



The Effect of Hand Grip Training on Increasing the Speed of Rock Climbers in UKM Garjamara

Aditya Nugraha¹, Dewi Susilawati^{2*}, Rizal Ahmad Fauzi³

¹²³Physical Education of Elementary Teacher Program, Universitas Pendidikan Indonesia, Bandung, Indonesia

Keywords

Rock Climbing; Hand Grip Exercise; Rock Climbing Speed

Abstract

This study aims to determine the effect of hand grip training on increasing rock climbing speed in members of the Garjamara student activity unit. The research method used is quantitative research with a pre-experimental design using a one group pretest-posttest design. The population in this study amounted to 30 members of the Garjamara Student Activity Unit, while the research sample was 10 people who were selected using the purposive sampling technique based on certain criteria. The research instrument uses a rock climbing speed test that has met the requirements for validity and reliability. Data analysis techniques include descriptive statistics and paired sample T-test to determine the difference in results before and after treatment. The results showed that the average pretest score of The results showed that the participants' average climbing time decreased from 4.4130 seconds in the pretest to 2.9170 seconds in the posttest. This decrease in climbing time indicates an increase in climbing speed after handgrip training, which showed an increase in rock climbing speed after being given hand grip training. The results of the paired sample t-test obtained a significance value of 0.000 (<0.05) with a calculated t-value of -9.849, thus showing that there is a significant influence of hand grip training on increasing rock climbing speed. The increase occurred because hand grip exercises were able to increase hand grip strength, arm muscle endurance, and movement efficiency when climbing. Thus, hand grip training can be used as one of the effective physical training methods to improve the performance of rock climbing athletes, especially in speed climbing.

✉ Corresponding Author:
E-Mail: Dewisusilawati@Upi.Edu

INTRODUCTION

A healthy lifestyle is a lifestyle that considers all aspects of a person's health. This applies not only to food but also to people's lifestyles. Health is an important factor that supports everything you do and do. A healthy lifestyle is an important aspect for maintaining physical and mental health. In its development, sports are considered not only as physical activity, but also as a means of developing good character and manners (Adriyani, Ayudhya Ilya M, 2023). Starting from health sports, recreational sports to competitive sports. Competitive sports are carried out to achieve the best performance in the sport. To achieve maximum performance, good coaching is needed in all areas of performance (Handayani, 2019). Sport today is one of the basic needs that needs the attention of every individual, because sport is a human physical activity in an effort to form a whole human being who is physically and spiritually healthy and has a good mentality. (Yurko, 2023) Exercise not only supports physical health, but also contributes to mental health, which is important for a better quality of life. (Putri et al., 2024) By exercising regularly, individuals can improve their overall well-being and develop positive character. Sports activities can be carried out in various forms, the most important of which is the consequences of sports themselves which are able to socialize sports and exercise society (Saputra, 2021). According to Djoko Pekik Irianto, Exercise is a systematic process that is carried out regularly and continuously to improve the body's functional abilities, physical fitness, and quality of life. In addition, Rusli Lutan Explains that exercise not only serves to improve physical health, but also plays an important role in the formation of individual character, discipline, sportsmanship, and social abilities. In line with this opinion, World Health Organization Stating that physical activity carried out regularly can help prevent various non-communicable diseases such as heart disease, diabetes, obesity, and hypertension, as well as improve people's mental health and quality of life. Therefore, exercise is an important part of modern human life because it provides wide benefits, both in terms of health, education, social, and psychological, so it needs to be applied regularly in daily life.

Rock Climbing is one of the extreme sports that continues to experience rapid development in Indonesia and the world. This sport not only demands physical strength, but also requires balance, coordination of movements, muscle endurance, flexibility, concentration, and courage in making decisions when climbing. According to International Federation Of Sport Climbing (IFSC), rock climbing is a competitive sport that combines technical ability, speed, strategy, and mental strength in completing a climbing path. In Indonesia, the development of rock climbing has increased significantly as the community of nature lovers and rock climbing clubs has increased, and the construction of facilities has increased. *Wall Climbing* In schools, campuses, and sports centers, as well as the increasing number of competitions organized by the government and sports organizations. Indonesia also has geographical conditions that support the development of this sport because of the many hilly areas and natural cliffs that can be used as training locations and rock climbing recreation. According to (Abdullah & Nawir, 2025), rock climbing sports include sports that require dominance of arm muscle strength, hand grip endurance (*Grip Strength*), body coordination, and good anaerobic ability so that physical exercise such as *Hand Grip Exercise* It is very important to improve the performance of athletes, especially in the number *Speed Climbing*. In addition to physical factors, psychological aspects such as focus, emotional control, and courage also greatly affect an athlete's success in completing the climbing trajectory. The popularity of rock climbing is increasing after this sport was officially contested in 2020 Summer Olympics, which is an important milestone in the development of rock climbing at the international level. Indonesia has also managed to show proud achievements through its athletes in various world championships, one of which is Veddriq Leonardo who won the gold medal in the number *Speed Climbing* In 2024 Summer Olympics. This achievement proves that Indonesia has great potential in rock climbing and is able to become one of the world's leading countries in speed numbers (Abadi et al., 2016). Achievement sports coaching must be carried out systematically, planned, and continuously so that athletes are able to achieve optimal performance. Therefore, with the support of growing sports facilities, structured training programs, and increasing achievements of Indonesian athletes at the

