



# The Effect of Bouldering Climbing Technique on Increasing Finger Grip Strength and Endurance on Rock Climbing Activities in Smapapala Organizations

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**Abstract.** Rock climbing sport which also called rock climbing is an activity that has values of adventure and sport which has a high level of difficulty. Both Climbing a rock or artificial wall is an activity that has a very high level of danger so that rock climbers or the athletes must have maximum physical abilities, strategies, and physical conditions. This research was conducted from May 15 to June 15 at the Monkey Cliff Sukoharjo Pacitan. The type of research uses an analytic observational method using a quasi-experimental approach. The implementation of this research involved 12 members of the smapapala organization. The data taken, namely the results of the pre-test and post-test of bouldering climbing and a test using a hand dynamometer. From the results of the hypothesis, it can be seen that there is an increase between pre-test and post-test by means of bouldering climbing exercises carried out by the Smapapala organization. This can be seen from the results of the pre-test and post-test which show that the paired samples test results –5,000 on finger grip strength and the paired samples test results – 2.569 on the rooftop or climbing test. Based on the results of data analysis and discussion of research that has been carried out, it can be concluded that there is an influence between the bouldering climbing technique on increasing finger grip strength and endurance in rock climbing activities in smapapala organization.

**Keywords:** Rock Climbing · Bouldering Climbing

## 1 Introduction

Rock climbing, also known as rock climbing, is an activity which has the values of sports and adventure in the wild which has a high level of very high difficulty. This rock climbing sport has its own charm variety of difficulties with indentations made according to the level of difficulty. Climbing an artificial rock or wall is an activity that has levels the danger is so high that a rock climber or rock-climbing athlete must have maximum physical ability, strategy, and physical condition. In rock climbing it takes leg skills and hand strength to overcome the bumps and fractures that is in an artificial wall or cliff so that climbers can climb a cliff or artificial wall up to a predetermined high point.

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M. H. Hikmat et al. (Eds.): ICOLAE 2022, ASSEHR 757, pp. 36–42, 2023.

[https://doi.org/10.2991/978-2-38476-086-2\\_5](https://doi.org/10.2991/978-2-38476-086-2_5)

It's not enough to use strength alone, but a rock climber must be accompanied by proper technique and coordination of movements. On own wall climbing activities There is a combination of grip strength, arm and leg strength become a top priority to facilitate the climbing process on wall climbing. To make it easier for a rock climber to overcome difficulties in climbing cliffs or artificial walls, a rock climber must increase his strength and techniques in rock climbing activities. Hand grip strength and strength This arm becomes an important factor in rock climbing activities.

Rock climbing walls have varied shapes, so that in Rock climbing requires a special climbing to recognize or master the techniques needed in rock climbing activities. In general, rock climbing is done in areas with rocky cliff contours with a slope angle of more than  $50^\circ$  and also have varying levels of difficulty. Basically, rock climbing is a sport sports that prioritize hand grip strength, flexibility, endurance strength body, feeling, intuition, teamwork as well as the skills and experience of each climber to get around obstacles from the cliff itself. In increasing height with take advantage of the rock crevices and through holes found on the cliffs as well as effective and efficient use of equipment to achieve the peak of climbing objectives.

Climbing on the boulder path is not too long and is limited to a few movements. Climbing the boulder is done without using a rope and without equipment so that if it comes off, from the point on the cliff wall it will crash and fall to the ground. In a climbing boulder artificial cliffs find their purity, pure climbing using no equipment assistance but relying on physical strength or the climber's body. On climbing boulder themselves are more likely to rely 5on movement coordination and rely on strength hand grip, arm muscle strength and leg muscle strength to support the success of the boulder climbing activity.

## 2 Method

This type of research is an analytic observational research using a quasi-experimental approach that is one group pretest and posttest. Quasi experiment pretest posttest. The subject group was observed before the intervention was carried out, then observation again after the intervention. The population in this study are all the players from the smapapala members are 12 people. The sample used in this study are 12 respondents are members of smapapala. Time for the treatment to be carried out 14 meetings and a duration of 1–1.5 h in one meeting according to the program which has been made. The treatment given is bouldering technique, strength strength, pull ups and push ups. The instrument used is using the test and measurement method the beginning of the roof top to find out how far it reaches the points, measure the strength with a hand dynamometer. After getting the data, the researcher uses SPSS 19 for windows to analyze data. Data analysis technique using test normality of data and paired sample t-test (sample paired t-test) as a test of difference initial measurement and final measurement of the sample data of this study.

### 3 Results and Discussion

#### 3.1 Results

This research is a research using analytic observational method with using a quasi-experimental approach. The implementation of this research involves 12 members of the smapapala organization with the data taken, namely the results of the pre-test and post-test from bouldering climbing and test using a hand dynamometer. The researcher here acts as an observer. The activities carried out are: comparing the results of the pre-test with the post-test after doing the bouldering climbing exercise for 14 meetings (Table 1).

#### Normality Test

Normality test was conducted to determine whether the study population normally distributed or not. For this test using the test formula kolmogorov-smirnov. With the output of pre-test and post-test data of a total of 12 population. With the following results: Results of pre-test and post-test finger grip strength (Table 2).

#### Lilliefors Significance Correction

From the data in Table 3, we can see the significant results of the pre-test 176 and the results of significant post-test 141. So it can be concluded that each variable in This study is normally distributed because the significance is more than 0.05 (5%).

