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Comparison of Hand Muscle Strength, Arm Muscle Strength, Back Muscle Strength, Abdominal Muscle Strength, and Flexibility among Calisthenics Communities in Yogyakarta

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Abstrak

Penelitian ini bertujuan untuk menemukan jawaban yang akurat secara ilmiah tentang ada tidaknya perbedaan tingkat kekuatan otot tangan, kekuatan otot lengan, kekuatan otot punggung, kekuatan otot perut, dan fleksibilitas antara komunitas *calisthenics* Aldebaran YSW dan Sambilegi Fit. Penelitian ini merupakan penelitian komparatif menggunakan metode survei. Subjek dalam penelitian ini adalah 9 anggota komunitas *calisthenics* Aldebaran YSW dan 11 anggota komunitas *calisthenics* Sambilegi Fit Yogyakarta yang aktif dalam olahraga *calisthenics*. Pengumpulan data menggunakan 5 item tes, yaitu tes kekuatan otot tangan dengan *handgrip dynamometer*, tes kekuatan otot lengan dengan push-up 30 detik, tes kekuatan otot punggung dengan *back dynamometer*, tes kekuatan otot perut dengan sit-up 30 detik, dan tes fleksibilitas dengan *sit and reach*. Analisis data menggunakan analisis uji-t melalui uji prasyarat uji normalitas dan uji homogenitas. Hasil penelitian ini menunjukkan bahwa: Terdapat perbedaan yang signifikan pada kekuatan otot tangan dengan selisih dari rata-rata sebesar 7,19% pada tangan kanan dan 8,18% pada tangan kiri, kekuatan otot lengan dengan selisih dari rata-rata sebesar 12,61%, kekuatan otot punggung dengan selisih rata-rata sebesar 16% antara komunitas *calisthenics* Aldebaran YSW dan sambilegi fit. Hal itu ditunjukkan dengan t hitung > t tabel dan nilai *sig* < 0,05. Tidak terdapat perbedaan yang signifikan pada kekuatan otot perut dan fleksibilitas antara komunitas *calisthenics* Aldebaran YSW dan Sambilegi Fit dengan selisih rata-rata 1,98% pada kekuatan otot perut dan 6,64% pada fleksibilitas.

Kata Kunci: *calisthenics*, kekuatan, fleksibilitas

Abstract

This research aims to find scientifically accurate answers about whether there are differences in the level of hand muscle strength, arm muscle strength, back muscle strength, abdominal muscle strength, and flexibility among the calistheninics communities such as Aldebaran YSW and Sambilegi Fit.This reserch was a comparative study using a survey method. The research subjects were 9 members of the Aldebaran YSW calisthenics community and 11 members of the Sambilegi Fit Yogyakarta Calisthenics Community who were active in calisthenics. The data collection used 5 test items, for the hand muscle strength test with handgrip dynamometer, arm muscle strength test with 30 second push-ups test, back muscle strength test with back dynamometer test, abdominal strength test with 30 second sit-ups test, flexibility test with sit and reach test. The data analysis used t-test analysis through the prerequisite test for normality and homogeneity tests. The result of this study indicate that: there is a significant difference in hand muscle strength with an average difference of 7.19% for the right hand and 8.18% for the left hand, the arm muscle strength with a difference from the average of 12.61%, back muscle strength with an average difference of 16% between the Aldebaran YSW and Sambilegi Fit calisthenics community. It is indicated by the value of t-count > t-table and sig value < 0.05. There is no significant difference in abdominal muscle strength and flexibility between Aldebaran YSW and Sambilegi Fit calisthenics community with an average difference of 1.98% in abdominal muscle strength and 6.64% in flexibility. .

***Keywords**: calisthenics, strength, flexibility*

INTRODUCTION

The COVID-19 pandemic has caused various negative impacts in Indonesia and across the world, affecting the education, economic, social, and health sectors. Despite its detrimental effects, the pandemic has also increased public awareness of the importance of exercise and healthy living. Regular physical activity can enhance the immune system, thereby helping to prevent various diseases.

