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Influence of Squat Jump Training on Leg Power in State Middle School

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ABSTRACT

This research aimed to investigate the impact of squat jump training on lower limb muscle power in the extracurricular futsal activities of State Middle School 29 Palembang. The research method employed a quasi-experimental approach using a "pretest and posttest one group" design. The sample for this study comprised 30 participants, and the research instrument used was the vertical jump test. The data processing and analysis involved assessing data normality and hypothesis testing using the T-test formula. The pretest results showed an average score of 18.1, while the posttest average was 31.8. Upon conducting the T-test, the calculated t-value was 16.54, and the critical t-value was 1.70. This indicated that the calculated t-value (t) was significantly higher than the critical t-value (t-table) at a 95% confidence level (α = 0.05) with a sample size of 30. The implications of this study suggest that squat jump training has a significant impact on lower limb muscle power in the extracurricular futsal activities of State Middle School 29 Palembang. The findings provide valuable insights for educators and trainers involved in enhancing the athletic performance of students in futsal and similar sports. Further research can explore the specific training regimens and techniques that yield the most substantial improvements in lower limb muscle power, contributing to the overall development of young athletes in the context of extracurricular activities.

***Keywords**: Squat Jump, Leg Muscle Power, Futsal.*

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INTRODUCTION

Futsal has gained immense popularity in recent times among people of all ages. Its appeal extends beyond being just a competitive sport; it is also viewed as a means of promoting health and recreation. Futsal has become a practical and affordable sporting option for the community due to the increasing availability of futsal facilities. It provides an opportunity for individuals to engage in play and competition. The surge in futsal's popularity can be attributed to its unique characteristics, allowing players to demonstrate their skills freely while adhering to the game's rules.

Futsal is a team-based invasion game played with five players on each side within a designated time frame. The game closely resembles soccer, particularly in the fundamental techniques required. Fundamental soccer techniques include passing, ball control, dribbling, shooting, and heading (Et.al & Pamungkas, 2020). Futsal is similar to soccer but played on a smaller field. It is played by only ten players (five on each team) with a maximum of nine

substitutes. A smaller, heavier ball is used in futsal compared to soccer. Futsal goals are also smaller, as cited by De Padua, et al. (Irawan Dwi & Suwasono, 2018).

To excel in this sport, one must focus on developing essential techniques and power in the lower limb muscles. This includes practicing the squat jump and other plyometric exercises. Training is a systematic process that can improve an individual's physical, technical, and mental conditions. It involves gradual, long-term activities aimed at enhancing physiological and psychological performance to meet set objectives (Zulvikar, 2021). (Ananta & Supriatna, 2018) training is a systematic, repetitive process with an increasing workload that aims to improve an athlete's physical and mental abilities over time. It is a conscious effort to optimize performance and meet the demands of the sport. To enhance lower limb muscle strength, various exercises like squat jumps and plyometric drills are essential.

Based on observations within the Extracurricular Futsal Activities at Junior High School No 29 Palembang, it has been noted that fundamental techniques in futsal have not been fully mastered. Players struggle with both the basic techniques and their execution. Additionally, many players lack lower limb muscle power, affecting their ability to take long-distance shots on goal. Many shots miss their target, and the ball frequently escapes during dribbling. Passes often fail to reach their intended targets. Therefore, the participants in extracurricular activities need specific training, including squat jump exercises, to improve their lower limb muscle power, enabling them to perform at their best.

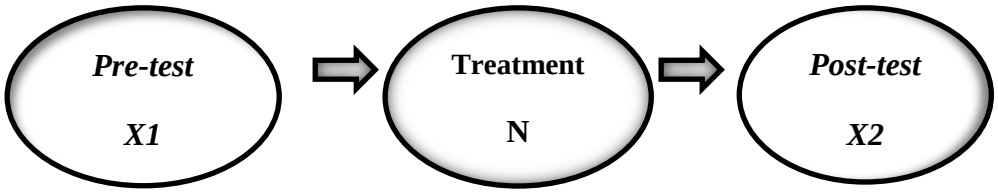
There are various methods for building lower limb muscle power, with plyometric exercises being one of the effective approaches. Some of these exercises include squat jumps, rope jumps, jump to box, split squat jumps, squat depth jumps, quarter squats, half squats, and squat thrusts. Squat jumps involve connecting both hands behind the head and then jumping while squatting and standing up. Explosive power is vital in futsal, as it is required for shooting, sprinting, ball handling, passing, jumping, and leaping (Ananta & Supriatna, 2018). According to (Bal & Dkk, 2022) plyometric training is a method to enhance explosive power and is a crucial component in sports for increasing strength and preventing boredom. It focuses on contracting the leg and arm muscles maximally, stretching and shortening them in a very brief period (Zakaria et al., 2018).

