athletes at Tapak Suci Tarbiyah Deli Serdang School in 2025. **Competitor: Jurnal Pendidikan Kepelatihan Olahraga**. 17 (2), p.1199-1211

INTRODUCTION

Exercise is a physical activity that has various benefits, including improving body fitness. According to (Fadilah et al., 2023), Exercise is an activity that involves physical and mental aspects, aiming to maintain and improve a person's health and fitness. One of the

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branches of martial arts that is becoming more popular as technology advances in the world of sports is martial arts. Pencak silat is part of the cultural heritage owned by the Indonesian people since ancient times (Nurhidayah et al., 2024). According to the Great Dictionary of the Indonesian Language (Salam, 2022) states that pencak silat is defined as a martial arts activity that involves swift movements to dodge, attack opponents, or protect oneself, either with the help of weapons or without tools. The researcher conducted research at Tapak Suci Tarbiyah Deli Serdang, whose trainer was Muhammad Ariza. Tapak Suci Tarbiyah College Deli Serdang Regency has 30 members. Tapak Suci Tarbiyah College, Deli Serdang Regency, was chosen as the object of this research because of the discovery of problems in the explosive power of the athlete's leg muscles. Because after the researcher made 3 observations at the Tapak Suci Tarbiyah College, Deli Serdang Regency, the researcher realized that there had been many improvements in the basic techniques carried out by athletes in each training session. However, from the results of the researcher's observations, there are basic movements in making the kick that makes the kick not yet able to be declared as an effective kick because it does not have effective power (explosive) power. In accordance with the observations made by the researcher, the researcher found that athletes were not suitable when making kicks where the athlete's power was still weak often shaking from the position of making kicks and also the lack of speed, strength and precision of leg movements in Tapak Suci Tarbiyah athletes, Deli Serdang Regency.

Pencak Silat is the result of Indonesian human culture in an effort to maintain integrity (manunggal) and independence (independence) towards the environment and the surrounding nature to create harmony in life and increase trust and piety to God Almighty (Aljuklan & Sukarmin, 2023). This study specifically examines the impact of the implementation of depth jump and single-leg bound exercises on increasing the explosive power of the lower extremity muscles in male pencak silat athletes of Tapak Suci Tarbiyah College in Hamparan Perak, Deli Serdang. The results of the research are expected to make a scientific contribution to the preparation of specific training programs to optimise the explosive power of athletes' limbs.

According to (Ilham et al., 2023), He believes that pencak refers to martial arts movements without any specific opponents in practice. On the other hand, silat refers to a martial art that should not be used as a match or competition. Pencak is a skill used to protect oneself or protect oneself from threats, while silat is a form of self-defence art that includes the action of evasion, attack, and self-defence, both with and without weapons. Therefore, pencak silat can be interpreted as an ability in the art of fighting that is based on the skills of attacking, dodging, and protecting oneself, both in the arena and real fighting conditions. According to (Gustama et al., 2021), Martial arts is a graceful action that involves avoidance and contains elements of humour. Pencak can be performed as an entertainment spectacle, while silat is a martial art that focuses on defending, attacking, and locking techniques that should not be displayed openly. Pencak silat is a contemporary term used by both Indonesian and Malaysian people as a form of traditional and modern martial arts, as a cultural heritage that is shown both by art and by fighting (Sinulingga et al., 2023).

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Power is the result of the ability of muscles or groups of muscles to respond to any stimulus as quickly as possible by utilizing muscle power. Strength is defined as the maximum capacity of the neuromuscular system to generate force against load resistance in a given time interval, with explosive muscle contraction characteristics (Wahono & Nasution, 2022) While Power is the ability to produce maximum power suddenly (explosive force), such as in the kick or punch technique in pencak silat, where the combination of strength and speed determines the effectiveness of the attack. Based on the previous description, it can be concluded that a person is said to have good explosive power if they meet the two main components, namely good strength and speed, and can utilize both simultaneously in a fairly short time. Explosive power is an ability that combines strength and speed, which is demonstrated through the ability of muscles to lift weights quickly. Another view states that explosive power or force is also known as explosive force. Strength is related to the power and speed in muscle contractions that take place suddenly, and involves the maximum use of muscle power in a very short period (Azhari, 2022).