Table 4 Normality Test From the data in Table 4, we can see that the post-test 200 significant results and the results of significant pre-test 200. So it can be concluded that each variable in this study is normally distributed because the significance is more than 0.05 (5%). Hypothesis testing To see the effect of bouldering climbing training carried

**Table 1.** Result Pre-Test and Post-Test Finger Grip Strength

No	Nama	Pretest	Posttest
1	Axel D	31	32
2	Aditya	30	30
3	Jhon N	32	32
4	Rama	31	31
5	Novca	32	33
6	Damon	29	30
7	Kidung	32	32
8	Aldo	33	33
9	Dino	32	32
10	Bagus	29	31
11	Arafat	30	30
12	Candra	30	31

**Table 2.** Result Pre-Test and Post-Test (Number of Runners/Check Points Achieved)

No	Nama	Pre-test	Post-test
1	Axel D	4	5
2	Aditya	6	7
3	Jhon N	7	8
4	Rama	8	8
5	Novca	6	6
6	Damon	5	7
7	Kidung	3	4
8	Aldo	4	5
9	Dino	3	4
10	Bagus	5	6
11	Arafat	7	8
12	Candra	8	8

**Table 3.** Test of Normality

	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	
posttest	.205	12	.176	.890	12	.118
pretest	.212	12	.141	.914	12	.243

**Table 4.** Test of Normality

	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
Posttest	.191	12	.200*	.872	12	.070
Pretest	.133	12	.200*	.929	12	.372

out for 14 times In the meeting, pre-test and post-test data were obtained as follows: Finger grip Hypothesis Test.

Hypothesis testing To see the effect of bouldering climbing training carried out for 14 times In the meeting, pre-test and post-test data were obtained as follows: Finger grip hypothesis test.

Based on the data in Fig. 1, there is a difference of  $-5,000$  with a significance value of  $>0.05$ , the effect of the exercise carried out can affect students in rock climbing. Due to an increase between the pre-test and post-test (Fig. 2).

Pair	pretest – postes	Mean	Std. Deviation	Std. Error Mean	Differences		t	df	Significance	
					Lower	Upper			One-Sided p	Two-Sided p
Pair 1	pretest – postes	.500	.674	.195	.928	.072	2.569	1	.013	.026

Fig. 1. Hypothesis Testing Finger Grip

Pair	pretest – postes	Mean	Std. Deviation	Std. Error Mean	Differences		t	df	Significance	
					Lower	Upper			One-Sided p	Two-Sided p
Pair 1	pretest – postes	-.833	.577	.167	-1.200	-.467	-5.000	11	<.001	<.001

Fig. 2. Difference Test

3.2 Discussion

Based on Table 4, there is a difference between the pre-test and the post-test of - 2,569 with a significance value >0.05, the effect of the exercise performed can be affect the resilience of the student body in rock climbing activities. So Based on the two data, the hypothesis stated earlier is true that there is an influence between the bouldering climbing technique on increasing strength finger grip and endurance in rock climbing activities in the SMAPapala organization.

In this study, 14 bouldering climbing exercises were carried out the seventh meeting and subsequent exercises showed 12 respondents fully achieved significant improvement during bouldering climbing practice. In the first practice until the fifth several experienced obstacles in the form of: bad weather, insufficient heating, respondents who did not come on time as specified, and permission regarding borrowing equipment from a related institution.

In the first meeting, there were 12 respondents who came in full, then warm up first after all the respondents have done the heating followed by the introduction of climbing tools after all respondents understood the tools used. The activity continued with a pre-test bouldering climbing. On practice the second meeting until the sixth

meeting carried out bouldering climbing exercises carried out routinely. The seventh meeting was carried out with training as usual and an evaluation was carried out for find out how the increase in respondents. Eighth meeting thirteenth meeting bouldering climbing exercise was carried out again as usual. Last meeting or In the fourteenth meeting, bouldering exercise was carried out as usual and posttest was carried out after the bouldering climbing exercise.

From the data above, it can be seen that the results of the pre-test and post-test calculations occur there is a significant improvement in endurance and finger grip strength in activities rock climbing. The results of hypothesis testing: there is an influence between bouldering climbing techniques on increasing finger grip strength and endurance in rock climbing activities in the smapapala organization. This is evidenced by an increase in the pre-test and post-test conducted after 14 times of bouldering climbing practice.

From the results of the hypothesis, it can be seen that there is an increase between the pre-test and post-test by means of bouldering climbing exercises conducted by the Smapapala organization. This can be seen from the results of the pre-test and post-test which indicate that the results of paired samples test  $-5,000$  on finger grip strength and paired samples test result  $-2.569$  on the rooftop test or climbing. The results of this study prove that Bouldering climbing exercises affect the increase in finger grip strength and power hold on doing rock climbing at the Smapapala organization.

From the results of the research above, it can be strengthened by research conducted by (Ronaldo Wijaya) in the journal "The Contribution of Arm Muscle Strength and Hand Strength" Against Climbing Speeds in Rock Climbing Sports at IKM Nature Lovers Bengkulu University". With the result that there is a relationship between arm muscle strength and strength hands on climbing speed by 74.69%.

## 4 Conclusion

Based on the results of data analysis and discussion of research that has been carried out, it can be concluded that there is an influence between the bouldering climbing technique on increasing finger grip strength and endurance in rock climbing activities in the smapapala organization. This is evidenced by an increase in the pre-test and post-test conducted after 14 bouldering climbing exercises. From the results of the hypothesis it can be seen that there is an increase between pre-test and post-test by bouldering climbing exercise conducted by the smapapala organization. This can It is known from the results of the pre-test and post-test which indicate that there are paired results samples test  $-5,000$  on finger grip strength and paired samples test result  $-2569$  on Rooftop test or climbing.

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