

# The Effect of Going Up and Down the Stairs to the Explosive Power of Leg Muscles in Pencak Silat Catching Snake Rolls

Weski Munandar<sup>1</sup>, Windo Wiria Dinata<sup>1</sup>, Endang Sepdanius<sup>1</sup>, Sonya Nelson<sup>1</sup>, Apri Agus<sup>1</sup>, Dally Rahman<sup>2\*</sup>, Fiky Zarya<sup>1</sup>

<sup>1</sup>Department of Sports Science, Universitas Negeri Padang, Indonesia

<sup>2</sup>Department of Medical Surgical Nursing and Emergency Nursing, Universitas Andalas, Indonesia

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Corresponding Author:

Dally Rahman

[dallyrahman@nrs.unand.ac.id](mailto:dallyrahman@nrs.unand.ac.id)

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**Abstract:** The problem in this research is the lack of explosive power of the leg muscles of pencak silat leg pencak silat catch snake roll in Lintau. For this reason, pencak silat leg pencak silat catch snake roll in Lintau needs to be trained programmatically through training principles that can be carried out both theoretically and practically in achieving maximum explosive power. There are several forms of exercise that can increase leg muscle explosive power, including an exercise program by going up and down stairs. This type of research is a quasi-experimental research. The population is the Pencak Silat College of tungkai pencak silat tangkap gulung ular in Lintau. Samples were taken by total sampling technique so that the sample amounted to 15 people. The research instrument uses a vertical jump test and the data analysis technique used is the t test hypothesis testing. As a result of research and hypothesis testing, it can be concluded that "There is an effect of going up and down stairs on the explosiveness of leg muscles in Pencak Silat Tangkap Snake Roll, which is evidenced by the  $t_{count} > t_{table}$  with a value of  $(3,310 > 1,761)$ .

**Keywords:** Explosive Power of Legs; Pencak Silat; Training Up And Down Stairs.

## Introduction

Pencak silat is a martial sport known as one of Indonesia's cultures that must be preserved. Therefore, pencak silat has 4 angles that are intertwined with each other. As explained by Erwin, (2015) that when viewed from his personality and rules, pencak silat is basically a substance and method for otherworldly mental education and an actual school to form people who can live and practice the philosophical lessons of honorable people and honorable people. It contains 4 fundamental angles, namely: (1) mental and otherworldly perspectives, (2) expertise perspectives, (3) pencak silat perspectives, (4) sports perspectives. According to Kiswanto (2015:13) Pencak Silat is a framework for self-protection obtained by our predecessors as a way of life for the state of Indonesia so that it must be saved,

encouraged, and created. According to Mulyana, (2013), according to the reference of Kata Besar Indonesian Language. Pencak silat contains the meaning of playing (ability) attentively by fighting, attacking, and defending oneself, either with or without weapons. As the heroes point out, the term pencak silat is separated into two different implications. According to Sutopo, (2021) Pencak silat prioritizes sports and achievements do not only contain elements of art. According to (Fani Marlianto, 2018) In pencak silat, kicking is a high point, which is equivalent to 3 points.

In the opinion of Irawadi, (2013), exercise is a systematic, planned, repetitive process in which the burden and itesthanity increase over time and eventually get stimulated throughout the body and aim to improve physically and mentally at the same time. Meanwhile, according to Bompa, (1994), training is a

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sports activity that is organized over a long period of time, progressively and individually improved which leads to the characteristics of human behavior and gestures to achieve certain goals. In addition, according to Nossek, (1982) The process for the development of sports performance is interconnected by using the content of the exercise, the method of training and the actions of the group together according to the objectives. According to Sakirno & Waluyo, (2012), exercise is an efficient cycle that is repeated every day by increasing the amount of preparation burden given. Expansion in practice results in experimental bunches due to the methodical and continuous preparation process and how much weight is applied develops step by step.

Training is a systematic process (planned, regular, gradual) that is carried out repeatedly and continuously by increasing the weight of training aimed at improving physical, mental, technical, emotional and social abilities. The exercises that are carried out must be regular and must be considered in terms of the basics of physiology to know the reactions of a person's body when doing an activity because the condition of the body that is forced to work hard without paying attention to warming up will damage the state of the body. Guided by the principles of training, among others, the principle of overload, multilateral development, individualization, specialization, principles regarding training intensity, training quality, training variety, training variation, relaxation and planning of trial tests. So, according to observers, it is an exercise in the field of sports to improve sports performance in carrying out systematic or measurable activities or exercises. According to Belo, (2021) Exercises are very closely related to the leg muscles when performing a kick because the exercises that are done in a structured manner will produce a powerful kick.

