



The Effect of Squat Training on Pivot Success in Ball Control among the Futsal Team of SMK Sinar Husni 2 TR

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Abstract

Objectives:

This study aims to determine the effect of squat training on the success of the pivot move during ball possession for the SMK Sinar Husni 2 TR futsal team.

Materials and Methods:

The study employed an experimental method using a one-group pretest-posttest design. The research sample consisted of 20 players, selected using the total sampling technique.

Results:

The research results show that the average pretest score was 11.4, while the average posttest score increased to 17.5.

Conclusions:

Thus, it can be concluded that squat training has a significant effect on the success of the pivot move during ball possession for the SMK Sinar Husni 2 TR Futsal Team.

Keywords: squat training; pivot; ball control; futsal

Introduction

Sport encompasses all forms of planned, structured, and repetitive physical activity aimed at improving physical fitness, health, skills, and athletic performance. According to Fernando (2022), sport is understood as a type of physical activity performed systematically, involving movements of most or all parts of the body, with the purpose of improving physical fitness. In general, sports involve body movements that require energy and are performed according to certain rules, either individually or in groups, one of which is futsal.

Futsal is one of the most popular sports, particularly among students in various parts of the world. This sport requires a high level of technical, physical, and tactical ability. Futsal is a form of indoor football played on a smaller court with smaller goals and by two teams consisting of five players each, including one goalkeeper. Ramadani (2025) states that futsal is a team sport consisting of five players who kick the ball with the objective of scoring goals against the opposing team. Differences in court dimensions and the number of players create different game dynamics in futsal, particularly in terms of the techniques and strategies employed. Kamaruddin and Djawa (2022) define futsal as a team game played on a hard court with boundary lines that aims to test foot agility and team coordination at a very fast pace.

One of the most important technical skills in futsal is ball possession, particularly when a player is under pressure from an opponent. In such situations, players often perform a pivot movement, which involves rotating the body around one foot as a pivot point to protect the ball, act as a target player or wall, or create space before making a pass or shot. Successful pivot performance is strongly influenced by balance, lower-limb muscle strength, and lower-body stability. Setiawan et al. (2024) define a pivot as a player with dominant technical and physical abilities, particularly in controlling the ball in limited spaces and maintaining possession under high pressure from opponents.



In futsal, the pivot is not merely responsible for maintaining ball possession but also represents a skill that influences the overall flow of the game. The ability to perform pivot movements correctly can create opportunities to score goals, as the pivot plays an important role as the focal point of the attack. Futsal is a sport that continues to gain popularity. Successful execution of the pivot technique is influenced not only by technical mastery but also by the player's physical condition, particularly lower-limb muscle strength, balance, and body stability. Therefore, improving pivot performance in futsal is an important priority. Developing pivot ability is particularly important in futsal training, especially for students who are still in the learning process.

However, at the vocational high school (SMK) level, particularly among the futsal team of SMK Sinar Husni 2 TR, a common problem is the lack of adequate understanding and technical skills, especially in performing pivot movements. Many students have not participated in organized futsal training, resulting in limited understanding of basic futsal techniques, including how to perform pivot movements correctly and effectively. Most of their futsal activities are informal and unstructured, so their technical abilities, including pivot movements, are not sufficiently practiced and do not develop optimally.

One type of physical exercise that is effective for increasing lower-limb muscle strength is the squat. Squat training is a fundamental exercise involving the quadriceps, hamstrings, gluteus, and core muscles. This exercise not only increases muscle strength but also helps improve stability, coordination, and body balance. It is expected that futsal players will be able to perform pivot movements more effectively while maintaining ball possession. In reality, sports, including futsal, are increasingly recognized as an important component of education. In addition to improving physical fitness, sports participation also contributes to the development of students' social and mental skills. Therefore, structured and effective training is essential to improve students' futsal skills. Organized training that applies appropriate techniques can help students, particularly at the vocational high school level, understand and master the fundamentals of futsal, such as performing pivot movements, which can subsequently improve their overall playing ability.

Based on initial observations and interviews conducted on the court, futsal training is one of the activities participated in by 20 students from Grades X to XII at SMK Sinar Husni 2 TR. The activity is conducted three times a week, on Mondays, Thursdays, and Saturdays, from 3:00 p.m. to 5:00 p.m. Western Indonesia Time (WIB), under the supervision of a coach and a Physical Education, Sports, and Health (PJOK) teacher. To support the futsal activities, several pieces of equipment are provided, including team uniforms, five futsal balls, ten cones, and two goals. The futsal court at SMK Sinar Husni 2 TR is used as the training venue.

