

## The Effect of Single-Leg Speed Hop Exercise on Leg Muscle of Aerobic Athletes

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**Abstract**

Power is indispensable for every sport that requires physical skills. Poor athlete's leg power will hinder optimal performance. This study aimed to determine the effect of single leg speed on the leg muscle power of aerobic athletes. Experimental research was used as the research method. The tool used to analyze the data was the SPSS version 23. The sample consisted of eight participants. The research results after the pretest and posttest showed a significant effect of single leg speed hop exercise on the leg muscle power of Riau aerobics athletes, with  $t_{\text{observed}}$  of 14,333 and  $t_{\text{critical}}$  of 1,895 (significant level of 0,05). The conclusion from this study is that the single leg speed hop exercise positively impacts aerobic gymnast leg muscle strength.

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### INTRODUCTION

The strength of an athlete's performance in achieving more optimal performance power greatly affects the quality of athletes in training and matches (Cuoco & Tyler, 2012; Kockum & Heijne, 2015; Zakharov & Zakharova, 2010). Improvements to improve aerobic exercise include technical guidance, physical development, and mental coaching (Erianti & Pitnawati, 2018; Pallett, 2014). Increasing power requires time and a good and correct training process, so athletes can feel the impact of leg muscle power training in a gradual and structured manner. With a good, regular, systematic, and planned exercise routine, the process of shaping the physical condition into the desired state can be achieved, resulting in the best preparation for competition or performance (Blazevich et al., 2021; Cuoco & Tyler, 2012; Harsono, 2017) (Sumarsono & Ramadona, 2019).

A training program needs to be prepared by taking into account basic training principles, for example, the principles of overload, specialization, individualization, variation, progressive load increase, multilateral building, and others (Amansyah, 2019; Apriyanto, 2020; Budiwanto, 2012). The physical components needed by gymnastics include speed, strength, flexibility, agility, power, balance, and coordination (Muntaner-Mas et al., 2018; Pallett, 2014; Suharjana, 2015). The explanation explains that aerobic exercise that produces a good style requires power. Power, often called explosive power, includes strength and speed (Dora & Syahara, 2019; Perdana & Agus, 2019; Ridwan & Sumanto, 2018; Yessis, 2009). Strength means the muscles' ability to handle the body's weight or objects that are moved by the body. Speed means how much the muscle contracts to get through the load. Combining those aspects provides explosive movement speed (Bafirman & Wahyuri, 2018).

When athletes do choreography with difficult jumps and do not yet have good power, they cannot do it optimally to produce high scores. Several studies on single-leg speed hop exercises for explosive power or leg muscle power have been carried out by several researchers (Bakar, 2019;

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Oktaviani et al., 2019; Ramdhan & Purnamasari, 2020; Utamayasa, 2020; Yatindra et al., 2017). The study showed that the exercise had an effect and increased leg muscle power in soccer, futsal, volleyball, basketball, long jump, triple jump, and martial arts. However, studies examining the effect of single-leg speed hop exercise on leg muscle power in aerobic gymnasts have not been studied. The results of the researchers' observations were also carried out in the field, which showed that the biggest obstacles in this sport were strength and speed (power).

## METHOD

The research method used was a quasi-experimental design. This research procedure is a type of experimental research. The research was carried out for eleven months, from May 2021 to April 2022. The sample of the study was eight Riau Aerobic Gymnastics athletes. The location of the research was the Rumbai gymnastics hall, Pekanbaru. The instrument collected data was a standing wide jump test (long jump) for leg muscle explosive power. The statistical method in this study was carried out in stages: taking pretest data using a standing broad jump, administering a single leg speed hop exercise, and taking the posttest data (Widiastuti, 2019).

## RESULTS AND DISCUSSION

### Result

This study discusses the effect of single-leg speed hop exercise on the leg power of Riau gymnastics aerobic athletes. The data obtained from the study results were based on the quality of the data through tests before and after the single leg speed hop exercise treatment was carried out in 12 meetings. The result of the male pretest was 911, with an average value of 227,75, a standard deviation of 3.30, a variance of 10.92, the highest value of 232, and the lowest value of 224. The male posttest result was 930, with a mean value of 232.5, the standard deviation of 2.89, the variance of 8.33, the highest score of 236, and the lowest score of 229.

The result of the female pretest was 621, with the average score of 155.25, the standard deviation of 7.46, the variance of 55.58, the highest score of 166, and the lowest score of 149. The posttest results obtained a total score of 645, with the average value of 161.25, the standard deviation of 7.14, the variance of 50.92, the highest score of 171, and the lowest value of 229. Tables 1 and 2 contain the data on the frequency distribution of the male pretest and posttest.

**Table1.** Male Pretest Frequency Distribution

No	Interval		Frequency	Relative Frequency
1	154	-	159	2
2	160	-	165	1
3	166	-	171	1
<b>Total</b>			4	100%

**Table2.** Male Posttest Frequency Distribution

No	Interval		Frequency	Relative Frequency
1	229	-	231	1
2	232	-	234	2
3	235	-	237	1
<b>Total</b>			4	100%

Tables 3 and 4 contain the frequency distribution of the female pretest and posttest.