Exercise is a physical activity performed individually or in groups in a systematic, rhythmic, and repetitive manner that can support the development of both physical and mental potential. It plays an important role in maintaining physical fitness. Exercise also increases metabolism and influences glandular function in the body, which helps strengthen the immune system and effectively reduces stress. During exercise, the body produces endorphins—natural chemical substances that help control pain and reduce stress. Therefore, individuals are encouraged to exercise regularly and consistently to achieve optimal physical fitness.

Law of the Republic of Indonesia Number 3 of 2005 concerning the National Sports System, Article 17, states that the scope of sports includes educational sports, recreational sports, and achievement sports. Educational sports are implemented as part of the educational process with the aim of teaching correct movement skills, fostering motivation to exercise, and identifying talents early in schools. Recreational sports are carried out as part of the process of restoring health and physical fitness.

The fundamental purpose of engaging in sports activities is to maintain or improve physical fitness and health. Physical fitness consists of several basic components, including muscle strength, muscle endurance, and cardiorespiratory endurance. Muscle strength is characterized by the force of muscle contraction when performing loads. Muscle endurance refers to the ability of muscles to perform work over a certain duration, while cardiorespiratory endurance is characterized by moderate-intensity muscle contractions performed over a long period.

Exercise can also serve as an effective stress reliever. This is in line with Garcia-Falgueras (2015), who stated that several scientific studies show that stress is produced in our muscles. Physical activity helps release tension and reduce stress levels. In the brain, the hypothalamus produces endorphins in peptide form, and the pituitary gland releases them into the bloodstream, which correlates with subjective feelings of pleasure.

Currently, exercise is not only a leisure activity but has become a lifestyle, especially in urban areas. An ideal body shape is desired by most people—men and women, young and old—whether for health reasons, appearance, or self-confidence. Besides proper diet and adequate rest, exercise is an important element in achieving these goals.

With the advancement of modern times, many companies and institutions have established various fitness centers that offer facilities for physical activity. For example, many people are willing to spend considerable money on gym memberships and personal trainers to ensure their training is effective and safe. This indicates increasing public awareness of health and fitness. However, besides gym-based exercise, there are alternative forms of physical activity that are relatively inexpensive or even free, one of which is calisthenics training.

Calisthenics is a form of exercise that has recently developed and become known in many cities in Indonesia, beginning around 2013. Although its growth has not been extremely massive, most major cities in Indonesia have at least one calisthenics community. Calisthenics is also known as street workout because it can be performed anywhere and is commonly practiced in groups in open spaces such as public parks.

Calisthenics is a type of exercise that trains muscles by maximizing the use of body weight. There is a fundamental difference between calisthenics and gym training in terms of outcomes: calisthenics focuses on muscle endurance and strength, whereas gym training often emphasizes muscle hypertrophy. A distinctive characteristic of calisthenics is the use of compound movements—exercises that involve multiple muscle groups simultaneously. One example is the push-up, which engages the deltoids, triceps, chest muscles, and serratus anterior. When performed correctly, push-ups can also strengthen the abdominal muscles.

Bodyweight-based calisthenics training includes various movements with high levels of difficulty

and uniqueness. According to Sulianta et al. (2015), calisthenics training schemes are mostly performed using bars (80%) rather than ground exercises (20%). As a result, practitioners tend to train upper-body muscles (hands, arms, shoulders, chest, back, and abdomen) more than lower-body muscles. Beginners often find it difficult to perform basic movements such as pull-ups, chin-ups, and push-ups. Even trained individuals require considerable time to master advanced movements such as the front lever, back lever, handstand, planche, human flag, and dragon flag.

In calisthenics, most movements—both basic and advanced—primarily involve the hands, arms, back, and abdominal muscles. Many movements require substantial strength to lift one's body weight and maintain positions for a certain duration. Maintaining these positions requires muscle stabilization so that the movement appears controlled and precise. In addition to relying on body weight, calisthenics training also demands high muscular endurance to perform repeated movements.

