The Effect Of Weight Training Using The Reverse Pyramid Set And Drop Set Method On Increasing Leg Muscle Endurance

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ABSTRACT

This study aims to determine the effectiveness of reverse pyramid set and drop set training methods on increasing leg muscle endurance, and comparing the two to determine which method is more effective. The study used a Two-Group Pretest-Posttest experimental design, with a sample of 17 volleyball extracurricular students at SMAN 1 Rancah. The research program was conducted for 12 meetings with half squat training material according to the method of each group. The instrument used to measure leg muscle endurance is the Wall Sit Test. The results of the analysis using SPSS version 25, Paired Sample t-test showed that the reverse pyramid set method (Sig. = 0.000) and drop set (Sig. = 0.036) both provided significant improvement. However, the Independent Sample t-test results (Sig. = 0.843) showed no significant difference between the two methods. Thus, both training methods are effective and provide comparable results. This finding can be used as a reference in the preparation of physical exercise programs. Future research is recommended to involve a larger sample and additional variables for more in-depth results.

Keywords: *Reverse Pyramid Set Method, Drop Set Method, Muscle Endurance*

ABSTRAK

Penelitian ini bertujuan untuk mengetahui efektivitas latihan metode piramid set terbalik dan drop set terhadap peningkatan daya tahan otot tungkai, serta membandingkan keduanya guna menentukan metode yang lebih efektif. Penelitian menggunakan desain eksperimen *Two-Group Pretest-Posttest*, dengan sampel 17 siswa ekstrakurikuler bola voli di SMAN 1 Rancah. Program penelitian dilakukan selama 12 kali pertemuan dengan materi latihan half squat sesuai metode masing-masing kelompok. Instrumen yang digunakan untuk mengukur daya tahan otot tungkai adalah adalah *Wall Sit Test*. Hasil analisis menggunakan SPSS versi 25, *Paired Sample t-test* menunjukkan bahwa metode piramid set terbalik (Sig. = 0.000) dan drop set (Sig. = 0.036) sama-sama memberikan peningkatan yang signifikan. Namun, hasil uji *Independent Sample t-test* (Sig. = 0.843) menunjukkan tidak terdapat perbedaan yang signifikan antara kedua metode tersebut. Dengan demikian, kedua metode latihan dinyatakan efektif dan memberikan hasil yang sebanding. Temuan ini dapat menjadi acuan dalam penyusunan program latihan fisik. Penelitian selanjutnya disarankan melibatkan sampel lebih besar dan variabel tambahan untuk hasil yang lebih mendalam.

Kata Kunci: Metode Piramid Set Terbalik, Metode Drop Set, Daya Tahan, Otot Tungkai

INTRODUCTION

Achievement sport is an integral part of the athlete development system that aims to achieve the best performance through a systematic and sustainable training process. In accordance with the Law of the Republic of Indonesia Number 11 of 2022 concerning Sports, achievement sports are carried out in an integrated and scientific manner in order to produce outstanding athletes at the national and international levels. Success in sports achievement is not only determined by technical and tactical aspects, but also greatly influenced by the athlete's optimal physical condition.

Physical condition is the main foundation in the development of athletes' performance capabilities. Among the various components of physical condition, muscular endurance has an important role because it supports the body's ability to maintain performance during intensive and repetitive activities (Bafirman and Wahyusri, 2018). Muscular endurance is an important ability in every sport that reflects the capacity of muscles to perform repeated contractions continuously without quickly experiencing fatigue (Rustiawan, 2020). This ability is crucial, not only in daily activities, but also in sports such as volleyball that demand dynamic and explosive movements such as jumping, defending, and lower passing (Renanda and Henjilito, 2023).

Increasing muscle endurance can be done through various training methods, one of which is weight training. This exercise can use internal loads such as your own body weight or external loads such as barbells or dumbbells. The effectiveness of weight training in increasing strength, power, and muscle endurance is highly dependent on the intensity, number of repetitions, and volume of training (Bompa, 2009). To train muscle endurance optimally, generally a load is used that allows a person to do 15 to 25 repetitions per set, with a rest between sets of about 2 minutes (Bafirman and Wahyusri, 2018).

In practice, various weight training methods have been developed to suit the needs of athletes and provide variety in training programs. Two popular methods that are often used are reverse pyramid sets and drop sets. Both involve a gradual decrease in weight within each set, but have different execution patterns. Reverse pyramid sets start with the heaviest weight and decrease in subsequent sets, while drop sets are performed by directly lowering the weight without rest after reaching the point of fatigue (Stoppani, 2015). Both methods are effective in increasing muscle mass, but not many studies have compared their effects on muscle endurance, especially leg muscles (Shodiq et al, 2023).

