WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

The Use of the Seated Leg Flutter Exercise on the Machine to Develop the Muscular Strength of the Anterior Thigh Muscles to Increase the Shooting Power of Soccer Players.

Haider Ghadhban Ibrahim [a]

[a] *College of Physical Education and Sports Sciences, Al-Mustansiriyah University, Baghdad, Iraq*

A B S T R A C T

Football is the most popular sport in the world. It has developed rapidly, and the need to improve physical and skill performance has become essential to achieve high-level performance by football players under any match conditions. Therefore, there is a pressing need to conduct applied scientific research in the field of sports training in football, in accordance with the environmental and social conditions available in the country, with the aim of advancing this field. The physical and skill aspects of players are considered a fundamental and important factor in achieving good sports results. With scientific progress in all branches of knowledge in the sports field, there is a need to develop and improve the physical aspect of players as well as to ensure their safety and protect them from injuries associated with this sport, which is characterized by contact with the ball and the opponent.

Keywords: football, shooting in football, muscle strength, quadriceps muscles, front leg flutter device.

1. Introduction

The development of muscular strength in the anterior thigh muscles is crucial for athletes, particularly soccer players, as it directly influences their performance in skills such as shooting. Strengthening these muscles enhances the player's ability to generate force, which is a key determinant in the velocity and power of a soccer shot (Varović et al., 2021). The seated leg flutter exercise, performed on a machine, is a relatively new approach designed to target the anterior thigh muscles, specifically the quadriceps (Khoganaamat et al., 2013). This exercise is increasingly being incorporated into strength training regimens with the goal of improving both muscular endurance and explosive power, which are critical for soccer players during competitive matches (Ramadhana et al., 2023).

The seated leg flutter exercise is designed to isolate the quadriceps, thereby maximizing the strength gains in this muscle group (MartínezAguirre-Betolaza et al., 2022). Such targeted exercises are essential in sports-specific training, as they can lead to significant improvements in key performance indicators, such as shooting power in soccer (Matsentides et al., 2023). This exercise emphasizes controlled movement and stability, which not only enhances muscle strength but also improves neuromuscular coordination, essential for executing powerful and accurate shots (Matsentides et al., 2023).

Previous studies have indicated that increased quadriceps strength correlates with higher shooting velocity in soccer players (Varović et al., 2021). This suggests that exercises focusing on the anterior thigh, like the seated leg flutter, could be highly effective in developing the necessary muscle strength to improve shooting power. However, empirical research specifically examining the effectiveness of the seated leg flutter exercise on enhancing soccer shooting power remains limited. Therefore, this study aims to explore the impact of the seated leg flutter exercise on the development of anterior thigh muscular strength and how this enhancement translates into increased shooting power among soccer players.

1.1 Research Problem

Football, and the beauty of its performance, depends on scoring a number of goals. Scoring goals is achieved through various methods and techniques, one of which is the development of the muscular strength of the quadriceps muscles in the players' thighs to increase the power of shooting the ball towards the goal. This power gives the team an advantage by scoring goals, as a team with players who have high shooting power holds the keys to victory and goal-scoring from long distances without exerting much effort, significantly reducing the time spent on passing between players. Additionally, the opponent's pressure on the players can prevent reaching the goal and hinder scoring, so the solution lies in long-range shooting, which often decides the results in favor of the team in most matches. Scoring goals from this situation requires special and continuous training to develop and achieve high accuracy in shooting, which necessitates that the player possesses significant muscular strength in the quadriceps muscles to help him shoot accurately from a distance. The lack of goal-scoring from long distances is due to the apparent weakness in the quadriceps muscles and the neglect of their weight

training, as well as the lack of training on long-range shooting. This skill is one of the most important characteristics of club and national football players. The researcher, through his field experience as a former football player and as an observer of football matches, noticed this weakness in most football players. The researcher believes that there is a need to enhance certain physical abilities, such as speed-strength, explosive power, and accuracy, to reach the desired level and achieve success, as accuracy is one of the most important requirements when shooting the ball. Therefore, the researcher decided to study this problem and propose some suitable solutions by providing an exercise aimed at developing the muscular strength of the quadriceps muscles, which has a significant impact on improving the skill of shooting and enhancing this essential skill in football.