In light of these issues, it is crucial to address them to enhance the quality of extracurricular activities. With the background provided, the researchers aim to conduct a study on participants in extracurricular futsal activities at Public Middle School Palembang, titled

"The Impact of Squat Jump Training on Lower Limb Muscle Power in Extracurricular Futsal Activities at State Middle School 29 Palembang." This research aims to improve the skills and abilities of the participants through specialized training, such as squat jump exercises.

METHODS

This study is a quasi-experimental research using the 'pretest and posttest one-group' research design. The first step involves measurement (pretest), followed by an intervention over a certain period. Subsequently, another measurement is conducted (posttest) to determine whether there is any difference before and after the intervention. In this research, the author aims to investigate whether there is an impact of Squat Jump training on lower limb muscle power in participants of the extracurricular futsal activities at State Middle School 29 Palembang.



Picture 1. Research Design (Arikunto, 2013).

The research design employed in this study is a pre-experimental design, specifically a one-group pretest and posttest design. The study's population consists of all participants in the extracurricular futsal activities at State Middle School 29 Palembang, totaling 30 students. The instrument used to measure lower limb muscle strength is a test involving the vertical jump or vertical leap.

Tabel 1. Vertical Jump Assessment.

Skor	Man	Woman
Excellent	>70	>60
Very good	61-70	51-60
Above average	51-60	41-50
Average	41-50	31-40
Below average	31-40	21-30
Poor	21-30	11-20
Very poor	<21	<11

The analysis technique employed by the researcher in this study includes the T-test,

normality test of the data, and hypothesis testing.

RESULTS AND DISCUSSION

Results

Description of the research data involves the results of a vertical jump test in futsal conducted on students, obtained from both the initial pretest and the final posttest. This study utilized a quasi-experimental approach known as the One-Group Pretest-Posttest Design, which involves a single group undergoing both pretest and posttest assessments. The tests were conducted at the futsal field of State Middle School 29 Palembang.

Tabel 2. List of Pretest Results Distribution.

No	Interval Class	*Fi*	*Xi*	*FiXi*	Xi^2	$Fi \cdot Xi^2$
1	9-11	2	10	20	100	200
2	12-14	5	13	65	169	845
3	15-17	4	16	64	256	1024
4	18-20	10	19	190	361	3610
5	21-23	7	22	154	484	3388
6	24-26	2	25	50	625	1250
Total		**30**		**543**	**1995**	**10317**
Mean ($\bar{x}$)				**18.1**		

Tabel 3. The Frequency Distribution of Pretest Data for Vertical Jump.

Pretest			
No	**Interval Class**	**Frekuensi**	**Presentase**
1	9-11	2	6.67%
2	12-14	5	16.67%
3	15-17	4	13.33%
4	18-20	10	33.33%
5	21-23	7	23.33%
6	24-26	2	6.67%
Total		**30**	**100%**

Based on the table above, out of a sample of 30 individuals, it was found that in the 9-11 interval, there were 2 students (6.67%), while in the 12-14 interval, there were 5 students (16.67%). In the 15-17 interval, there were 4 students (13.33%), and in the 18-20 interval, there were 10 students (33.33%). In the 21-23 interval, there were 7 students (23.33%). Meanwhile, in the 24-26 interval, there were 2 students (6.67%).

