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THE IMPACT OF KNEE TUCK JUMP TRAINING ON INCREASING A FUTSAL PLAYER'S LEG MUSCLES' EXPLOSIVE POWER

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Abstract

The reason for this research is that futsal players' limb muscles have less explosive strength. Based on observations, it can be seen that players' gastric bait kicks are easily grabbed by opponents when counterattacking, often losing player jumps when heading, and players are always left behind in making transitions. A preliminary study involving futsal players randomly used the standing broad jump test found an average jump distance of 219.2 cm. These findings show that limb muscles of futsal players are not very explosive. Based on preliminary studies, some futsal players took a standing broad jump test to measure their leg muscle explosiveness. The results showed a range of 219.2 cm for players, indicating that futsal players still have a low explosiveness ability. Determining the effect of knee tuck jump training as an independent variable on the dependent variable increasing leg muscle explosiveness was the aim of this study. This kind of study has a one-group pre-test-post-test design, making it a quasi-experiment. All futsal players were included in the study population, which amounted to 16 athletes. In addition, the total sampling method was used to take the sample. Standing Broad Jump Test results were used to get information on the explosive power of the leg muscles. The study's hypothesis is that training in knee tuck jumps significantly improves futsal players' leg muscles' explosive strength. As the method of data analysis, the t-test formula was applied with a significance level of 5%. It has been demonstrated that practicing knee tuck leaps increases the strength and explosive force of a futsal athlete's leg muscles, which enhances performance.

Keywords: Knee Tuck Jump, Limb Muscle Explosiveness.

INTRODUCTION

Sport is physical activity that is done regularly and planned to improve a person's fitness and health as well as their physical abilities [1][2]. Exercise can include various types of well-organized games or competitions and helps to improve muscle strength, flexibility, cardiovascular endurance, weight management, mental health, social skills, and reduce the risk of chronic diseases [3]. To improve physical condition, exercise is a regular and planned action performed repeatedly. Sport is now not only done to keep people happy and fit, but also to achieve high performance so as to enhance the dignity of a community, region or nation [4][5]. Sports achievement refers to a kind of competition that uses sports science and technology to help athletes reach their goals in a planned, tiered, and sustainable manner. Containers or locations to carry out the development and coaching of futsal accomplishments in its implementation include schools with specialist futsal facilities, sports clubs with futsal programs, and futsal academies. These locations offer controlled settings where athletes can work with qualified coaches, make use of specialized training gear, and take part in practice sessions and competitions on a regular basis. Furthermore, futsal-specific complexes and community sports centers frequently provide resources and programs aimed at honing futsal abilities and strategies, fostering a positive environment that improves player performance. [6][7].

Sports, especially games, have evolved over time. Many people play futsal, a rapidly expanding sport, all around the world, including in Indonesia [8][9]. People are interested in participating in matches at local, national, and even international levels to achieve achievements. Futsal is a type of indoor soccer played by two teams of five players each on a smaller pitch with a smaller, heavier ball [4]. The game lasts for two halves, twenty minutes each, and allows players to switch positions at any time [10]. Due to the tight space and high tempo of the game, futsal improves technical skills, ball control, and quick decision-making. Futsal has slightly different rules than conventional soccer, such as no strict penalties and offside [1] [11]. Futsal was first played in Uruguay in the 1930s, and later became popular in Brazil, a country that has a strong futsal tradition. In addition to improving players' soccer skills, the sport also improves their physical fitness [12]. Since the early 2000s, futsal has grown rapidly in Indonesia [13]. It became popular due to its dynamics and smaller fields [14][15]. Improving the quality of the game is done by major futsal leagues such as the Pro Futsal League (PFL) and Liga Futsal Nusantara, as well as national tournaments [16][17]. In international competitions such as the AFF and AFC Futsal Championships, the Indonesian national futsal team is improving [18][19]. In various major cities, futsal clubs and academies concentrate on developing young talent through specialized training [20][21]. With increasing public interest and support from various parties, futsal in Indonesia has great potential to grow [1][22]. However, there are some obstacles, such as lack of facilities, lack of funds, and lack of experienced coaches [23][24].

The knee tuck jump is a plyometric exercise that is great for increasing leg muscle explosive power by engaging several muscle groups like the quadriceps, hamstrings, glutes, and calves [25]. Because of the explosive nature of the exercise, it improves neuromuscular adaptations, which improves timing, coordination, and efficiency of muscle recruitment, which are all important for developing explosive power [26][27]. Additionally, it increases muscle strength and flexibility [28]. Place your feet shoulder-width apart in order to execute a knee tuck leap. Ascending to the maximum height while bringing your knees up to your chest [29]. Land softly with knees slightly bent to absorb the impact [30]. Make sure to incorporate knee tuck jumps into your routine with proper form, gradual growth, and enough rest [31].