In Yogyakarta, several calisthenics communities exist, including Sambilegi Fit and Aldebaran YSW. The Sambilegi Fit community, established on April 1, 2019, has 11 active members. Although relatively new, Sambilegi Fit has adequate and varied training facilities such as monkey bars, dip bars, and pull-up bars. However, after the COVID-19 pandemic, the community has rarely gathered for training, with a frequency of only one to two sessions per week. Moreover, although training is conducted together, most practitioners follow different training programs, making collective evaluation difficult.

Meanwhile, Aldebaran YSW is the oldest calisthenics community in Yogyakarta, established in 2014 and still actively training. The community trains at the UNY Community Sports Park and is mostly composed of university students from various regions. Currently, Aldebaran YSW has nine active members, as many former members have become inactive after graduating and moving away. Several former members have pursued careers as personal trainers specializing in bodyweight training. The Aldebaran YSW community trains regularly three to four times per week using a group training program, with differences only in repetition numbers according to individual ability.

Based on observations of these two communities, the researcher found differences in training frequency and experience in calisthenics between Aldebaran YSW and Sambilegi Fit. Interviews and surveys indicate that Aldebaran trains three to four times per week—consistent with Kanca (2004), who stated that physical performance improvement generally requires training three to five times per week—whereas Sambilegi Fit trains only one to two times per week. Based on these differences, the researcher is interested in examining the comparison of strength and flexibility levels between the Aldebaran YSW and Sambilegi Fit calisthenics communities, particularly in frequently trained muscle groups: the hands, arms, back, abdominal muscles, and flexibility.

Method

Research Design

This study employed a survey research design with a quantitative descriptive approach. A method is a way to obtain truth through observation. Sedarmayanti and Syarifuddin Hidayat (2011:25) define a method as a procedure or systematic way of knowing something through structured steps. Furthermore, they state that the scientific method consists of systematic steps to acquire knowledge. Research methods are closely related to the procedures, techniques, instruments, and research design used. Therefore, the research design must be appropriate to the selected research approach.

Time and Place of the Study

This study was conducted on December 6–13 at the UNY Community Sports Park (TOM UNY) and Sambilegi Calisthenics Park, Nanggulan, Maguwoharjo, Sleman.

Population

According to Suharsimi Arikunto (2006:130), population is the entire subject of the research. When a researcher studies all elements within the research area, it is considered a population study. Based on this definition, the population of this study consisted of active members of the Aldebaran YSW calisthenics community (9 members) and the Sambilegi Fit community (11 members).

Data Collection Instruments

Sugiyono (2017:102) states that a research instrument is a tool used to measure observed natural or social phenomena. Arikunto (2006:160) explains that research instruments are tools or facilities used by researchers to collect data so that the process becomes easier and the results are more accurate, complete, and systematic.

This study employed standardized instruments using test and measurement techniques to assess physical performance. Hand muscle strength was measured using a handgrip dynamometer (kg) with a validity of 0.880 and reliability of 0.938 (Sheilani, 2013). Arm muscle strength and endurance were assessed using the 30-second push-up test (repetitions), which has a validity of 0.94 and reliability of 0.93 (Meshalindri, 2014). Back muscle strength was measured using a back and leg dynamometer (kg) with a validity of 0.82 and reliability of 0.93 (Hardianto, 2013). Abdominal muscle strength and endurance were evaluated using the 30-second sit-up test (repetitions) with face validity and a reliability of 0.94 (Darma et al., 2013). Flexibility was measured using the sit-and-reach test (cm), which also has face validity and a reliability of 0.92 (Darma et al., 2013).

Data collection is a crucial component of research because it is directly related to the accuracy of the findings. This study used a survey method combined with physical testing to measure hand, arm, back, and abdominal muscle strength as well as flexibility. The instruments included one handgrip dynamometer, one back and leg dynamometer with strap, one sit-and-reach box, one stopwatch, and one exercise mat. Prior to hypothesis testing, prerequisite analyses were conducted to improve analytical accuracy. Data normality was tested using the Shapiro–Wilk test with SPSS version 22, while homogeneity of variance was examined using Levene's test (F test). The data were considered homogeneous when the significance value exceeded 0.05 ($p > 0.05$) (Budiyono, 2004).