During field observations, it was found that many students experienced difficulties in mastering pivot movements while maintaining ball possession. Several technical problems were identified, including difficulties in coordinating foot and body movements, maintaining body balance, and protecting the ball from opponents. During training sessions, errors in pivot movements occurred quite frequently, making it easier for opponents to win possession of the ball. Therefore, it is important for the team to improve pivot skills through more organized and systematic training so that the pivot can maintain possession and contribute to goal-scoring opportunities.

Although players are expected to master pivot movements effectively, many of them still perform the technique incorrectly. This may occur due to insufficient training and a lack of attention to the mastery of pivot technique. Although the correct procedure for performing the pivot movement has been explained during training, it has not been properly applied on the court. This is supported by Fataha et al. (2025), who state that one of the main causes of discrepancies between theory and practice is the lack of



structured and repetitive training aimed at developing technical skills in depth. Meanwhile, the futsal facilities at SMK Sinar Husni 2 TR, such as the court and futsal balls, are already adequately available.

Based on the initial observation conducted to assess students' ability to perform pivot movements, the results showed that most students still experienced difficulties in performing the pivot technique correctly and accurately. Of the 20 students who participated in the test, only 5 students were able to perform the technique correctly, indicating that many students still struggled to master the pivot technique, which is an important component of futsal performance. Inability to perform the pivot movement correctly can significantly affect match performance, as the futsal team of SMK Sinar Husni 2 TR often experiences difficulties in interschool competitions because the pivot position does not function effectively.

Mastery of the basic pivot technique is essential in futsal because effective pivot play requires a combination of physical strength for duels, ball control, and finishing ability under pressure from opponents. One method that can be applied to improve pivot performance is squat training. This exercise aims to help students improve their balance, strength, and lower-body control when rotating around one foot as a pivot point, thereby increasing the effectiveness of the pivot in maintaining ball possession. According to Siff Mel C. (2009), the squat is a multi-joint exercise that develops the quadriceps, hamstrings, and gluteus maximus muscles. This strength provides a foundation for athletes to produce explosive power.

Materials and Methods

Study Design

This study employs an experimental method with a quantitative approach. The design used is a pre-experimental design, specifically the One-Group Pretest-Posttest Design. The experimental method was selected to determine the impact of the treatment on the observed variables under controlled conditions.

Study Participants

In this study, the population consists of the 20 students participating in futsal training for the SMK Sinar Husni 2 TR futsal team. The sampling method employed is the saturated sampling technique, in which the entire population serves as the sample. Consequently, the sample for this study comprises the 20 students participating in the SMK Sinar Husni 2 TR futsal training.

Study Organization

The research instruments employed were tests and measurements of the pivot technique in futsal, specifically a pivot test assessment form or rubric comprising five indicators: supporting foot position, ball control, body balance, accuracy of subsequent decision-making, and speed of execution. Assessments utilized a 1–4 scale and were conducted during both pre-test and post-test phases to determine the effectiveness of the pivot technique in ball possession following squat training.

Statistical Analysis

Data analysis in this study employs hypothesis testing and the t-test to determine the significance of the effect of Variable X (squat training) on Variable Y (pivot success in futsal ball control).

Results

The data analyzed consist of pre-test and post-test results regarding pivot success in ball possession, obtained from the entire research sample of 20 players from the SMK Sinar Husni 2 TR Futsal Team. The results of the study are presented in the following table.



Table 1. Descriptive Results of Pivot Success in Ball Possession for the SMK Sinar Husni 2 TR Futsal Team

Information	N	Mean	Median	Modus	Std Dev	Min	Max
<i>Pretest</i>	20	11.4	12	12	2.3	7	16
<i>Posttest</i>	20	17.5	18	15	2.1	15	20

Based on the table, the pretest results show a mean of 11.4, a median of 12, a mode of 12, and a standard deviation of 2.3, with minimum and maximum scores of 7 and 16, respectively. Following the squat training, posttest results improved, showing a mean of 17.5, a median of 18, a mode of 15, and a standard deviation of 2.1, with minimum and maximum scores of 15 and 20. These results indicate an improvement in the success of pivoting during ball possession following the squat training.