1.2 Research Objective

The research aims to increase the ball-shooting power of football players by using the front leg flutter exercise to develop the muscular strength of the quadriceps muscles.

Research Methodology and Field Procedures

Research Methodology

The researcher adopted the experimental method in preparing this research, as it is the most suitable for solving the research problem. The experimental method "is considered the true choice for determining the specific cause-and-effect relationships and represents the most accurate approach to addressing many practical problems in a scientific manner."

Research Sample

The objectives set by the researcher and the procedures used in the research determine the nature of the sample that will be selected. Accordingly, the research sample was determined using the deliberate selection method. The researcher identified the research community as the youth football players of the Naft Maysan Club, totaling 12 players out of 22, aged 15–16 years for the 2023-2024 season. The researcher selected 12 players for the main experiment and chose 5 players for the exploratory experiment from the original team of 22 players. The researcher conducted both pre-tests and post-tests on the sample and worked on identifying the changes between the pre-test and post-test.

1.3 Homogeneity

The researcher conducted homogeneity tests on the research sample in the variables of weight, height, and age. A sample is considered homogeneous if the skewness coefficient does not exceed (+3). As shown in Table 1, the skewness coefficient values were (0.104, 1.40, 0.363) respectively, all of which are within the range of (+3). The closer the skewness coefficient values are to (+3), the more normally distributed the scores are. If the values exceed or fall short of this range, it indicates a flaw in the sample selection. The ages of the sample ranged between 15-16 years, with a mean age of 15.44 years and a standard deviation of 0.675. The mean weight was 57.05 kg with a standard deviation of 1.373, while the mean height was 165.77 cm with a standard deviation of 2.23. Table 1 illustrates these findings.

Tests used Front Leg Flutter Device from a Seated Position (Leg Extension Machine)

This is a multifunctional training device or exercise machine used to strengthen the quadriceps muscles, also known as the front thigh muscles. The device provides a leg extension exercise that helps improve the strength and flexibility of the quadriceps and legs. The front leg flutter exercise is safe and effective for people of all ages and fitness levels and can be performed using various weights and repetitions to meet individual fitness goals.

Specifications:

- It includes a small seat pad to stabilize the body during exercise.
- The device is equipped with a mechanical system that allows adjustment of the seat position, back pad, and leg pad to suit your needs.
- It features a strong and durable design made from high-quality materials to ensure durability and sustainability.

Some benefits of using the Front Leg Flutter Device include:

- Strengthening the quadriceps muscles: The quadriceps are responsible for knee extension, so front leg flutter is a great way to strengthen these important muscles.
- Improving knee extension: The exercise can also help improve knee extension, which is essential for activities like walking, running, and jumping.
- Reducing pain and inflammation: The exercise can benefit people suffering from knee pain or inflammation. Its low-impact nature can help reduce pain and inflammation while providing a strengthening workout.
- Rehabilitation: Front leg flutter is a common exercise used in rehabilitation programs for people with knee injuries. It helps gradually strengthen the quadriceps and improve knee extension, promoting healing and recovery.

If you are new to the front leg flutter exercise, it is important to start with a light weight and gradually increase it as you become stronger. It is also crucial to use the device correctly to avoid injury.

Performance Method for the Front Leg Flutter Device:

- Sit upright on the seat with your back straight and your feet flat on the ground.
- Adjust the seat so that your knees are bent at a 90-degree angle when your feet are under the leg pad.
- Push the leg pad down slowly and steadily until your legs are fully extended.
- Lower the pad slowly back to the starting position.

Additional tips for using the Front Leg Flutter Device to avoid injuries:

- Keep your back straight at all times.
- Do not arch your back or neck to lift the weight.
- Do not push the pad down with too much force.
- If you feel knee pain, stop the exercise.

By following these tips, you can reduce the risk of injury while using the Front Leg Flutter Device.

1.4 Tests used

Standing Long Jump Test

This is a multifunctional training device or exercise machine used to strengthen the quadriceps muscles, also known as the front thigh muscles. The device provides a leg extension exercise that helps improve the strength and flexibility of the quadriceps and legs. The front leg flutter exercise is safe and effective for people of all ages and fitness levels and can be performed using various weights and repetitions to meet individual fitness goals.