international level, rock climbing is expected to continue to develop and be increasingly in demand by the Indonesian people both as a recreational sport and an achievement sport. The strength of the arm muscles plays a crucial role in determining the performance of athletes. Good muscle strength allows athletes to climb efficiently, perform complex technical movements, speed reaches the top and overcome obstacles better. The strength of the handgrip or hand grip is one of the important indicators in the performance of rock climbing athletes. A Study By (Putri et al., 2023). Shows that grip strength and arm muscle strength are significantly correlated with performance in rock climbing. This is also in line with research conducted by (Husnul, 2024). Which reveals that increasing the strength of the dominant and non-dominant arm muscles can improve the endurance and efficiency of the climber's movements, which ultimately has a positive impact on overall performance (Herlambang, 2025).

According to Harsono, physical abilities such as muscle strength, endurance, flexibility, and coordination greatly affect a person's success in carrying out sports activities that require special skills, including rock climbing. In addition, John Long explained that the success of a climber is not only determined by the strength of the hands, but also by the ability to regulate body position, movement efficiency, and accuracy in determining footing and grip. Therefore, a climber must be able to master basic techniques well in order to minimize the risk of injury or accidents when climbing. The use of safety equipment such as harnesses, karman straps, carabiners, and climbing shoes is also an important factor in supporting the safety and comfort of climbers. With mastery of techniques, good physical condition, and the use of equipment that meets standards, rock climbing activities can be carried out more safely, effectively, and optimally for both achievement sports and recreational needs.

Techniques in rock climbing are basic skills that involve coordinating hand and foot movements in utilizing protrusions and cracks in the rock wall as a foothold and grip to reach a certain point. Good mastery of technique is very important because it can help climbers maintain body balance, save energy, improve movement efficiency, and reduce the risk of injury when climbing. (Munir & Nugraha, 2022) The use of hands and feet in rock climbing is adjusted to the conditions of the cliff surface faced. One of the basic techniques of the feet is *Edging*, which is a tread technique by utilizing the outside or front side of climbing shoes on small and narrow footing so that climbers can maintain maximum body stability. In addition, there are techniques *Smearing*, which is a tread technique by attaching most of the surface of the footwear to a relatively flat or minimal footing wall so that the friction force between the shoe and the wall can help support the climber's weight. In the use of hands there are techniques *Open Grip*, which is an open grip technique used on flat and wide rock protrusions by relying on the strength of the fingers and palms to maintain the grip, while *Vertical Grip* It is a vertical grip technique that is performed by utilizing arm strength and weight to pull the body on an upright grip or gap. Mastery of these basic techniques is very important in supporting the ability of climbers because good techniques will make movements more effective, efficient, and help increase success in the climbing process.

Hand grip training is a form of physical exercise that plays an important role in improving the ability of rock climbers, especially in terms of hand grip strength and speed when climbing. In rock climbing, arm and finger muscle strength is needed to maintain grip and support weight when passing through the climbing path. According to Bompa, strength training done regularly can improve the ability of muscle contractions so that movements become more effective and efficient. In addition, Harsono explained that exercises that are carried out systematically and repeatedly will provide physiological adaptation to the muscles so that they can improve athletes' performance. Hand grip exercises can help climbers improve hand muscle endurance, strengthen grip, and reduce fatigue when climbing, resulting in better climbing speed (Munir & Nugraha, 2022). The strength of the hand grip is closely related to the success of grip techniques and displacement in rock climbing. Thus, it can be concluded that hand grip exercises have a positive influence on increasing the speed of rock climbers because they are able to increase the strength and endurance of hand muscles which are needed in the climbing process. Based on the background description that has been submitted, this research is focused on answering the main problem. Is there an effect of *hand grip* training on

the increase of rock climbers in Garjamara UKM. On. This problem is the basis for increasing the speed of rock climbing with *hand grip* exercises.