According to Amahoru, (2023), stair climbing and descending exercises is one of the sports that demands the explosiveness of the leg muscles in fencing. According to hendra, (2022) Exercises using the stair up and down training method are considered the most effective to increase the results of an explosive force. The definition of training according to (Reno Putra et al., 2024). This stair climbing and descending exercise was carried out with the aim of increasing the explosive element in physical condition. Therefore, the element of explosive power is a fundamental part of durability. Muscle endurance is the ability of a muscle to undergo contractions with submaximum load repeatedly or maintain muscle contractions over a period of time. Going up and down a single staircase is a real health test according to Nurdin et al., (2024); Raffiandy Putra et al., (2024). The test was intended to estimate his readiness to

work his muscles and his capacity to recover from training.

According to Bafirman et al., (2023); Zarya & Welis, (2021) stated that: "explosive power is the ability of a muscle or a group of muscles to overcome a load with high strength and speed in one complete movement". According to Sania et al., (2022), Explosive power is a combination of maximum speed and force while according to Kurniawan et al., (2023); Osrita et al., (2020) Explosive power refers to a person's ability to unleash force explosively or quickly. Explosive power is the capacity of an individual to perform the greatest muscle force, with the work exhausted in the shortest amount of time. According to Nur et al., (2023); Purnama et al., (2024), anatomically the limbs include the legs, calves, and thighs in the condyle coxae, which is the most widely used portion of the body in terms of mobility, and in supporting the body in several upright positions. Humairoh et al., (2023) who states that there are three types of pulling in human muscles, specifically; static, concentric and variable.

## Method

This study uses a pseudo-experimental method. The experimental method is a way to find a causal relationship between the factors deliberately caused by the researcher by eliminating or reducing other factors that can be interfering. "Experiments are always carried out with the intention of seeing the consequences of a treatment". Pseudo-experiment is a type of experimental research that cannot fully function to control external variables that affect the conduct of the experiment.

The research design used in this study is pre-test post-test. This study uses an initial test on the sample, after being given measurements through a pretest, the sample is given a form of submaximum physical exercise (explosive training) for 18 meetings.

## Result and Discussion

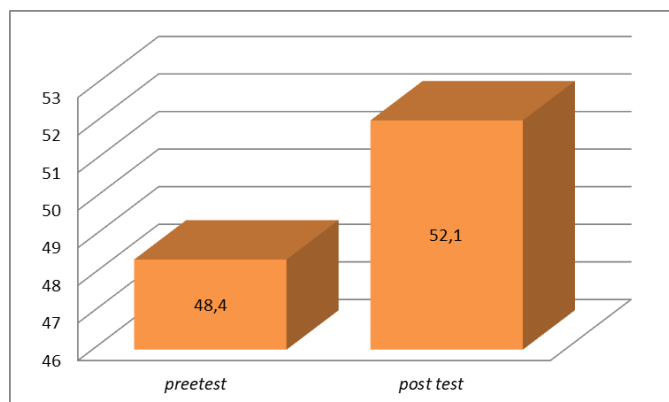
### *Research characteristics*

The subject of this study is the Snake Roll Catching Silat in North Lintau Buo District. This subject was chosen because it was considered that he had never done physical exercise up and down stairs. The entire research population is 20 people. Then those who were selected as the research sample were 15 people. This research was only conducted through one group that did physical exercise using going up and down stairs. A descriptive description of the data in this study can be seen as follows:

**Table 1.** Distribution of Pre Test and Post Test Data

Data	Sample	Average	STDEV	Max	Min
Pre test	15	48.4	7.209121207	66	37
Post test	15	52.1	6.529785237	68	44

Based on the above research data, the pre-test was obtained with an average of 48.4, STDEV 7.209121207, a maximum score of 66 and a minimum score of 37. Meanwhile, in the results of the post test, a score with an average of 52.1 was obtained. STDEV 6.529785237, maximum score of 68 and minimum score of 44. For more clarity, the histogram below shows the difference in results before and after the treatment using up and down the stairs.