**Table3.** Female Pretest Frequency Distribution

No	Interval		Frequency	Relative Frequency
1	149	-	154	3
2	155	-	160	0
3	161	-	166	1
<b>Total</b>			4	100,00

**Table4.** Female Posttest Frequency Distribution

No	Interval	Frequency	Relative Frequency
1	154	-	159
2	160	-	165
3	166	-	171
<b>Total</b>		4	100,00

The Liliefors test was used to determine the normality with a significant level of 0.05. This test is used to see whether the research sample is normally distributed. The decision rule for this test is that if  $L_{\text{max}}$  is lower than  $L_{\text{table}}$ , the sample comes from a normally distributed population. The following is the normality data.

**Table5.** The Result of the Normality Test

Variable	$L_{\text{max}}$	$L_{\text{table}}$
<b>Pretest Results</b>	0,243	0,285
<b>Posttest Results</b>	0,250	

Table 5 shows the normality test result on pretest data which shows that  $L_{\text{max}}$  is smaller than  $L_{\text{table}}$ . The normality test result on posttest data also shows that the obtained value is lower than  $L_{\text{table}}$ . In conclusion, the pretest and posttest were normally distributed.

The hypothesis test was performed using a t-test. If  $t_{\text{observed}}$  is higher than  $t_{\text{table}}$ , then  $H_0$  is rejected, and  $H_1$  is accepted. On the other hand, if  $t_{\text{observed}}$  is lower than  $t_{\text{table}}$ ,  $H_0$  is accepted  $H_1$  is rejected. The tested hypothesis was:

**$H_1$ :** Riau aerobics athletes have a significant effect of single leg speed hop (X) exercise on leg muscle power (Y). The hypothesis test result is shown in Table 6.

**Table 6.** The Result of Hypotheses Test on Pretest and Posttest Data

Group	Mean	$t_{\text{observed}}$	$t_{\text{critical}}$	Significance
<b>Pretest</b>	191,50	14,333	1,895	0,05
<b>Posttest</b>	196,88			

Based on the table above, the  $t_{\text{observed}}$  value is 14.333, and the  $t_{\text{critical}}$  value is 1.895, with a significant level of 0.05. Therefore,  $t_{\text{observed}}$  is higher than  $t_{\text{critical}}$ . In conclusion,  $H_1$ , which reads there is a significant influence of single leg speed hop (X) training on the leg muscle power (Y) of Riau gymnastic aerobic athletes.

## Discussion

Based on the analysis, exercise is an important factor in achieving maximum performance. By providing the right training, there will be changes in the results of the exercise (Amsari, 2018). The description of the pretest and posttest data shows a change in the jumping distance due to the training provided to these athletes. Through these data, it was obtained that for males, there were three samples improved by 5cm. on the other hand, for females, there were two samples that improved by 7cm.

To experience good leg muscle power, one application that can increase leg muscle power is the single leg speed hop exercise. This exercise method is very useful because the movement mechanism of the exercise focuses more on increasing leg muscle strength. The application of this exercise is to focus on the strength of the leg muscles using a plyometric exercise model. The more routine we do single-leg speed hop exercises, the greater the leg power of Riau aerobics athletes.

Based on the results of processing the analyzed data, it is concluded that there was a significant effect of single leg speed hop (X) exercise on leg muscle power (Y) in Riau aerobic gymnastics athletes. This data is indicated by the value of pretest data (1532) with an average value of 191.50 and the value of posttest data (1575) with an average value of 196.88. Based on the t-test analysis, there was a significant effect of single leg speed hop exercise on the leg muscle power of Riau aerobics athletes. The hypothesis testing results illustrate that the athlete's strength was

affected by the single-leg speed hop exercise. This quasi-experimental research did not monitor the samples for 24 hours.

This research implies changes in the leg muscle power of Riau aerobics athletes based on the posttest results. In the posttest, five samples experienced a significant improvement. This study is almost similar to research carried out by several previous researchers (Drouzas et al., 2020; Mapato et al., 2018; Meylan et al., 2009). The researchers' limitation in conducting this research was that they could not completely control the activities of athletes outside of the given training. Therefore, some athletes did not increase significantly because some could not attend the exercise.

## CONCLUSION

This single-leg speed hop exercise affects the leg muscle power of aerobic gymnasts. This training technique provides power training effectiveness, so this exercise becomes an alternative choice for trainers to increase leg muscle power. The single-leg speed hop exercise program should be included in every training program and maximized for aerobic gymnasts to optimize individual performance.

## AUTHOR CONTRIBUTION STATEMENT

GT was responsible for participant recruitment, intervention management, design, data administration, and write-up. NPNW made contributions to the write-up, data analysis, and design. HH helped with the writing, data analysis, and design. MF final finalization of data processing.

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