Result and Discussion

This study aimed to determine the comparison of hand muscle strength, arm muscle strength, back muscle strength, abdominal muscle strength, and flexibility between the Aldebaran YSW calisthenics community and the Sambilegi Fit calisthenics community in Yogyakarta.

The sample in this study consisted of two communities: the Aldebaran YSW calisthenics community (9 members) and the Sambilegi Fit calisthenics community (11 members). The study was conducted on December 6–13, 2020, at Sambilegi Calisthenics Park and the UNY Community Sports Park.

The data in this study were obtained through several tests to measure muscle strength and flexibility, namely: hand muscle strength using a handgrip dynamometer, arm muscle strength using the push-up test, back muscle strength using a back and leg dynamometer, abdominal muscle strength using the sit-up test, and flexibility using the sit-and-reach test. The descriptive statistics of the research data are presented as follows:

1. Aldebaran YSW Calisthenics Community

The results of the muscle strength and flexibility measurements for the Aldebaran YSW calisthenics community were analyzed using descriptive statistics. The complete results are presented in the following table:

Statistik	*Handgrip*		*Push Up*	*Back Dynamometer*	*Sit Up*	Flexibilitas
	Kanan	Kiri				
N	9	9	9	9	9	9
Mean	47.8444	44.7667	41.6667	109.8333	24.5556	34.2444
SD	2.94581	2.61103	3.24037	11.33027	2.555495	5.68971
Min	44.50	40.60	38.00	97.50	20.00	26.00
Max	54.50	48.50	47.00	131.00	28.00	43.20

1. Sambilegi Fit Calisthenics Community

The results of the muscle strength and flexibility measurements for the Sambilegi Fit calisthenics community were analyzed using descriptive statistics. The complete results are presented in the following table:

Descriptive Statistics of Muscle Strength and Flexibility of the Sambilegi Fit Calisthenics Community

Statistik	*Handgrip*		*Push Up*	*Back Dynamometer*	*Sit Up*	Flekibilitas
	Kanan	Kiri				
N	11	11	11	11	11	11
Mean	44.6364	41.3818	37.0000	94.6818	24.6364	36.5182
SD	3.07352	3.79653	5.21536	15.00545	2.06265	4.65657
Min	39.00	35.80	30.00	65.00	22.00	29.10
Max	49.90	47.20	47.00	118.50	29.00	43.60

Normality Test

Table. Normality Test Results

Kelompok	p	Sig.	Keterangan
Komunitas *Calisthenic*s Aldebaran YSW			
Handgrip Kanan	0,148	0.05	Normal
Handgrip Kiri	0,543	0.05	Normal
Push Up	0,178	0.05	Normal
Back Dynamometer	0,162	0.05	Normal
Sit Up	0,890	0.05	Normal
Fleksibilitas	0,862	0.05	Normal
Komunitas *Calisthenic*s Sambilegi Fit			
Handgrip Kanan	0,924	0.05	Normal
Handgrip Kiri	0,429	0.05	Normal
Push Up	0,241	0.05	Normal
Back Dynamometer	0,555	0.05	Normal
Sit Up	0,383	0.05	Normal
Fleksibilitas	0,269	0.05	Normal

Based on the table above, the muscle strength and flexibility data show p-values (Sig.) greater than 0.05; therefore, the variables are normally distributed. Since all data are normally distributed, the analysis can be continued. The complete results are presented in the normality test appendix on page 100.

Homogeneity Test

Table. Homogeneity Test Results

Kelompok	Sig.	Keterangan
Handgrip Kanan	0.731	Normal
Handgrip Kiri	0.075	Normal
Push Up	0.102	Normal
Back Dynamometer	0.444	Normal
Sit Up	0.442	Normal
Fleksibilitas	0.295	Normal

Based on the table above, the significance value (p) is greater than 0.05; therefore, the data are homogeneous. Since the data are homogeneous, the analysis can be continued using parametric statistics.