**Figure 1.** Diagram of the results of the pretest and posttest of the explosive power of the leg muscles

Based on the diagram above, the difference in explosive power of the pre test and post test shows that there is an increase in explosive power after treatment, namely going up and down the stairs by 7,6%.

*Test Requirements Analysis*

The hypothesis of this study was tested using t-test analysis. Before the t-test analysis is carried out, a normality test will be carried out. The data normality test was carried out through the lilifors test with a real test significance level ( $\alpha$ ) of 0.05. The test criterion is that "rejected" if  $Lcounts > Ltable$  and vice versa "accepted" if  $Lcounts < Ltable$ .

**Table 2.** Data Normality Test

Variable	N	L count	L table
Pretest	15	0.050	0.220
Posttest	15	0.127	0.220

Based on the results of the calculation of the normality test above, it was found that the Lcount (Lh) obtained was smaller than the Ltable (Lt) at the real level ( $\alpha$ ) 0.05. Thus, it can be concluded that all the data in this study were taken from a normally distributed

population so that it can be used for testing research hypotheses.

*Hypothesis Testing*

The test research hypothesis test uses the t-test, which is explained as "There is an effect of training up and down stairs on the explosiveness of the leg muscles in Pencak Silat Tangkap Roll Snake".

**Table 3.** Pree test and Post test

Variable	N	T count	T table	information
Pre test	15	3.310	1.761	Significant
Pos test				

The table above shows the large influence of the training method of climbing and descending stairs on the explosive power of the leg muscles in the Pencak Silat Tangkap Snake Roll obtained by Thitung 3,310 while the Ttable is 1,761 with a significant level of  $\alpha$  0.05 and  $n = 15 - 1 = 14$ . Based on the above decision-making, the  $Count > Ttable$  ( $3,310 > 1,761$ ). It can be said that there is a significant influence of the training of going up and down stairs on the explosive power of the leg muscles in Pencak Silat Tangkap Roll Snake

*Discussion*

This study was designed to study the increase in the explosiveness of leg muscles by exercising using children descending stairs. After data analysis using the t-test, it can be concluded that the hypothesis proposed in this study can be accepted as true. This study began by conducting a pretest by measuring the explosive power of the leg muscles in the Pencak Silat Catching Snake Rolls, after that the treatment was given for 18 meetings with kick training materials using steps, and then conducting a posttest by measuring the explosive power of the leg muscles in the Pencak Silat Catching Snake Rolls. By using a pree test-post test design, it functions to compare before and after being treated, so that the difference can be more accurately known.

Based on the results of the research that has been carried out, in the experimental group that was given training material for going up and down stairs for 18 meetings and tested by looking for the explosive power of the leg muscles of the silat fighters before and after being given the training of going up and down the stairs, the results of the t-test were obtained with a calculated t-value of 3.310 and a table t-value of 1.761. It turns out that the calculated t value obtained is greater than the t table, because the calculated t value  $>$  t table ( $3,310 > 1,761$ ) means that there is a significant influence on the explosive power of the leg muscles in the snake roll catching pencak silat from the results it can be seen that the exercise of going up and down the stairs has a

significant influence on the increase in the leg muscle explosiveness in the snake roll catching pencak silat.

Based on the implementation of the treatment of leg muscle explosiveness training in snake roll catching pencak silat, which is carried out systematically, repeatedly, and the load increases, as well as using the principles and stages of exercise in accordance with the procedure, the exercise is able to increase muscle contraction from weak to strong in the working muscles (Bafirman, Zarya, et al., 2023). Structured exercises are able to increase targets in accordance with specifications in psychology and physics Amansyah, (2019), so it is evident that the exercise of going up and down stairs has a significant influence on the explosiveness of the leg muscles in Pencak Silat Tangkap Roll Snake.

Furthermore, the average result of the pre-test before being treated for going up and down the stairs was 48.4, while the average score after being given the treatment of going up and down the stairs for 18 meetings was 52 percent of 7.6%. So it can be concluded that the explosive power of the leg muscles in the pencak silat catching snake rolls has increased by 7.6% This means that the results of the exercise of going up and down the stairs can increase the explosive power of the leg muscles in the Pencak Silat Catching Snake Rolls. The results of the study are the same as several para opinions. Based on these results, the average difference between the pre test and the post test was 3.7. From the difference in the average score, it can be seen that the increase.