The objective of the study of the knee tuck jump for leg muscle explosive power improvement is to evaluate how effective it is as a plyometric exercise in increasing explosive strength and power in the lower body [26] [32]. This includes measuring the activation of the muscles, measuring the amount of power that is released, and comparing it to other exercises and traditional strength training techniques [33][34]. Additionally, the research aims to understand how improved explosive power affects specific athletes [35]. In addition, an important part of the research is to ensure that the athlete is safe and does not experience any sport-related harm [36]. Ultimately, the research will provide evidence-based recommendations for sportsmen and fitness enthusiasts [37].

METHODOLOGY

This kind of study is known as a quasi-experiment. This approach is experimental in nature, i.e., it involves attempting something to determine the impact of a single or combination of treatments. A pretest-posttest approach involving a single group was used for this study. studies that include a pre-test prior to therapy and a post-test

following it. The sample was given medication three times a week before to the initial test, also known as the pre-test, and the research period spanned roughly seven weeks. Following the sample's treatment, the last test was administered. The purpose of this study is to ascertain whether training in the knee tuck jump increases the explosive power of leg muscles used by futsal players. With training meetings 3 times a week, namely Wednesday, Friday and Sunday. Conducting pre tests, post tests, and finding the maximum training load. This study uses total sampling, namely all futsal players totaling 16 people.

Exercise Program

Day 1	Day 2 – 5 beginning of adaptation	Day 6 – 9 Increased Intensity	Day 10 – 13 volume increase	Day 14 – 17 peak intensity	Day 18
- Pre Test - Small Side Game	**Warm-up:** - Jogging in place: 5 minutes - Dynamic Stretch: Leg Swing, High Knee, Butt Kick, Lunge with Twist (10 repetitions per move) **Main Exercise:** - Knee Tuck Jump: 2 sets x 8 reps - Box Jump: 2 sets x 8 reps - Squat Jump: 2 sets x 8 reps **Cooling:** - Static Stretching: Quad Stretch, Hamstring Stretch, Calf Stretch, Hip Flexor Stretch (30 seconds per side)	**Warm-up:** - Jogging in place: 5 minutes - Dynamic Stretch: Leg Swing, High Knee, Butt Kick, Lunge with Twist (10 repetitions per move) **Main Exercise:** - Knee Tuck Jump: 3 set x 10 reps - Box Jump: 3 set x 10 reps - Squat Jump: 3 set x 10 reps **Cooling:** Static Stretching: Quad Stretch, Hamstring Stretch, Calf Stretch, Hip Flexor Stretch (30 seconds per side)	**Warm-up:** - Jogging in place: 5 minutes - Dynamic Stretch: Leg Swing, High Knee, Butt Kick, Lunge with Twist (10 repetitions per move) **Main Exercise:** - Knee Tuck Jump: 4 sets x 10 reps - Box Jump: 4 sets x 10 reps - Squat Jump: 4 sets x 10 reps **Cooling:** Static Stretching: Quad Stretch, Hamstring Stretch, Calf Stretch, Hip Flexor Stretch (30 seconds per side)	**Warm-up:** - Jogging in place: 5 minutes - Dynamic Stretch: Leg Swing, High Knee, Butt Kick, Lunge with Twist (10 repetitions per move) **Main Exercise:** - Knee Tuck Jump: 4 sets x 12 reps - Box Jump: 4 sets x 12 reps - Squat Jump: 4 sets x 12 reps **Cooling:** Static Stretching: Quad Stretch, Hamstring Stretch, Calf Stretch, Hip Flexor Stretch (30 seconds per side)	- Post Test - Mini Competition

Exercise is carried out by encouraging repetition and set increases. It is important to use repetition and set intensities in training to develop strength, endurance, and hand-eye coordination. By gradually increasing the number of sets and repetitions in a methodical manner, the otot will always be motivated to grow and develop. This also helps to increase training volume and foster otter adaptation, making otter more robust, more flexible, and more receptive to activities requiring strength and stamina, such as futsal games.

RESULTS

1. Pre Test Data of Limb Muscle Explosiveness

An initial examination of leg muscle explosiveness using the standing broad jump test was performed on the sample prior to treatment with single leg speed hop training. The findings of the first test, which was administered to 16 samples, were as follows: the highest score was 251, the lowest was 211, with an average of 225.75 and a standard deviation of 11.27. See the table below for further information.