The initial test (pretest) results regarding the success of pivoting during ball possession for the SMK Sinar Husni 2 TR Futsal Team prior to the squat training intervention are presented in the following table.

Table 2. Frequency Distribution of Pretest Results for Pivot Success in Ball Possession: SMK Sinar Husni 2 TR Futsal Team

No.	Intervals	Category	Frequency	Presentation (%)
1	17 - 20	Very good	0	0%
2	13 - 16	Good	6	30%
3	9 - 12	Fair	9	45%
4	5 - 8	Poor	5	25%
Total			20	100%

Based on the pre-test results, the distribution of ball-handling pivot proficiency among the SMK Sinar Husni Futsal Team prior to the squat training intervention shows that the fair category was the most dominant, comprising 9 players (45%), followed by the good category with 6 players (30%) and the poor category with 5 players (25%). Meanwhile, no players fell into the excellent category (0%).

Upon completion of the entire squat training program, data was collected via a post-test using the same instrument as the pre-test. The post-test results regarding pivot success in ball possession for the SMK Sinar Husni 2 TR Futsal Team are presented in the following table:

Table 3. Frequency Distribution of Post-test Results for Pivot Success in Ball Possession SMK Sinar Husni 2 TR Futsal Team

No.	Intervals	Category	Frequency	Presentation (%)
1	17 - 20	Very good	13	65%
2	13 - 16	Good	7	35%
3	9 - 12	Fair	0	0%
4	5 - 8	Poor	0	0%
Total			20	100%

Based on the post-test results, the distribution of success in ball-possession pivots for the SMK Sinar Husni 2 TR Futsal Team following the squat training intervention was



determined. The very good category was the most dominant, comprising 13 players (65%), followed by the good category with 7 players (35%). Meanwhile, no players fell into the fair or poor categories (0%).

Discussion

The results of the study showed that squat training had a positive effect on the success of pivoting in ball possession among the Futsal Team of SMK Sinar Husni 2 TR. This was demonstrated by an increase in the mean pivot performance score, from 11.4 in the pretest to 17.5 in the posttest. In addition, there was a considerable change in the distribution of test result categories. Before the treatment was administered, most players were in the moderate category (45%), whereas after participating in the squat training program, most players were in the very good category (65%). This improvement indicates that squat training was able to enhance the players' ability to maintain ball possession through the pivot technique.

Based on the hypothesis test using a paired-samples t-test, the significance value was less than 0.05, indicating that H_0 was rejected and H_1 was accepted. Therefore, it can be concluded that squat training had a significant effect on the success of pivoting in ball possession among the Futsal Team of SMK Sinar Husni 2 TR. These findings indicate that a systematically designed training program can produce physical adaptations that support improvements in players' technical skills.

The improvement in pivot performance can be explained by the fact that squat training focuses on increasing lower-limb muscle strength, particularly in the quadriceps, hamstrings, gluteus, and core muscles. The strength of these muscle groups is essential when performing the pivot technique, including maintaining body balance, resisting pressure from opponents, and rotating the body while maintaining ball possession. The greater the lower-limb strength possessed by the players, the better their body stability when performing the pivot technique.

In addition to increasing muscle strength, squat training also contributes to improvements in balance, coordination, and body control. In futsal, a pivot player must be able to receive the ball with their back to the goal, protect the ball from opponent pressure, and then rotate their body to create attacking opportunities. These abilities are strongly influenced by the player's physical condition, particularly lower-body stability. Therefore, the improvement in physical condition resulting from squat training directly supports the successful execution of the pivot technique.

The findings of this study are consistent with the research conducted by Sari and Victoria (2025), which reported that squat jump training could increase lower-limb muscle power in futsal players, thereby improving overall playing performance. Hidayat et al. (2024) also explained that squat training was effective in increasing lower-limb power, which is an important component in supporting futsal players' technical abilities. In addition, Peprianti (2023) reported that squat training using resistance bands had a significant effect on increasing lower-limb muscle strength in futsal athletes. The consistency of these findings indicates that squat training is an effective training method for developing the physical abilities required in futsal.