According to Harsono, (1988) training is a systematic process of training that is carried out repeatedly, this training is carried out by increasing the amount of weight studied. In addition, according to Mulya, exercise is a basic need in improving physical exercise (Mulyana, 2013). according to (Candra et al., (2023) stated that each athlete has a different training load, this is influenced by hereditary factors, nutritional maturity, rest and sleep time, fitness level, environmental influences, pain and injury and motivation. Therefore, it is necessary to realize that each child has a difference in the training load. Likewise, according to Nurhasan (1986:23), it is physical activity that helps improve overall health in order to increase the explosive power of the leg muscles. According to Kriswanto, (2015) Vertical jump jump is judged from a person's ability to jump high also relying on the explosive power of the leg muscles. The vertical jump movement occurs when we bend the elbow in the left hand, the right hand must move it as high as possible with the help of a tool using chalk to find out the jump point obtained by the sample. Vertical jump jump is the ability of a person to jump straight up without using an external load. Vertical jumping can also be interpreted as a movement to jump as high as possible, with an

emphasis on the strength of the leg muscles, in order to achieve maximum jumps, this opinion is the same as the Ministry of National Education (Agus, 2012) regularly going up and down stairs is able to improve the ability of athletes to maintain body endurance and muscle strength acquired through physical exercise.

According to Sajoto, repetitions are the number of repetitions of lifting a weight, while a set is a series of activities from several reps. According to Nossek, (1982) that the exercise used is a set system, meaning that in its implementation a person uses a maximum load of 50%-75% by doing several repetitions, namely 4-6 sets and 6-10 reps, the perpetrator rests for 3-5 minutes.

According to Fadli, (2018), Explosive power is a combination of maximum speed and force while according to (Yanti et al., 2022) Explosive power refers to a person's ability to unleash force explosively or quickly. Exercise using the method of going up and down stairs will function well on our body, especially in burning fat (Hirwana et al., 2023) while the explosive power of the leg muscles is the ability of the muscles in a short time to move maximum strength to achieve goals (Yoslanda et al., 2022).

Based on the conclusion of the results of the above research, some suggestions can be given as follows: It is recommended that coaches use the method of going up and down stairs to increase the explosive power of the leg muscles in the pencak silat sport in order to improve maximum performance, especially training the explosive power of the leg muscles to practice more.

## Conclusion

The conclusion of this study confirms that the structured and systematic training program for climbing and descending stairs has a significant influence on increasing the explosive power of leg muscles in Pencak Silat athletes who catch snake rolls in Lintau. Through a quasi-experimental approach using the total sampling technique, the research sample consisting of 15 athletes showed a significant increase in the explosive strength of the leg muscles after undergoing the exercise program. Measurements of explosive power using a vertical jump test, which was then analyzed using a t-test, showed results that supported the hypothesis that stair climbing and descending exercises could be an effective training method in improving the explosive ability of leg muscles. This improvement is especially important in the context of pencak silat, where the strength and agility of the limbs play a crucial role in performing offensive and defensive techniques. Thus, this training program can be applied as an integral part of the physical training program of pencak silat, both theoretically and practically, to help athletes achieve

maximum performance in competition. In conclusion, the exercise of going up and down stairs is one of the effective and applicable methods in the development of leg muscle explosiveness for pencak silat athletes, especially in the snake roll catching branch in Lintau.

#### Author Contributions

Each author contributes in some way to the completion of this research activity. The main author provides basic ideas and provides research materials and the second, third, fourth authors design research methods and furthermore, all authors share responsibility for data collection, data tabulation and analysis, review process, and article writing.

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#### Conflicts of Interest

Regarding this study, the author declares that there is no conflict of interest

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- when Exercising Department of Sports Science , Universitas Negeri Padang , Padang , West Sumatra , Indonesia Department of Medical Education , Universitas Negeri Padang ,. *Poltekita: Jurnal Ilmu Kesehatan*, 17(4), 1292-1298. <https://doi.org/10.33860/jik.v17i4.3571>
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