Based on the above explanation, it is clear that explosive power capabilities make a vital contribution to the implementation of various sports. The reason for this is that Power is a combination of the factors of strength and speed, where power serves as a drive and also as an injury deterrent. Therefore, if this *Power* is properly trained, it can produce optimal power as a driving force. In addition to utilizing exercises specifically designed to increase muscle strength and explosiveness, the exercise method is more focused on developing explosive power known as plyometrics. (Purba, 2021). According to the explanation in the Great Dictionary of the Indonesian Language, the leg is the entire part of the leg that covers from the groin to the sole. Some experts argue that the measurement of the length of the legs can be done in two ways: from the very bottom of the spine or the trochanter to the floor (Bayu Thomi Rizal et al., 2020). The leg muscles are the muscles that move the lower part of the body and are mostly made up of transverse muscle fibres or skeletal muscles. According to (Study et al., 2024), it states that the muscles in the legs are the muscles in both legs, including the muscles in the lower part, such as the anterior tibialis, extensor digitorum longus, peroneus longus, gastrocnemius, and soleus. Meanwhile, the muscles in the upper extremities include: tensor fascia lata, sartorius, abductor, rectus femoris, vastus lateralis, and vastus medialis.

(Naldi, 2023) The capacity of human muscle strength is limited by a variety of interacting factors, including structural, functional, and demographic aspects. In terms of anatomy, the cross-sectional area of the cross-sectional area, the number of active muscle fibres, and morphological characteristics such as the shape and length of the muscles at rest play an important role in determining the output of strength. Physiologically, the speed of muscle contraction, the degree of stretching when contracting, basal muscle tone, and neuromuscular coordination, both intramuscular (between motor units in one muscle) and intermuscular (between muscle groups involved in movement), also affect performance. In addition, psychological factors such as motivation and demographic variables, including age and gender, also contribute significantly to the variation in strength capacity between individuals. The complexity of

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the interaction between these factors determines the limits of human muscle strength capabilities. It can be explained that muscle strength as well as speed in movement are the main characteristics of explosive abilities. Explosive power is usually understood as a combination of power and speed in action (Palmizal, Nurkadri, 2019). Strength is the physical capacity or group of muscles to face obstacles when doing sports activities (Alief Lam Akhmady; Ardiansyah Nur; Stanfor Rafles Souw, 2022). Speed is defined as the duration it takes for the body to complete a physical movement. In the world of sports, this ability is a fundamental element that allows the body or limbs to move quickly between positions (Kania Nisa Fauziah et al., 2022).

In the study carried out on 'The effect of depth jump training and single-leg bound training on leg muscle strength of male athletes of Tapak Suci Tarbiyah Deli Serdang 2025 college'. There needs to be relevant research with the research, relevant research with includes:

1. Research conducted by Inas Azhar Khumairoh and Heri Wahyudi (Secondary & First, n.d.) with the title "The Influence of Exercise Plyometrics Depth jump Against the C kick in the first level of male pencak silat athletes". This study aims to investigate whether depth jump training has an effect on C Kick for Men's Pencak Silat athletes at the Junior High School level. In contrast to the previous study referred to by the researcher to assess the effect of depth jump training on C kick in pencak silat athletes, this study focuses on the impact of depth jump training on leg muscle strength.
2. (Teguh Wibowo & Achmad Fandi Nur, 2022) In the research titled "The Effect of Single Leg Bound Plyometric Training and Circuit Training on the Speed of the Sickle Kick in Pencak Silat Students of the Setia Hati Brotherhood Terate Rayon Wiyoro Branch Ngadirojo Pacitan in 2021", Investigating the effectiveness of two training modalities (one-legged plyometric and circuit training) in increasing the speed of the sickle kick technique in pencak silat athletes of the Setia Hati Terate Brotherhood in Ngadirojo Pacitan. This study aimed to test the significance of the difference in impact between the two methods.

Speed is highly dependent on (direct) force, since increased speed is not possible without force. If a student wants to increase the maximum speed, he or she also needs to increase the intensity. This is because the speed gained is highly dependent on the impulse to the force and is the result of the speed of the body itself. To obtain optimal results, explosive training must be enhanced through a structured training program, carried out consistently over the long term, with gradual load increases and tailored to each individual's ability. The purpose of this is to improve the physiological and psychological systems and functions of the body so that when carrying out sports activities, it can achieve optimal performance (Rizka Nur Faidah1, Rizma Okavianti2, Putri May Maulidia3, Eva Putri Muliyani4, 2024). Depth jump: It is a plyometric exercise that involves almost the entire body, specifically to develop the strength of the muscles of the legs, thighs, hips, and lower back. This exercise is very effective for increasing explosive power and leg speed, so it can produce optimal explosive power (Wea & Samri, 2022).

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Depth jump exercises have a greater impact on explosive power compared to jump to box or front box jump exercises. This happens because, in practice, athletes must perform continuous jumps based on reps that have been determined for each individual. This condition results in the leg muscles functioning continuously, so the leg muscles are trained to always contract, both when shortening (concentric contraction) and when lengthening (eccentric contraction).