Hypothesis Testing Results

a. Right-Hand Handgrip

The t-test was used to test the hypothesis stating that "there is a difference in hand muscle strength among calisthenics communities in Yogyakarta," based on the collected data. If the analysis shows a significant difference, it indicates a comparison of right-hand muscle strength. The result is considered significant if the calculated t-value (t-count) is greater than the t-table value and the significance value is less than 0.05 (Sig. < 0.05). Based on the analysis, the results are as follows:

Table. T-test Results of Right-Hand Handgrip

Kelompok	Rata-rata	*t-test for Equality of means*				
		t ht	t tb	Sig.	Selisih	%
Aldebaran	47.8444	2.365	2.11	0.029	3.20808	7.19 %
Sambilegi	44.6364					

From the t-test results, it can be seen that the calculated t-value is 2.365 and the t-table value is 2.11 (df = 17) with a significance value of p = 0.029. Since t-count (2.365) > t-table (2.11) and the significance value (0.029) < 0.05, the result indicates a significant difference. Therefore, the alternative hypothesis (Ha), which states that there is a difference in hand muscle strength among calisthenics communities in Yogyakarta, is accepted. This means that the right-hand muscle strength of the Aldebaran calisthenics community is higher than that of Sambilegi. The mean difference is 7.19%.

a. Left-Hand Handgrip

The t-test was used to test the hypothesis stating that there is a difference in hand muscle strength among calisthenics communities in Yogyakarta, based on the collected data. If the analysis shows a significant difference, it indicates a comparison of left-hand muscle strength. The result is considered significant if the calculated t-value is greater than the t-table value and the significance value is less than 0.05 (Sig. < 0.05). Based on the analysis, the results are as follows:

Table. T-test Results of Left-Hand Handgrip

Kelompok	ata-rata	t-test for Equality of means				
		ht	tb	ig.	elisih	
Aldebaran	4.7667	.267	.111	.036	.38485	.18%
Sambilegi	1.3818					

From the t-test results, it can be seen that the calculated t-value is 2.365 and the t-table value is 2.11 (df = 17) with a significance value of p = 0.029. Since t-count (2.365) > t-table (2.11) and the significance value (0.029) < 0.05, this result indicates a significant difference. Thus, the alternative hypothesis (Ha), which states that "there is a difference in hand muscle strength among calisthenics communities in Yogyakarta," is accepted. This means that the right-hand muscle strength of the Aldebaran calisthenics community is higher than that of Sambilegi. The mean difference is 7.19%.

b. Left-Hand Handgrip

The t-test was used to test the hypothesis stating that "there is a difference in hand muscle strength among calisthenics communities in Yogyakarta," based on the collected data. If the analysis shows a significant difference, it indicates a comparison of left-hand muscle strength. The result is considered significant if the calculated t-value is greater than the t-table value and the significance value is less than 0.05 (Sig. < 0.05). Based on the analysis, the results are as follows:

Table. T-test Results of Left-Hand Handgrip

From the t-test results, it can be seen that the calculated t-value is 2.267 and the t-table value is 2.11 (df = 17) with a significance value of p = 0.036. Since t-count (2.267) > t-table (2.11) and the significance value (0.036) < 0.05, this result indicates a significant difference. Thus, the alternative hypothesis (Ha) is accepted. This means that the left-hand muscle strength of the Aldebaran calisthenics community is higher than that of Sambilegi. The mean difference is 8.18%.

c. Push-Up

The t-test was used to test the hypothesis stating that "there is a difference in arm muscle strength among calisthenics communities in Yogyakarta," based on the collected data. If the analysis shows a significant difference, it indicates a comparison of arm muscle strength. The result is considered significant if the calculated t-value is greater than the t-table value and the significance value is less than 0.05 (Sig. < 0.05). Based on the analysis, the results are as follows:

1. Sambilegi Fit Calisthenics Community

The results of the muscle strength and flexibility measurements of the Sambilegi Fit calisthenics community were analyzed using descriptive statistics. The complete results are presented in the following table:

Descriptive Statistics of Muscle Strength and Flexibility of the Sambilegi Fit Calisthenics Community

Statistik	*Handgrip*		*Push Up*	*Back Dynamometer*	*Sit Up*	Flekibilitas
	Kanan	Kiri				
N	11	11	11	11	11	11
Mean	44.6364	41.3818	37.0000	94.6818	24.6364	36.5182
SD	3.07352	3.79653	5.21536	15.00545	2.06265	4.65657
Min	39.00	35.80	30.00	65.00	22.00	29.10
Max	49.90	47.20	47.00	118.50	29.00	43.60

Normality Test

Table. Normality Test Data

Kelompok	p	Sig.	Keterangan
Komunitas *Calisthenic*s Aldebaran YSW			
Handgrip Kanan	0,148	0.05	Normal
Handgrip Kiri	0,543	0.05	Normal
Push Up	0,178	0.05	Normal
Back Dynamometer	0,162	0.05	Normal
Sit Up	0,890	0.05	Normal
Fleksibilitas	0,862	0.05	Normal
Komunitas *Calisthenic*s Sambilegi Fit			
Handgrip Kanan	0,924	0.05	Normal
Handgrip Kiri	0,429	0.05	Normal
Push Up	0,241	0.05	Normal
Back Dynamometer	0,555	0.05	Normal
Sit Up	0,383	0.05	Normal
Fleksibilitas	0,269	0.05	Normal

Based on the table above, the muscle strength and flexibility data have significance values (p) greater than 0.05; therefore, the variables are normally distributed. Since all data are normally distributed, the analysis can be continued. The complete results are presented in the normality test appendix on page 100.

Homogeneity Test

Table. Homogeneity Test Results

Kelompok	Sig.	Keterangan
Handgrip Kanan	0.731	Normal
Handgrip Kiri	0.075	Normal
Push Up	0.102	Normal
Back Dynamometer	0.444	Normal
Sit Up	0.442	Normal
Fleksibilitas	0.295	Normal

Based on the table above, the significance value (p) is greater than 0.05; therefore, the data are homogeneous. Since the data are homogeneous, the analysis can be continued using parametric statistics.

Hypothesis Testing Results

a. Right-Hand Handgrip

The t-test was used to test the hypothesis stating that there is a difference in hand muscle strength among calisthenics communities in Yogyakarta, based on the collected data. If the analysis shows a significant difference, it indicates a comparison of right-hand muscle strength. The result is considered significant if the calculated t-value is greater than the t-table value and the significance value is less than 0.05 (Sig. < 0.05). Based on the analysis, the results are as follows:

Table. T-test Results of Right-Hand Handgrip

Kelompok	Rata-rata	*t-test for Equality of means*				
		t ht	t tb	Sig.	Selisih	%
Aldebaran	44.7667	2.267	2.11	0.036	3.38485	8.18 %
Sambilegi	41.3818					

From the t-test results, it can be seen that the calculated t-value is 2.267 and the t-table value is 2.11 (df = 17) with a significance value of p = 0.036. Since the calculated t-value (2.267) is greater than the t-table value (2.11) and the significance value (0.036) is less than 0.05, the result indicates a significant difference. Therefore, the alternative hypothesis (Ha), which states that there is a difference in hand muscle strength among calisthenics communities in Yogyakarta, is accepted. This means that the right-hand muscle strength of the Aldebaran calisthenics community is higher than that of Sambilegi. The mean difference is 8.18%.