- Purpose of the test: To measure the muscular strength of the legs.
- Equipment: A flat surface that does not cause slipping, a measuring tape, and a line drawn on the ground for the start.
- Performance specifications: The tester stands behind the start line with feet slightly apart and arms raised. The arms swing forward, downward, and backward while bending the knees slightly and leaning the torso forward as if about to start swimming. From this position, the arms swing forcefully forward as the legs extend along the torso, pushing off the ground with both feet to jump forward as far as possible.

1. The jump distance is measured from the start line (the inner edge) to the nearest point of contact made by the player close to the start line, or where the heels touch the ground.
2. If the tester loses balance and touches the ground with another part of their body, the attempt is void and must be repeated.
3. Both feet must be in contact with the ground until the moment of takeoff.
4. The tester is allowed two attempts, with the best one recorded.

1.5 Exploratory Experiment

The exploratory experiment is a preliminary experimental study conducted by the researcher on a small sample before conducting the main research. The purpose of this experiment is to select appropriate research methods and tools. Therefore, the researcher carried out the exploratory experiment with the assistance of the research team on a sample of 5 players from the original community, who are players from the Naft Maysan Sports Club. This experiment was conducted to identify the following:

- The obstacles and difficulties that the researcher and the research team might encounter during the main experiment.
- The adequacy of the research team in implementing various tests and recording results accurately.
- The suitability and appropriateness of the sequence of tests related to the research.

1.6 Pre-tests

The researcher conducted the pre-test, which is the skill test for "static shooting accuracy towards a divided target."

1.7 Training Program

The researcher prepared a training program that includes exercises using tools and supportive means based on the technical errors identified by the researcher in the performance of the research sample. The proposed training program was implemented over 12 sessions, with two sessions per week, each lasting 40 minutes. The training load was progressively increased in terms of intensity, volume, and rest, according to the specific needs of the training. The training level of the research sample was good both technically and training-wise to ensure the success factors of the training program. The increase in training load was carefully timed to allow for physical and functional adaptation, which is necessary to achieve the intended increase in training load and to elevate this load from week to week. The training program was implemented over a period of 6 weeks, with two training sessions each week, conducted on Sundays and Tuesdays.

1.8 Post-tests

After completing all the training sessions of the program on the research sample, the post-test was conducted. All conditions related to the tests, such as location, time, and implementation, were kept constant to replicate the conditions of the pre-tests as closely as possible.

1.9 Statistical Methods

The researcher used appropriate statistical methods for the research, utilizing the ready-made SPSS statistical software package. The following statistical techniques were used:

- Arithmetic mean
- Standard deviation
- Skewness coefficient
- T-test for dependent samples between the pre-test and post-test for the same group

2. Results

Table 1 - The table shows the results of the arithmetic means, standard deviations, and T-values for the shooting power variable in the pre-test and post-test, along with their discussion.

Pre-test	Post-test	Mean Difference	Std. Error Difference	Calculated T	Tabulated T	Significance
Mean (M)	**Std. Dev. (SD)**	**Mean (M)**	**Std. Dev. (SD)**			
1.6	1.34	3.1	0.99	3.95	0.336	7.75

The tabulated value is under a degree of freedom of 9 and a significance level of 0.05.

The above table shows that the calculated T-value between the pre-test and post-test for the shooting power test was (7.75), which is greater than the tabulated value of (2.26) under a degree of freedom of 9 and a significance level of 0.05. This indicates that there are statistically significant differences in favor of the post-test in the shooting variable, which is expressed in this test and also applies to situations involving static positions.

3. Discussion

The significant differences observed in the shooting skill, which is considered a static play situation for the sample members, are attributed to the effectiveness of the training methods used by the researcher on this group. These methods helped ensure the performance was complete from the technical side, according to the technical characteristics associated with the development of speed-strength and explosive power, which are related to the level of performance of this skill. The use of various training methods was instrumental in developing the required control when using the shooting skill optimally. This, in turn, contributed to achieving the highest possible ball release speed in the desired direction (Zayer, 2022).

On the other hand, it is assumed that there is integration with the remaining variables that play an active role in achieving high efficiency and a good rate of release speed, such as the correct positions of the trunk and arm movements. The proper utilization of these variables and their stable and smooth application ensures high values for the ball's release speed as well (Gadev & Peev, 2022).