Jumping with one leg is a type of plyometric exercise that is very effective for improving strength, throwing, and balance in the legs. This movement involves jumping with one foot in turn, which makes the body have to work harder to maintain balance and create greater force (Dianti et al., 2024). (Students, N.D.) This exercise is similar to an exercise that uses both legs, but it is performed with only one leg. This exercise requires extra weight focused on the hips, legs, and lower back, while also working the stabilizing muscles of the knees and ankles. This plyometric movement is performed with one foot in a 90-degree bending position, then jumps explosively and lands using the same foot. Unused legs should remain elevated to maintain balance. After landing with one foot as a support, immediately perform repeated jumps with the same technique.

According to (Teguh Wibowo & Achmad Fandi Nur, 2022), Anatomically, single-leg bound exercises involve several muscle groups as follows: (1) Emphasis on the thighs, which involve the sartorius, iliacus, and gracilis muscles. (2) Extensions in the knee involve muscles such as the tensor fasciae latae, vastus lateralis, medialis, intermedius, and rectus femoris. (3) Thigh extensions and flexions in the legs involve the biceps femoris, semitendinosus, and semimembranosus muscles, as well as the gluteus maximus and gluteus minimus muscles. (4) Flexions in the knees and ankles, involving the gastrocnemius, peroneus, and soleus muscles. (5) The movement of adduction and abduction in the thighs is carried out with the gluteus maximus and minimus muscles, as well as the adductor muscles of longus, brevis, magnus, minimus, and hallucis.

Researchers concluded that what affects athletes' explosive power to be less than optimal is the lack of leg muscle strength, which can be seen when athletes move to do athletic jumps that tend to be stiff and slow. And after the test was carried out, the results of the leg muscle power test were obtained in the less than average category, where five athletes were in the sub-average category and three others were in the under-average category. So the researcher concluded that exercise needs to be done by applying an exercise program that is specifically focused on the aspect of leg muscle power. With the intention of seeing and finding out how the power of the leg muscles affects the explosive power of male athletes of Tapak Suci Taribiyah after the treatment (implementation of the training program). Therefore, the researcher determined two forms of exercise that were assessed following the aspects that have been described to strengthen the strength of the leg muscles and explosive power of male athletes of Tapak Suci Tarbiyah college, namely: Depth jump exercise and Single leg bound exercise to train leg muscle strength.

Depth jump training is a form of plyometric training designed to develop explosive power and contraction speed in lower extremity muscle groups, including the leg, thigh, hip, and erector spinae muscles. In addition, this exercise also has the potential to

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improve the reactive abilities of the neuromuscular system. Steps to perform depth jump exercises: Drop yourself forward from the box, land on the ground with both feet, jump up quickly and strongly. Single-leg bound exercises fall into the plyometric category that focuses on increasing the power and strength of the leg muscles. In addition, this movement also trains athletes' balance and coordination skills. This exercise is done by jumping using one foot alternately, where one foot remains in contact with the ground while the other foot is used to push the body forward or upwards in a jumping motion. This exercise is effective in increasing the strength of the thighs, hips, and calf muscles, as well as increasing agility, endurance, and body stability and increasing the explosiveness of Tapak Suci Tarbiyah male athletes.

METHODS

This research is planned for March 2025 – May 2025, with 18 meetings held 3 times a week, namely on Tuesday, Thursday, and Saturday of a week. This research was conducted at Tapak Suci Tarbiyah Hamparan Perak College in Deli Serdang Regency. According to Sugiyono (Karo-Karo et al., 2020), Population refers to all research subjects that have certain specific characteristics according to the criteria that have been determined by the researcher, from which data are collected and generalisations of results are made. In this study, the research population consisted of all active male athletes from Tapak Suci Tarbiyah College in Deli Serdang, with a total sample of 10 respondents. Samples are a part or representation of the population being studied (Tampubolon, 2023). According to Sugiyono (Syahrul & Nurhafizah, 2021), A sample is a portion of the overall population that represents the characteristics of that population. Data collection is carried out so that research can run more effectively and efficiently. The sampling technique used in this study is non-probability sampling. This means that this method does not give every individual in the population the same opportunity to be selected. Methodologically, the sampling technique used does not apply the principle of probability sampling, where not all elements of the population have the same probability of selection to be selected as part of the research sample (Sugiyono, 2016:120).