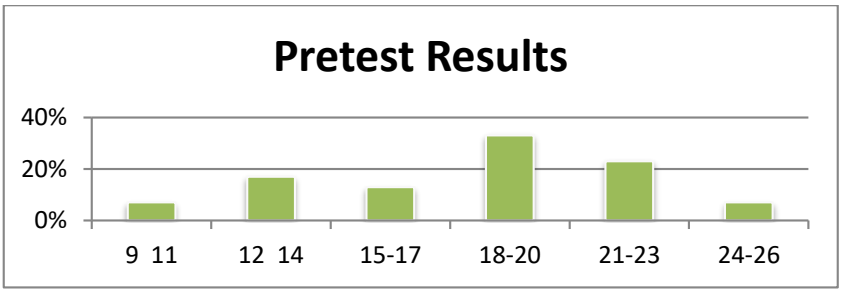


Figure 2. Histogram of Pretest Data Results.

Tabel 4. List of Distribution of Posttest Results.

No	Interval Class	*Fi*	*Xi*	*FiXi*	Xi^2	$Fi \cdot Xi^2$
1	17-21	3	19	57	361	1083
2	22-26	2	24	48	576	1152
3	27-31	10	29	290	841	8410
4	32-36	8	34	272	1156	9248
5	37-41	4	39	156	1521	6084
6	42-46	3	44	132	1936	5808
Total		**30**		**955**	**6391**	**31785**
Mean ($\bar{x}$)				**31.8**		

Tabel 5. The Frequency Distribution of Posttest Data for Vertical Jump.

Posttest			
No	**Interval Class**	**Frekuensi**	**Presentase**
1	17-21	3	10%
2	22-26	2	6.67%
3	27-31	10	33.33%
4	32-36	8	26.67%
5	37-41	4	13.33%
6	42-46	3	10%
Total		**30**	**100%**

Based on the table above, from a sample of 30 individuals, it was found that in the 17-21 interval, there were 3 students (10%), while in the 22-26 interval, there were 2 students (6.67%). In the 27-31 interval, there were 10 students (33.33%), and in the 32-36 interval, there were 8 students (26.67%). In the 37-41 interval, there were 4 students (13.33%). Meanwhile, in the 42-46 interval, there were 3 students (10%).

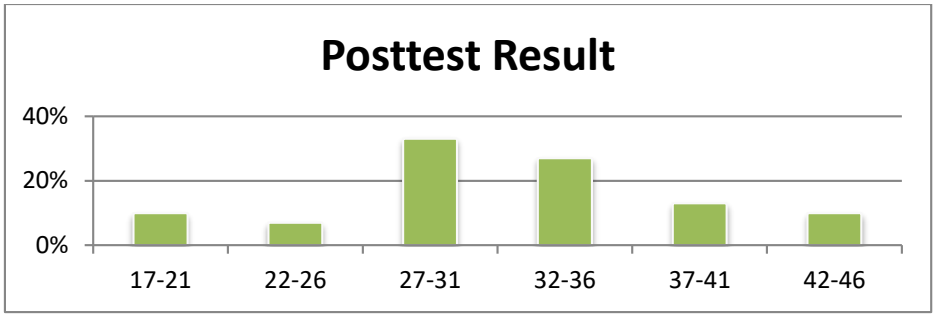


Figure 3. Histogram of Posttest Data Results.

Results of Data Normality (Pretest)

Based on the analysis of the standard deviation in the pretest, the average $\bar{X}$ was found to be 18.1, and the mode was 19.5. Therefore, data normality can be assessed using the Pearson correlation formula as follows:

$$K_m = \frac{\bar{x} - mo}{s}$$

$$= \frac{18,1 - 19,5}{8,09}$$

$$= - 0,17$$

Since the Pearson correlation coefficient (r) is -0.17, this value falls between -1 and 1, indicating that the pretest data follows a normal distribution.

Results of Data Normality (Posttest)

Based on the analysis of the standard deviation in the posttest, the average $\bar{X}$ was found to be 31.8, and the mode was 30.5. Therefore, data normality can be assessed using the Pearson correlation formula as follows:

$$K_m = \frac{\bar{x} - mo}{s}$$

$$= \frac{31,8 - 30,5}{6,91}$$

$$= 0,19$$

Since the Pearson correlation coefficient (r) is 0.19, this value falls within the range of -1 and 1, indicating that the posttest data follows a normal distribution.