Based on this background, this study aims to examine and compare the effectiveness of the reverse pyramid set and drop set methods in increasing leg muscle endurance. The results of this study are expected to contribute to coaches, athletes, and fitness practitioners in choosing the right and efficient weight training method.

METHODS

This study uses an experimental method with a Two-Group Pretest-Posttest Design design which aims to determine the effect of reverse pyramid set and dropset training methods on increasing leg muscle endurance. This design involved two experimental groups, each of which received different treatments. Before and after the intervention, both groups underwent measurements using the same instrument to assess the changes that occurred.

The research was conducted at SMAN 1 Rancah with research subjects who were students participating in volleyball extracurricular activities. A total of 17 students were used as samples with total sampling technique. To divide the two groups evenly, the pretest scores were sorted from highest to lowest, then divided in an A-B-B-A pattern so that the distribution of initial abilities in the two groups was relatively equal. The first

group consisted of nine students who participated in training with the reverse pyramid set method, while the second group consisted of eight students with the dropset method.

The measurement instrument used in this study was the Wall Sit Test, which serves to measure leg muscle endurance (Mackenzie 2008). The study lasted for four weeks with a total of twelve meetings. The training material in this study was half squats, with the first group running the reverse pyramid set method and the second group using the dropset method. The exercise program focused on movement specificity for leg muscle endurance, performed progressively with increasing load each week (40-70% of 1RM).

Data from pretest and posttest results were analyzed using the help of the SPSS version 25 application. Before hypothesis testing was carried out, prerequisite analysis was first tested, namely normality test and homogeneity test. The normality test was conducted with Shapiro-Wilk to evaluate whether the data was normally distributed. Data is considered normal if the significance value is more than 0.05. Furthermore, the homogeneity test was conducted using Levene's Test to ensure the similarity of variance between groups. Once the prerequisites were met, hypothesis testing was conducted using a t-test to measure the mean difference in results between the two groups, with a significance level of 5%.

FIDINGS AND DISCUSSIONS
1. Fidings

This descriptive analysis aims to provide an overview of the research data by presenting the average scores and standard deviations in each group during the pretest and posttest phases. The study involved two experimental groups, namely the Reverse Pyramid Set group and the Drop Set group, with measurements taken before and after the training intervention using the Wall Sit Test to assess leg muscle endurance. The complete descriptive data are presented in Table 1.

Tabel 1.1
Deskripsi Data

Kelompok	Pretest		Posttest		Gian	
	Mean	Sd	Mean	Sd	Mean	Sd
Reverse Pyramid Set	65,11	20,59	77,33	14,56	12,22	6,35
Drop Set	68,25	18,42	76,00	12,45	7,75	8,49

In the Reverse Pyramid Set group, the average pretest score was 65.11 with a standard deviation of 20.59. After the training intervention, the posttest average increased to 77.33 with a standard deviation of 14.50. This resulted in a mean gain of 12.22 and a standard deviation of 6.35. Meanwhile, the Drop Set group had a slightly higher pretest average of 68.25 with a standard deviation of 18.42, and improved to a posttest average of 76.00 with a standard deviation of 12.40. The gain score in this group was 7.75 with a standard deviation of 8.49. These findings show that both training methods led to improvements in leg muscle endurance, with the Reverse Pyramid Set group demonstrating a higher average increase than the Drop Set group.

Tabel 1.2 Pariated Sample T Test

Kelompok	Mean	Std Devation	Std Eror	t	Sig. (2-tailed)
Reverse Pyramid Set	-12.222	6.630	2.120	-5.766	0.000
Drop Set	-7.750	8.498	3.004	-2.579	0.036

Based on the results of the paired sample t-test analysis, the significance value (Sig. 2-tailed) in the Reverse Pyramid Set group was 0.000 and the Drop Set group was 0.036. Both significance values are smaller than the significance level used (α = 0.05), indicating a statistically significant difference between the pretest and posttest results within each group.

In the Reverse Pyramid Set group, the mean value of the increase in leg muscle endurance was -12.222 with a standard deviation of 6.630, and a t value of -5.766. This shows that the training program with the Reverse Pyramid Set method resulted in a significant increase in leg muscle endurance.

Meanwhile, in the Drop Set group, the average increase value was -7.750 with a standard deviation of 8.498, and a t value of -2.579. These results also showed a significant increase, although not as great as the increase that occurred in the Reverse Pyramid Set group. Thus, it can be concluded that both the Reverse Pyramid Set and Drop Set methods are equally effective in increasing leg muscle endurance, but the Reverse Pyramid Set method shows a greater and significant increase compared to the Drop Set method.