This study uses a purposive sampling approach in the data collection process. This approach involves selecting subjects that are not based on strata, randomness, or location, but rather based on specific objectives. In the book Research Methods (Prof. Dr. Sugiyono, 2013) stated that purposive sampling is a method to select samples with special considerations. Here, the researcher selected a sample based on direct observation of male athletes from Tapak Suci Tarbiyah Deli Serdang College to conduct the Depth jump and Single-leg jump.

According to the book Research Procedure work (Arikunto, 2010), it is stated that: Several requirements need to be considered in the selection of samples to suit the purpose of the research, namely:

a. The sampling process needs to be based on certain attributes, characteristics, or traits that are the main characteristics of the population.

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b. The individuals sampled must truly represent the individuals who have the most characteristics in the population.
c. The identification of population characteristics was carefully carried out in the initial research stage.

Following this view, the selection of samples taken was 8 individuals who were able to perform Depth jump and Single Leg Bound movements in a good way.

Table 1.
Personal Data of Male Athletes of Tapak Suci Tarbiyah College

No	Name	Duration of training	Age
1	Yaseer Afafat	1 Year	14 Years
2	Leo Anggara	1 Year	14 Years
3	M. Fahri Syahputra	2 Years	15 Years
4	Rakha Habibi	2 Years	15 Years
5	Hasbi	1 Year	14 Years
6	Alfi Febrian	1.5 Years	14 Years
7	Avrizky	2 Years	15 Years
8	M. Yudha	1.5 Years	14 Years

In a study, it is important to choose the right method that can help explain an issue. The success of scientific research is greatly influenced by the methods applied in the research process. The problems analyzed and the goals to be achieved in the research will affect the selection of research methods. The method applied in this study is the experimental method, with data collection techniques through tests and measurements. Before doing the exercise, pre test data will be taken first using Vertical Jump and after the training treatment for approximately 6 weeks then post test data will be taken using Vertical Jump to determine information about "The Effect of Depth Jump Training and Single Leg Bound Training on Power Increase Leg Muscles in Male Athletes of Tarbiyah Deli Serdang Sacred College 2025".

The research design is a plan to be used as a guide for the implementation of research activities. The goal of the research design is to provide researchers with a systematic and clear direction in conducting their research. Said that: "Quantitative research is a scientific approach based on the positivist paradigm. This method studies specific populations and samples through an efficiently designed sampling technique. The data collection process is carried out using predetermined research tools, while the data processing applies statistical methods to test the correctness of the hypothesis that has been predetermined.

The design in this study uses tests and measurements with one group, a pre-test design with a test form, namely, Leg muscle power. The design of the research is as follows.

Table 2.
Research Design

Pre-Test	Treatment (X1)	Post-Test (T2)
T1	Depth jump exercises Single-leg tied exercises	T2

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Table 3.
Norm Vertical Jump

Man	Criterion
>70	Very Good
61 - 70	Good
51 - 60	Above Average
41 - 50	Keep
31 - 40	Below Average
21 - 30	Less
<21	Very Less

The data obtained from the pre-test and post-test are basic data that will be processed statistically and analyzed to determine whether the hypothesis proposed in this study is acceptable or not. To calculate the strength of the leg muscles, exercises are carried out Depth Jump and Single leg tied, which were then analyzed using hypothesis tests and t-tests. The hypothesis test was carried out through several statistical steps by referring to the book Sudjana, 2005 in (Siregar et al., 2021) as follows:
Finding the average score of the Pre-Test and Post-Test

$$\bar{X} = \frac{\sum X_1}{N}$$

Finding the standard deviation of the Pre-Test and Post-Test

$$S_1^2 = \frac{n\sum x1^2 - (\sum x1)^2}{n(n-1)}$$

Normality Test (Lilliefors Test)

$$Z_1 = \frac{x_1 \bar{x}}{s}$$

Homogeneity Test

$$F = \frac{\text{varians terbesar}}{\text{varians terkecil}}$$

Looking for different averages

$$\bar{B} = \frac{\sum B}{n}$$

Looking for different standard deviations

$$SB^2 = \frac{n\sum B^2 - (\sum B)^2}{n\,(n-1)}$$

Finding the t count (t-test)

$$t = \frac{B}{Sb/\sqrt{n}}$$

RESULTS AND DISCUSSION

Result

Description of Research Data

The results of measurements carried out at the location are information obtained from observations carried out in 18 meetings. The data below illustrates the results of research that have been processed using statistical formulas.

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Table 4
Result Pre-Test and Post-Test Vertical Jump

Data Description	Vertical Jump Test	
	Pre-Test	Post-Test
Number of samples (n)	8	
Average	24,62	34,75
Default deviation	4,62	4,26

Source: Data processed by researchers

Testing Analysis Requirements

Normality Testing

The Liliefors test is a normality testing method used in this study. The data is considered normal if the requirement α 0.05 Lcal is met.