This study generally aims to determine the effect of hand grip training in increasing rock climbing speed in members of Garjamara UKM. Through this research, it is hoped that the right solution can be found to optimize the ability of rock climbing techniques. (Pranitha et al., 2021) The results of this study are expected to make a significant contribution to the development of more effective training programs and safety policies in rock climbing. (Sukmawati et al., 2024) This research can also help in identifying factors that influence performance and safety in rock climbing, as well as provide insights for the development of more effective training techniques. Thus, this research has the potential to provide a strong basis in designing more targeted and safe training programs for rock climbing athletes. Thus, this research can be a reference for coaches and athletes in applying a sports science approach to improve technique and performance in rock climbing.

METHOD

This type of research uses quantitative research with a pre-experimental method (Pre-Experimental Design). Quantitative research is a structured, measurable, systematic, and positivism-based approach that emphasizes numerical measurement, statistical analysis, and hypothesis testing to obtain objective and generalizable results (Sumilih et al., n.d.). This study aims to determine the effect of exercise Hand Grip Towards increasing the speed of rock climbing in members of Garjamara. The research design used is pre-experimental (Kumara et al., 2024), which is a research design that uses a group of research subjects who are given repeated measurements before and after treatment to see the changes that occur in rock climbing skills after being given treatment in the form of exercises Hand Grip. The variables in this study consisted of independent variables, namely exercise Hand Grip And the bound variable is the increase in rock climbing speed.

The population in this study is all members of the Garjamara UKM which totals 30 people. Based on the criteria that have been determined, especially the level of active attendance in activities and expertise in the field of rock climbing at Garjamara, The study subjects consisted of 10 members of the Garjamara Community Activity Unit (UKM) aged 18–25 years with at least one year of rock climbing training experience. All subjects attended all training sessions and data collection and were in sufficient physical condition to perform the research tests. Members who were absent during the training program or experienced injuries that could potentially affect the measurement results were excluded from the study. Therefore, the sampling technique used in this study is purposive sampling, which is a sample determination technique based on certain considerations or criteria that are in accordance with the purpose of the research, so that the sample used is really relevant to the needs of the research. By using this technique, the researcher can ensure that the subjects involved have characteristics that are appropriate to the focus of the research, so that the data obtained becomes more valid, in-depth, and able to describe the actual conditions in the field. In addition, selective sample selection also helps to increase accuracy in drawing research conclusions and minimize bias that may occur due to underrepresentative sample selection.

The data collection technique in this study uses a rock climbing speed test which aims to measure the rock climbing speed of Garjamara UKM members before and after being given treatment. The data obtained from the test results were then analyzed using several statistical analysis techniques. The data analysis used includes descriptive statistics to describe the mean value, standard deviation, and data distribution of the measurement results. Next, an analysis prerequisite test was carried out consisting of a normality test to find out whether the data was distributed normally. After meeting the analysis requirements, hypothesis testing was carried out using a t-test to find out if there was a significant difference between the results of the measurements before and after the treatment. If the data is not normally distributed, then the analysis can be performed using the Mann-Whitney U Test nonparametric test. Thus, the series of analysis techniques used in this study is expected to be able to provide accurate, objective, and scientifically accountable results in testing the effectiveness of the

applied exercise model. In addition, the use of this systematic analysis method also aims to increase the validity and reliability of research results.

Rock climbing speed test instruments must meet the requirements of validity and reliability in order to be used as a measuring tool in research. According to Hary Sulistyaro (1999:30) in (Ismawati, 2015), the rock climbing speed test has a validity value of 0.852 which is included in the good category, and a reliability of 0.759 which is included in the high category. Thus, the instrument is considered suitable for use to measure rock climbing speed. Thus, the use of this test instrument in the study is considered feasible and accurate to evaluate the increase in rock climbing speed, and can provide an objective picture of the improvement in skills of Garjamara UKM members after being given training treatment.

RESULTS AND DISCUSSION

The following are the results of the pretest and posttest research on the increase in rock climbing speed that has been given to Garjamara SMEs, so the descriptive statistics of the average score can be seen in the following table:

Table 1. Statistical Descriptive Test

	N	Minimum	Maximum	Red	Std. Deviation
Pretest	10	3.04	5.59	4.4130	.83759
Posttest	10	2.01	4.09	2.9170	.63976
Valid N (Listwise)	10				

Table 2. Simple Paired Sample Test

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			Paired Differences	95% Confidence Interval of the Differences				
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig.(2-tailed)
Pair1 post-test-pretest	-1.49600	.48035	.15190	-1.83962	-1.15238	-9.849	9	.000