The researcher believes that this is due to the clear impact of the applied training methods, which helped the sample members perform the skill correctly. The important technical foundation that the sample members must accomplish to complete this skill is the strengthening of the anterior thigh muscles so that the ball striking force is sufficient to achieve positive results in the shooting skill (Baştürk & Peker, 2019). Additionally, the working muscles on these joints need to produce the required force for performance, which increases the speed of the foot joint of the leg due to the increased efficiency of the working muscle groups (Silva et al., 2022). This development resulted from the improved work of the muscles exposed to various resistances due to the different training methods, increasing their adaptability and efficiency. Moreover, all the training included exercises related to the technical

performance of football skills, helping to achieve clear differences between the pre-test and post-test and fully realizing the objective of these skills, particularly the shooting skill. This skill was also applied during training, including the necessary movements that help increase kicking speed (Hamzah et al., 2022).

It can be said that the movement of the striking leg should be very fast and powerful since it determines the ball's speed. This is what the researcher aimed to achieve through practical training. According to most studies, there is a high correlation between ball speed and the strength of the thigh muscles of the foot, the latter being an important factor in the interaction mechanism between the ball and the kicking foot (Gadev & Peev, 2022).

4. Conclusions

- Training focused on the development of explosive power and speed.
- Combined training had a clear impact when paired with weight training in developing the anterior thigh muscles, thereby enhancing explosive power and speed-strength.
- All training methods contributed to the improvement of the variables measured in the post-tests compared to the pre-tests after applying the training programs.

5. Recommendations

In light of the conclusions reached by the study, the research suggests several recommendations:

- Emphasize the use of weight training equipment to develop various aspects of physical capabilities.
- Stress the importance of focusing on strength training due to its influence on other physical characteristics throughout the training process.
- Conduct similar studies and research on other samples.
- Encourage professionals in the field of the game and training to build and distribute weight-based training programs in a well-considered manner to maximize their benefits.
- Recommend the use of leg flutter machines to develop the anterior thigh muscles, thereby increasing the force of ball strikes.

References

Baştürk, D., & Peker, A. T. (2019). The Effect of a 8 Week-Explosive Power Training on Some Performance Parameters of Students who Studying in Sports High School. Higher Education Studies.

Gadev, M., & Peev, P. (2022). Correlation of the Ball Speed and Relative Strength Potential and Explosive Power of the Lower Limbs of In-step Kick of Elite Football Players. Trakia Journal of Sciences.

Hamzah, A., Ali, A. H., & Shakir, L. A. (2022). The effect of Ableton model to developing some motor abilities and learning the technical performance of football shooting skill for students. Journal of Sports Science and Nutrition.

Khoganaamat, K., Sadeghi, H., & Nazari, S. (2013). Effect of Seated Leg Press Exercise on Knee Extensor Strength in Elderly. Medicine.

MartínezAguirre-Betolaza, A., Jacka, K., Sargent, D., Paterson, C., Stone, K., & Stoner, L. (2022). Leg Fidgeting Enhances Blood Lactate Clearance Following Maximal Anaerobic Exercise. International Journal of Sports Science & Coaching.

Matsentides, D., Christou, M., & Zaras, N. (2023). The Effects of Different Re-Warm-Up Strategies on Power, Changing of Direction and Ball Shooting Velocity in Well-Trained Soccer Players. Sports.

Ramadhana, M. R., Zulfikar, Z., Miskalena, M., Putra, S., Syamsulrizal, S., & Abdurrahman, A. (2023). Contribution of Leg Muscle Power and Balance to Shooting Accuracy in SSB Elang Biru Soccer Team Players. Path of Science.

Silva, L. M., Neiva, H. P., Marques, M. C., Izquierdo, M., & Marinho, D. A. (2022). Short Post-warm-up Transition Times Are Required for Optimized Explosive Performance in Team Sports. Journal of Strength and Conditioning Research.

Varović, D., Žganjer, K., Vuk, S., & Schoenfeld, B. (2021). Drop-Set Training Elicits Differential Increases in Non-Uniform Hypertrophy of the Quadriceps in Leg Extension Exercise. Sports.

Zayer, M. (2022). The Effect of Rebounding Strength Exercises in Developing the Peak Ability and Shooting Skill of Advanced Football Players.