Table 1: Results of Limb Muscle Explosive Power Pre-Test Frequency Distribution

Classification	*Pre Test*		Category
	Frequency	Percentage	
211-220	5	31,25%	**Less**
221-230	7	43,75%	**Moderate**
231-240	2	12,50%	**Fair**
241-250	1	6,25%	**Good**
>250	1	6,25%	**Excellent**
Total	**16**	**100 %**	

According to the frequency distribution table with 16 samples above, there are 5 people who have leg muscle explosiveness in the less category with a percentage of 31.25%, 7 people have moderate leg muscle explosiveness with a percentage of 43.75%, 2 people have sufficient leg muscle explosiveness with a percentage of 12.50%, 1 person has good leg muscle explosiveness with a percentage of 6.25%, and 1 person has excellent leg muscle explosiveness with a percentage of 6.25%.

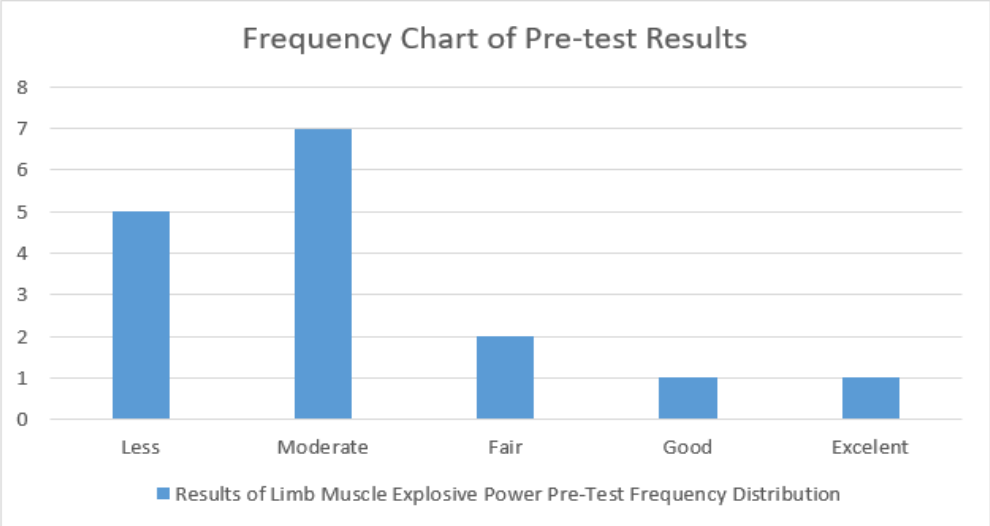

Figure 1: Frequency Chart of Pre-test Results

2. Post Test Data of Limb Muscle Explosiveness

Following treatment with eighteen repetitions of single-leg speed hop training, the sample underwent the standing broad jump test as the last assessment of leg muscle explosiveness. The final test results, which were analyzed using 16 samples, showed that the highest score was 253, the lowest was 216, with an average of 230.87 and a standard deviation of 10.94. See the table below for further information.

Table 2: Frequency Distribution of Leg Muscle Explosive Power Post-Test Results

Classification	*Post Test*		Category
	Frequency	Percentage	
211-220	4	25%	**Less**
221-230	3	18,75%	**Moderate**
231-240	6	37,50%	**Fair**
241-250	2	12,50%	**Good**
>250	1	6,25%	**Excellent**
Total	**16**	**100 %**	

Of the 16 samples, 4 samples (or 25% of the total) showed leg muscle explosiveness in the poor group, according to the frequency distribution table above, 3 samples had moderate leg muscle explosiveness with a percentage of 18.75%, 6 samples had sufficient leg muscle explosiveness with a percentage of 37.50%, 2 samples had good leg muscle explosiveness with a percentage of 12.50%, and 1 sample had excellent leg muscle explosiveness with a percentage of 6.25%.

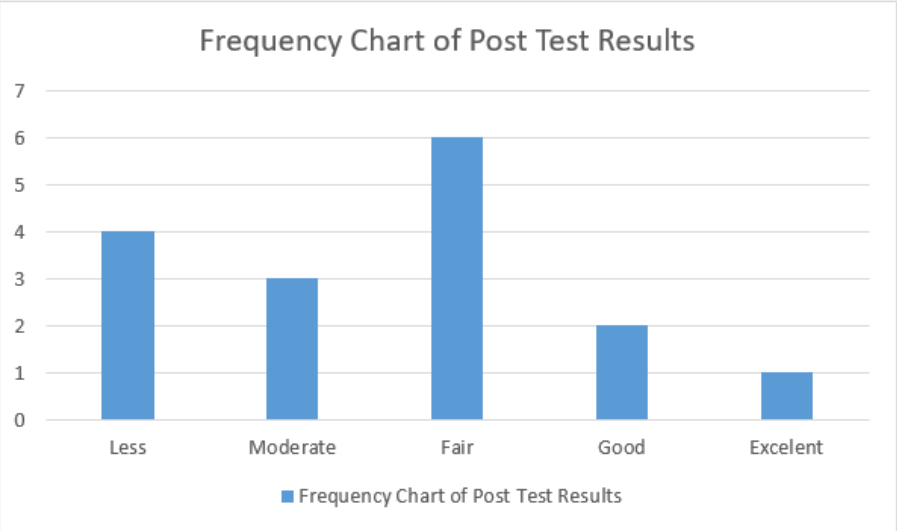

Figure 2: Frequency Chart of Post Test Results

3. Normality Test

The Lilifors test is used to analyze the normality of a data distribution. A significant level of (a) = 0.05 is utilized to determine whether to reject or accept a normal choice. As per the test criteria, if L0 derived from the observation data is greater than L table, then H0 is rejected, and vice versa. If L table is greater than L0, then H0 is acceptable. To do this, just apply the formula below:

- Ho= rejected if L0>Lt (L table)
- Ha = accepted if Lo < Lt (L tabel)

Table 3: Synopsis of data from the normalcy test before and after the leg muscle explosiveness test

No	Variable	N	Lo	Lt	Description
1	Pretest data of leg muscle explosiveness	16	0,114	0,213	**Normal**
2	Leg muscle explosiveness post test data	16	0.09	0,213	**Normal**

It is evident from the preceding table that at the actual level (α) = 0.05, the Lcount (Lc) value generated from the data for all variables is smaller than the Ltabel (Lt) value. Therefore, it can be said that all of the study's data came from a population that was normally distributed, allowing for the use of parametric statistical testing to proceed.

4. Hypothesis testing

"Single leg speed hop training has a positive effect on increasing the explosive power of leg muscles of futsal players," is the study's alternate hypothesis. The t-test formula was used to test this hypothesis.

T count = 3.71> t table = 1.753 was calculated using the t distribution table with degrees of freedom (dk) n-1 = 16-1 = 15 significant level 0.05. Next, Ho is turned down and Ha is accepted. Thus, it can be said that training for knee tuck jumps has an impact. For more clarity, it can be understood through the summary table of data analysis results below:

Table 4: Summary of hypothesis testing results

Dk = n – 1 = 16 – 1	Test results for the explosive power of the leg muscles (standing broad jump)		T Count	T Table	Description
	Average (pretest)	Average (post test)			
15	225,76	230,88	3,71	1,753	Ho is rejected, Ha is accepted

With a significance level of 0.05 and n = 15, the table above indicates that the t count is 3.71 and the t table is 1.753. The t count is greater than the t table (3.71> 1.753). Ho is rejected and Ha is accepted in accordance with the requirements for hypothesis testing. We may conclude that training for knee tuck jumps has an impact on futsal players' leg muscles' explosive power.

DISCUSSION

This paper discusses the analysis's findings based on theoretical research and statistical computations. Subsequently, we will discuss them more. The t test method is used to calculate sample data analysis in order to analyze the impact of knee tuck jump training on futsal players' increased explosive power in their leg muscles. The pre-test results for the players' leg muscle explosiveness were 225.76 on average and 11.27 on standard deviation, according to the calculations. 251 was the highest score, and 211 was the lowest. The post-test's standard deviation was 10.94 and its average was 230.88. 253 was the highest score, and 216 was the lowest. The data indicates a 2.26% rise in the period prior to and following the administration of the knee tuck jump exercise treatment.

The study's findings indicate that training in knee tuck jumps enhances the explosive strength of futsal players' leg muscles (t count > t table 3.71 > 1.753). This demonstrates how futsal players' leg muscles' explosive strength is increased by knee tuck jump training. This demonstrates that training for the knee tuck jump strengthens the leg muscles of futsal players, increasing their explosive strength [38]. Futsal players benefit from improved knee tuck jump performance as well as improved ability to perform high and quick gastric bait kicks, head duels for ball possession, and transition quickly between attack and defense [39]. All of these enhancements point to a notable increase in leg muscle explosiveness, which is essential for preserving an advantage over opponents on the futsal court.

CONCLUSIONS

When knee tuck jump training is used to improve futsal player's leg muscle explosiveness, it has the following effects: the player's gastric bait kick can soar high and quick past the opponent until it reaches the intended target, the player excels in winning the heading time jump for ball possession, the player can move the position quickly ahead of the opponent when the player makes the transition from defense to attack or vice versa, and the player's knee tuck jump ability can improve.

To sum up, adding knee tuck jump training to a futsal player's routine greatly increases leg muscle explosiveness, leading to a number of important performance gains. The player gains the capacity to perform a fast and high gastric bait kick, which makes it easier for them to outpace opponents and hit their chosen targets. In order to keep a competitive advantage over rivals, the player also improves their ability to win heading duels for ball possession and switch between defense and offense quickly. All things considered, practicing the knee tuck leap increases a player's explosive power while also improving their speed, agility, and adaptability on the futsal court.

Conflicts of interest

There are no conflicts of interest with this study.

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