Table 3. Tests of Normality

		Kolmogorov-Smirnov			Shapiro-Wilk		
	Differentiator	Statistic	Df	Sig.	Statistic	df	Sig.
Pretestposttest	Pretest	.246	10	.088	.895	10	.192
	Posttest	.143	10	.200*	.931	10	.454

Based on the results of the *paired sample T-test*, it is known that the mean difference between the *posttest* and *pretest* results is -1.49600 with a standard deviation of 0.48035. The test results showed a value of $t = -9.849$ with a degree of freedom (df) = 9 and a significance value (*sig. 2-tailed*) of 0.000. Because the significance value is less than 0.05, there is a significant difference between the *pretest* and *posttest* results. Thus, it can be concluded that the exercises provided have a significant effect on improving the participants' abilities. These results show that the *hand grip* training program applied is effective in increasing the speed of rock climbing.



Figure 4. The research data collection process was conducted on members of the Garjamara UKM through a pretest and a posttest. The purpose of data collection was to determine the effect of handgrip training on increasing rock climbing speed.

The First Part Forever

Based on the results of the research that has been conducted, it is known that hand grip exercises have a significant influence on increasing the speed of rock climbing in members of Garjamara SMEs. This can be seen from the results of descriptive statistical analysis which shows a change in the average score between the pretest and posttest. The average pretest score of 4.4130 decreased to 2.9170 in the posttest. The decrease in travel time showed that the participants' rock climbing speed ability increased after being given treatment in the form of hand grip exercises. In addition, the results of the paired sample T-test showed a significance value of 0.000 or less than 0.05, so it can be concluded that there is a significant difference between the results of the pretest and posttest after being given a training program. Thus, the research hypothesis that hand grip exercises have an effect on increasing rock climbing speed is acceptable.

The increase in rock climbing speed occurs because hand grip exercises are able to increase the strength and endurance of the hands, arms, and fingers muscles which are the main components in rock climbing. In the climbing process, the strength of the hand grip is indispensable to maintain the grip, support the weight, and make quick and efficient movements. According to Bompa and Buzzichelli, strength training that is carried out systematically and repeatedly can improve the ability of muscles to contract so that it results in more effective movement performance. This is in line with Harsono's opinion that physical exercise that is carried out programmatically and continuously will cause physiological adaptation to muscles and body systems so that athletes' abilities are optimally increased. Therefore, the hand grip exercises given in this study are able to help participants improve grip strength and reduce muscle fatigue when climbing. Grip Strength has a significant relationship with rock climbing performance (Sumilih et al., n.d.). Athletes who have better grip strength tend to be able to maintain a more stable body position, make faster movements, and save energy during the climbing process. Research (Abdullah & Nawir, 2025) It also shows that increasing the strength of the dominant and non-dominant arm muscles can improve the efficiency of climbers' movements so that it has a positive impact on overall performance. With the increase in hand and arm strength through hand grip exercises, climbers become more able to perform grip techniques such as open grip and vertical grip more optimally so that the speed in reaching the top of the track can increase.

In addition to the physical strength factor, the increase in rock climbing speed is also influenced by the technical ability and coordination of body movements. Hand grip exercises not only increase muscle strength, but also assist climbers in maintaining movement control when doing footsteps and handles on climbing walls. According to John Long, the success of climbers is

influenced by the ability to regulate body position, movement efficiency, and accuracy in determining handles and footing. With better grip strength, climbers can move more confidently and stably, making the climb travel time faster. These conditions show that physical exercise and technique have a mutually supportive relationship in improving rock climbing performance.

Based on the overall results of the study, it can be concluded that hand grip training is an effective training method to increase the speed of rock climbing in members of Garjamara UKM. Exercise programs that are carried out regularly, systematically, and continuously are able to improve hand grip strength, arm muscle endurance, and climber movement efficiency so that it has a positive impact on climbing performance. The results of this study are expected to be a reference for rock climbing coaches and athletes in developing a more effective physical training program to improve rock climbing sports achievements, especially in speed climbing numbers.

CONCLUSION

Based on the results of research that has been conducted on members of Garjamara UKM, it can be concluded that hand grip exercises have a significant influence on increasing rock climbing speed. The results of the descriptive analysis showed a change in the average value between the pretest of 4.4130 and the posttest of 2.9170, which indicated an improvement in climbing speed performance after being given a training program. In addition, the results of the paired sample T-test showed a significance value of 0.000 (< 0.05) with a calculated t-value of -9.849, so it can be stated that there is a significant difference between the results before and after treatment. Thus, the Hand Grip training program has proven to be effective in improving the ability of rock climbing speed in members of Garjamara SMEs. This exercise can be used as one of the right physical training methods to improve hand grip strength, arm muscle endurance, and athlete performance in rock climbing.

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