Table 5
Normality Test Results of Research Data

Data	L_{hitung}	L_{tabel}	Information
Vertical Jump Pre-Test	0,210	0,285	Usual
Post-Test Vertical Jump	0,117	0,285	Usual

Source: Data processed by researchers (Microsoft Excel 2007)

From the Pre-Test Vertical Jump data, it was obtained = 0.210 and 0.285 with n=8 and a real level of 0.05. Because then it can be concluded that the sample comes from a normally distributed population LhitungLtabel Lhitung < Ltabel.

From the Post-Test Vertical Jump data, it was obtained = 0.117 and 0.285 with n=8 and a real level of 0.05. Because then it can be concluded that the sample comes from a normally distributed population. LhitungLtabel Lhitung < Ltabel.

Homogeneity Testing

The homogeneity test in this study aims to determine whether the existing data is uniform or not. The data in the study is considered uniform if the following conditions are met: The homogeneity test formula used in this study is the F test. $F_{hitung} < F_{tabel}$.

Table 6
Homogeneity Test Result

Data	Variant	F_{hitung}	F_{tabel}	α	Conclusion
Vertical Jump Pre-Test	21,410	1,17	3,79	0,05	Homogeneous
Post-Test Vertical Jump	18,214				

Source: Data processed by researchers

Based on the analysis contained in the vertical jump test, the Fcal value was obtained of 1.17 with a significance level of α = 0.05, while the Ftable value (7.7) was 2.58. So, the value of Fcal is 1.17.

Hypothesis Testing

Based on the assessment carried out on vertical jumps, the Thcount hypothesis value was obtained of 21.531. Furthermore, this value is compared with the Ttable at the degree of freedom dk = n-1 (8-1 = 7) with a significance level of α = 0.05, which is 1.894. Because the Thcount is larger than the Ttabel, it can be concluded that there is an impact

of depth jump and single leg bound exercises on increasing the strength of the leg muscles of the Male Athlete of the Tarbiyah Sacred College, Deli Serdang in 2025.

Discussion

The conclusion of this study is based on a discussion that explains the results of the data analysis that has been carried out. This study aims to assess the impact of depth jump and single-leg bound exercises on increasing the leg muscle strength of Male athletes of Tapak Suci Tarbiyah Deli Serdang College in 2025. In the testing process before and after this study, all participants followed a series of tests and measurements. Eight athletes were the subjects of the study, with a training program that was carried out for six weeks with a total of 18 meetings. Based on the analysis of the data that has been carried out, it was found that depth jump and single-leg bound exercises contribute to increasing the strength of the leg muscles of the Tapak Suci Tarbiyah Deli Serdang Male College athletes in 2025.

Depth jump exercises are known to be able to stimulate the neuromuscular system explosively, thereby increasing the ability of leg muscles to produce power quickly. Meanwhile, single-leg bound exercises specifically target the leg muscles unilaterally (one side), which strengthens coordination and stability when performing movements such as kicks. The combination of these two training methods not only has an effect on increasing muscle strength but also increases movement efficiency, explosiveness, and speed in performing kick techniques. The improvements seen in leg muscle power suggest that the training program that has been put together successfully supports the physiological changes required by athletes.

CONCLUSION

Based on the research results that have been obtained through analysis and hypothesis testing, it can be concluded that:

1. There is an effect of depth jump training on increasing the leg muscle power of male athletes at the Tapak Suci Tarbiyah School, Deli Serdang Regency.
2. There is an effect of single-leg bound training on increasing the leg muscle power of male athletes at the Tapak Suci Tarbiyah School, Deli Serdang Regency.

And the researcher provides several suggestions as follows:

1. For other researchers, it is advisable to conduct research with a wider scope that can affect the increase in leg muscle power.
2. The trainers to pay attention to the form of training, the appropriate training program to improve the goals to be achieved in improving performance.
3. Athletes are expected to concentrate and focus more on carrying out the training program that has been given by the trainer.

ACKNOWLEDGMENT

Praise be to God Almighty for the completion of this article. The author would like to express his deepest gratitude to:

1. Mr. Dr. Nurkadri, SPd, M.Pd, as the supervisor who patiently and carefully provided guidance, input, and invaluable knowledge during the process of compiling this article.
2. Comrades who always provided support, motivation, and productive discussions so that this article could be completed properly.
3. My beloved family for their prayers, affection, and endless support, which have become a source of strength in every step of compiling this work.

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