Kelompok	Rata-rata	t ht	t tb	Sig.	Selisih	%
Aldebaran	47.8444	2.365	2.11	0.029	3.20808	7.19 %
Sambilegi	44.6364					

From the t-test results, it can be seen that the calculated t-value is 2.365 and the t-table value is 2.11 (df = 17) with a significance value of p = 0.029. Since the calculated t-value (2.365) is greater than the t-table value (2.11) and the significance value (0.029) is less than 0.05, the result indicates a significant difference. Therefore, the alternative hypothesis (Ha), which states that there is a difference in hand muscle strength among calisthenics communities in Yogyakarta, is accepted. This means that the right-hand muscle strength of the Aldebaran calisthenics community is higher than that of Sambilegi. The mean difference is 7.19%.

a. Left-Hand Handgrip

The t-test was used to test the hypothesis stating that there is a difference in hand muscle strength among calisthenics communities in Yogyakarta based on the collected data. If the analysis shows a significant difference, it indicates a comparison of left-hand muscle strength. The result is considered significant if the calculated t-value is greater than the t-table value and the significance value is less than 0.05 (Sig. < 0.05). Based on the analysis, the results are as follows:

Table. T-test Results of Left-Hand Handgrip

is 2.11 (df = 17) with a significance value of p = 0.036. Since the calculated t-value (2.267) is greater than the t-table value (2.11) and the significance value (0.036) is less than 0.05, the result indicates a significant difference. Therefore, the alternative hypothesis (Ha), which states that there is a difference in hand muscle strength among calisthenics communities in Yogyakarta, is accepted. This means that the left-hand muscle strength of the Aldebaran calisthenics community is higher than that of Sambilegi. The mean difference is 8.18%.

b. Push-Up

The t-test was used to test the hypothesis stating that there is a difference in arm muscle strength among calisthenics communities in Yogyakarta based on the collected data. If the analysis shows a significant difference, it indicates a comparison of arm muscle strength. The result is considered significant if the calculated t-value is greater than the t-table value and the significance value is less than 0.05 (Sig. < 0.05). Based on the analysis, the results are as follows:

Table. T-test Results of Push-Up Test

Kelompok	Rata-rata	t-test for Equality of means				
		t ht	t tb	Sig.	Selisih	%
Aldebaran	41.6667	2.335	2.11	0.031	4.66667	12.61 %
Sambilegi	37.0000					

The t-test results showed that the calculated t-value was 2.335 and the t-table value was 2.11 (df = 17), with a significance value of p = 0.031. Since the calculated t-value (2.335) exceeded the t-table value (2.11) and the significance value (0.031) was less than 0.05, the result indicates a significant difference. Therefore, the alternative hypothesis (Ha), which states that there is a difference in arm muscle strength among calisthenics communities in Yogyakarta, is accepted. This finding indicates that the arm muscle strength of the Aldebaran calisthenics community is higher than that of Sambilegi, with a mean difference of 12.61%.

Back Dynamometer

The t-test was used to examine the hypothesis that there is a difference in back muscle strength among calisthenics communities in Yogyakarta based on the collected data. A result is considered significant if the calculated t-value is greater than the t-table value and the significance value is less than 0.05 (Sig. < 0.05). The analysis results are presented in the following table:

Table. T-test Results of Back Dynamometer

Kelompok	Rata-rata	*t-test for Equality of means*				
		t ht	t tb	Sig.	Selisih	%
Aldebaran	109.833	2.498	2.11	0.022	15.1515	16 %
Sambilegi	94.6818					

From the t-test results, it can be seen that the calculated t-value was 2.498 and the t-table value was 2.11 (df = 17), with a significance value of p = 0.022. Since the calculated t-value (2.498) exceeded the t-table value (2.11) and the significance value (0.022) was less than 0.05, the result indicates a significant difference. Therefore, the alternative hypothesis (Ha), which states that there is a difference in back muscle strength among calisthenics communities in Yogyakarta, is accepted. This finding indicates that the back muscle strength of the Aldebaran calisthenics community is higher than that of Sambilegi, with a mean difference of 16%.

a. Sit-Up

The t-test was used to test the hypothesis stating that there is a difference in abdominal muscle strength among calisthenics communities in Yogyakarta based on the collected data. If the analysis shows a significant difference, it indicates a comparison of abdominal muscle strength. The result is considered significant if the calculated t-value is greater than the t-table value and the significance value is less than 0.05 (Sig. < 0.05). Based on the analysis, the results are as follows:

Table. T-test Results of Sit-Up Test

Kelompok	Rata-rata	*t-test for Equality of means*				
		t ht	t tb	Sig.	Selisih	%

Aldebaran	24.556	0.078	2.11	0.442	0.8081	1.98 %
Sambelegi	24.636					

From the t-test results, it can be seen that the calculated t-value was 0.078 and the t-table value was 2.11 (df = 17), with a significance value of p = 0.442. Since the calculated t-value (0.078) was less than the t-table value (2.11) and the significance value (0.442) was greater than 0.05, the result indicates no significant difference. Therefore, the alternative hypothesis (Ha), which states that there is a difference in abdominal muscle strength among calisthenics communities in Yogyakarta, is rejected. This finding indicates that there is no significant difference in abdominal muscle strength between the Aldebaran and Sambilegi communities. The mean difference was 1.98%.

d. Sit and Reach

The t-test was used to examine the hypothesis that there is a difference in flexibility among calisthenics communities in Yogyakarta based on the collected data. A result is considered significant if the calculated t-value is greater than the t-table value and the significance value is less than 0.05 (Sig. < 0.05). The analysis results are presented in the following table.

From the t-test results, the calculated t-value was 0.984 and the t-table value was 2.11 (df = 17), with a significance value of p = 0.295. Since the calculated t-value (0.984) was less than the t-table value (2.11) and the significance value (0.295) was greater than 0.05, the result indicates no significant difference. Therefore, the alternative hypothesis (Ha), which states that there is a difference in flexibility among calisthenics communities in Yogyakarta, is rejected. This indicates that flexibility between the Aldebaran and Sambilegi communities is relatively similar. The mean difference was 6.64%.

Discussion

In general, many factors influence muscle strength and flexibility in calisthenics, such as age, training frequency, and sex. In this study, the subjects were males aged 22–30 years. Based on the muscle strength and flexibility tests, practitioners from the Aldebaran community performed better than those from the Sambilegi Fit community in hand muscle strength, arm muscle strength, and back muscle strength. However, no significant differences were found in abdominal muscle strength and flexibility, indicating that these components were relatively similar between the two communities.

In terms of experience in calisthenics, most Aldebaran practitioners had been involved longer than those in the Sambilegi Fit community. This likely provided Aldebaran members with greater experience and knowledge regarding calisthenics training principles.

From the training program perspective, Aldebaran trains three to four times per week, which is consistent with Kanca (2004), who stated that improving physical performance generally requires training three to five times per week. In contrast, Sambilegi Fit trains only one to two times per week. Calisthenics movements are generally dominated by pull-ups, dips, and push-ups. When performed consistently while applying proper training principles, increases in repetitions, sets, and intensity enable practitioners to perform more challenging movements with higher difficulty levels, thereby maintaining progressive training.

Bodyweight-based calisthenics training includes various movements with high levels of difficulty and uniqueness. According to Sulianta et al. (2015), approximately 80% of calisthenics training uses bars and 20% uses ground-based exercises. Consequently, practitioners tend to train upper-body muscles (hands, arms, shoulders, chest, back, and abdomen) more frequently than lower-body muscles (thighs, calves, and legs).

Conclusion

Based on the results and discussion, it can be concluded that:

There were significant differences in hand muscle strength, with mean differences of 7.19% for the right hand and 8.18% for the left hand;

arm muscle strength, with a mean difference of 12.61%; and back muscle strength, with a mean difference of 16%, between the Aldebaran YSW and Sambilegi Fit calisthenics communities. This was indicated by calculated t-values greater than the t-table values and significance values less than 0.05. These findings demonstrate that the Aldebaran YSW community performed better than the Sambilegi Fit community in hand, arm, and back muscle strength.

There were no significant differences in abdominal muscle strength and flexibility between the Aldebaran YSW and Sambilegi Fit communities, with mean differences of 1.98% and 6.64%, respectively. This was indicated by calculated t-values less than the t-table values and significance values greater than 0.05.

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