Tabel 1.3 independet Sample T Test

Kelompok	Mean	t	df	Sig. (2-tailed)
Reverse Pyramid Set	12.222	1.238	15	0.235
Drop Set	7.750			

Based on the results of the analysis, the average value (mean) of the increase in leg muscle endurance in the Reverse Pyramid Set group was 12.222, while in the Drop Set group it was 7.750. The test results show a t value of 1.238 with a degree of freedom (df) of 15, and a significance value (Sig. 2-tailed) of 0.235.

Since the significance value is greater than 0.05 (0.235 > 0.05), it can be concluded that there is no significant difference between the Reverse Pyramid Set and Drop Set groups in terms of improvements in leg muscle endurance. In other words, although numerically the Reverse Pyramid Set group showed a higher average increase, the difference was not the difference was not statistically significant.

2. Discussions

Based on the results of statistical tests, it is known that both the reverse pyramid set and dropset methods have a significant effect on increasing leg muscle endurance. This is indicated by the results of the paired sample t-test which shows a significance value <0.05 in both groups. However, the results of the independent sample t-test on posttest values showed no significant difference between the two groups (Sig. = 0.235 > 0.05). Thus, although there was a difference in average improvement between the two methods, the difference was not statistically strong enough to suggest that one method was superior to the other.

Descriptively the reverse pyramid set group showed an average improvement of 12.222, while the dropset group amounted to 7.750. This means that the reverse pyramid set method tends to provide a higher increase in leg muscle endurance, although this difference is not significant. This finding is supported by Cattan (2021) which shows that the reverse pyramid set method produces greater improvements in elbow extension strength, back isometric strength, and leg strength. This suggests that this method is more effective in stimulating strength adaptations, especially in the lower leg muscles and extensor muscle groups, which also play an important role in muscle endurance.

Meanwhile the dropset method also has the special characteristic of maintaining muscle tension for a longer time. This advantage contributes to increasing muscle endurance capacity, because the muscles are stimulated continuously with high repetitions and decreasing loads. This is in accordance with the statement of Setiawan et al. (2024) which states that training with

light intensity and high repetitions is effective in increasing muscle work volume and endurance development.

Thus although both methods show effectiveness in increasing leg muscle endurance, the reverse pyramid set method tends to provide greater improvement, while the dropset method provides muscle endurance stimulus through high training volume. Both can be chosen according to the needs and goals of the training program. The results of this study are in line with the findings of Shodiq et al. (2023) which showed that the drop set weight training method provided a more significant increase in muscle hypertrophy compared to the pyramid set method. This finding supports the effectiveness of the drop set method in muscle mass increase programs. Therefore, method selection can be tailored to individual preferences, training program goals, or the athlete's physical condition.

CONSLUSION

Both training methods, namely the reverse pyramid set and dropset, proved effective in improving leg muscle endurance, as shown through the paired sample t-test results with a significance value <0.05 in each group. Descriptively, the reverse pyramid set method produced a higher average increase (12.222), than the dropset method (7.750), indicating a tendency that the reverse pyramid set method provides a greater impact on leg muscle endurance. However, based on the independent sample t-test, there was no statistically significant difference between the posttest results of the two groups (Sig. = 0.235 > 0.05). Thus, both methods have comparable effectiveness in improving leg muscle endurance.

The reverse pyramid set method is superior in stimulating muscle strength adaptation through the use of heavy loads at the beginning of the exercise, while the dropset method is effective in maintaining muscle tension for a longer duration, which is very useful in the development of muscle endurance through a high volume of repetitions. These findings reinforce previous studies such as those conducted by Cattan (2021), Setiawan et al. (2024), and Shodiq et al. (2023), as well as providing additional contributions in the context of increasing leg muscle endurance through a structured weight training approach for 4 weeks with systematic training methods and principles.

RECOMMENDATIONS

Based on the results of this study, it is recommended to future researchers to develop the study by involving a larger number of samples so that the results of the study have higher generalizability. Further research is also recommended to extend the duration of the training program beyond four weeks, so as to evaluate the long-term effects of the reverse pyramid set and dropset methods on improving leg muscle endurance and other aspects of fitness.

In addition, future researchers can explore additional variables such as muscle strength, power, or muscle hypertrophy as indicators of training effectiveness. Incorporating biometric measurements or biomechanical analysis may also provide more in-depth information regarding the body's adaptation mechanisms to each training method. Another recommendation is to compare these training methods with other methods such as circuit training, super sets, or traditional methods to see the relative advantages of each approach. Thus, future research is expected to enrich the scientific literature in the field of weight training and provide practical contributions in planning more effective and specific fitness programs.

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