Hypothesis Testing

The confidence level chosen was $\alpha = 5\%$ with $t(1-\alpha) = t(0.95)$, or 95%. Thus, conducting a significance test at $\alpha = 0.05$ with degrees of freedom (df) = 30 - 2 = 28, the critical

t-table value was obtained as ttabel = 1.70. Based on the calculations, it can be concluded that t calculated (t hitung) is greater than the critical t-table value, i.e., 16.54 > 1.70. Therefore, the alternative hypothesis (Ha) is accepted, and the null hypothesis (Ho) is rejected. Thus, it can be inferred that there is an influence of Squat Jump exercise on lower limb muscle power in extracurricular futsal activities at State Middle School 29 Palembang.

Discussion

Based on the research conducted on the extracurricular futsal students at State Middle School 29 Palembang, the pretest results showed an average score of 18.1, with the highest vertical jump test result being 25 cm and the lowest being 9 cm. The frequency distribution for pretest results was as follows: in the 9-11 interval, there were 2 students (6.67%), in the 12-14 interval, there were 5 students (16.67%). In the 15-17 interval, there were 4 students (13.33%), in the 18-20 interval, there were 10 students (33.33%), in the 21-23 interval, there were 7 students (23.33%), and in the 24-26 interval, there were 2 students (6.67%). In the posttest, the average score obtained was 31.8 after students underwent squat jump training, with the highest vertical jump test result being 45 cm and the lowest being 17 cm. The frequency distribution for posttest results was as follows: in the 17-21 interval, there were 3 students (10%), in the 22-26 interval, there were 2 students (6.67%). In the 27-31 interval, there were 10 students (33.33%), in the 32-36 interval, there were 8 students (26.67%), and in the 37-41 interval, there were 4 students (13.33%). In the 42-46 interval, there were 3 students (10%).

After obtaining the pretest and posttest data, a normality test was conducted, and it can be stated that the data follows a normal distribution. Subsequently, the t-test result was found to be 16.54. Based on the calculations and data analysis presented above, there is an improvement after students were given squat jump training. In the pretest, the average score was 18.1, and in the posttest, the average score was 31.8. Using the t-test with t-calculated = 16.54 and t-table = 1.70, it can be concluded that t-calculated > t-table. This means that the alternative hypothesis (Ha) is accepted, and the null hypothesis (Ho) is rejected. Therefore, it can be inferred that there is an influence of squat jump training on lower limb muscle power in extracurricular futsal activities at State Middle School 29 Palembang.

Based on the results of the study, researchers use existing research materials that are relevant to this research because they are very useful to support the theory and results of research that has been done. From the results of previous research that has been conducted, (DW Santosa, 2015) Using squat jump exercises with short interval method on leg muscle

explosive power the purpose of this study is to determine the difference before and after Squat jump training with short interval method on leg muscle explosive power, using split squat jump exercises with vertical jump and spike / smash methods to increase leg muscle power and smash accuracy in the voly ball game the goal is to see the extent of the increase in leg muscle power and smash accuracy in the voly ball game.

Explosive power is vital in futsal, as it is required for shooting, sprinting, ball handling, passing, jumping, and leaping (Ananta & Supriatna, 2018). According to (Bal & Dkk, 2022) plyometric training is a method to enhance explosive power and is a crucial component in sports for increasing strength and preventing boredom. It focuses on contracting the leg and arm muscles maximally, stretching and shortening them in a very brief period (Zakaria et al., 2018).

CONCLUSION

Based on the research conducted on extracurricular futsal students at State Middle School 29 Palembang, the average pretest score was 18.1, and the average post-test score was 31.8. This indicates that squat jump training can enhance lower limb muscle power in extracurricular futsal students at State Middle School 29 Palembang. This improvement is observed after the treatment compared to before the treatment. In hypothesis testing, the obtained t-value (t-calculated) was greater than the critical t-table value, with 16.54 > 1.70. Therefore, it can be concluded that there is an influence of squat jump training on lower limb muscle power in extracurricular futsal activities at State Middle School 29 Palembang. Based on the results and discussions presented, it can be concluded that there is a significant impact of squat jump training on enhancing lower limb muscle power in extracurricular futsal students at State Middle School 29 Palembang. The improvement in lower limb muscle power is attributed to the squat jump training, which was conducted over 18 sessions, with a frequency of 3 times a week over a span of 6 weeks.

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