Overall, the results of this study demonstrate that the squat training program implemented during the research period improved pivot performance in ball possession among futsal players of SMK Sinar Husni 2 TR. By improving lower limb muscle strength, balance, and body stability, players were better able to maintain possession when under pressure from opponents and perform the pivot technique more effectively. Therefore, squat training can be recommended as one form of physical training that coaches can implement to improve playing performance, particularly among players who occupy the pivot position.



Conclusions

Research findings indicate that squat training significantly influences the success of the pivot maneuver during ball possession for the SMK Sinar Husni 2 TR futsal team. The average pivot performance improved from 11.4 prior to the intervention to 17.5 following a squat training program conducted over 16 sessions. Hypothesis testing yielded a significance value (Sig.) of less than 0.05, demonstrating that squat training is effective in enhancing pivot performance by improving leg muscle strength, balance, and body stability.

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Conflict of Interest

The authors declare no conflict of interest.

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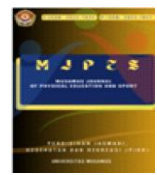
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References

- Afonso, P., Forte, P., Branquinho, L., Ferraz, R., Garrido, N. D., & Teixeira, J. E. (2025). Shaping Training Load, Technical–Tactical Behaviour, and Well-Being in Football: A Systematic Review. *Sports*, 13(8), 1–48. <https://doi.org/10.3390/sports13080244>
- Al Baihaqi, L. I., & Pratama, R. S. (2025). Pengembangan Pola Latihan Taktik Serangan Untuk Meningkatkan Efektivitas Serangan Pada Futsal. *SPORTIVE: Journal Of Physical Education, Sport and Recreation*, 9(5), 9–16.
- Ali, A. (2022). A descriptive-comparative study of performance characteristics in futsal players of different levels. <https://doi.org/https://doi.org/10.1080/02640414.2015.1134806>
- Amin, N. F. (2023). Konsep umum populasi dan sampel dalam penelitian. Anjanika, Y., Ali, M., & Rizky Ramadhani, E. (2023). Pengaruh Variasi Latihan
- Passmove Terhadap Keterampilan Teknik Dasar Passing Futsal. *Cerdas Sifa Pendidikan*, 12(1), 39–48. <https://doi.org/10.22437/csp.v12i1.26234>
- Arifin, R., Hamid, A., & Warni, H. (2024). Pelatihan Tes dan Pengukuran Fisik Dominan Pemain Sepak Bola Tanah Laut Training Test and Dominant Physical Measurement of Tanah Laut Football Players Persetela atau Persatuan Sepakbola Tanahlaut adalah klub sepak bola Indonesia yang bermarkas di Kabupate. 9(4), 1273–1281.
- Aytac. (2024). Post-activation performance enhancement on change of direction speed: Effects of heavy back-squat exercise. <https://doi.org/https://doi.org/10.1016/j.scispo.2023.04.005>
- Bompa. (2021). Periodization of strength training for sports. *Human Kinetics*. Coutinho, D., Kelly, A. L., Santos, S., Figueiredo, P., Pizarro, D., & Travassos, B. (2023). Exploring the Effects of Tasks with Different Decision-Making Levels on Ball Control, Passing Performance, and External Load in Youth Football. *Children*, 10(2). <https://doi.org/10.3390/children10020220>



- Fataha, I., Daud, A., Gani, A. A., Studi, P., Keolahragaan, I., Keguruan, F., & Pendidikan, I. (2025). Pengaruh Latihan Variasi Berpasangan Terhadap Keterampilan Dasar Sepak Sila Sepak Takraw the Effect of Pair Variation Training on Basic Skills of Sepak Takraw. *Jambura Journal of Sports Coaching*, 7(1), 50–57.
- Fernando, J. (2022). Jurnal Olahraga dan Kesehatan Indonesia (JOKI) Media Pembelajaran Bola Voli Interaktif. *Jurnal Olahraga Dan Kesehatan Indonesia (JOKI)*, 2, 94–99. Futsal. (2023).
- Haff, T. O. (2026). Periodization : theory and methodology of training / Tudor O . Bompa , G . Gregory Haff. 23947.
- Harsono. (2018). Latihan Kondisi Fisik. PT Remaja Rosdakarya.
- Hidayat, M., Syamsuramel, S., & Syafaruddin, S. (2024). Influence of Squat Jump Training on Leg Power in State Middle School. *Altius: Jurnal Ilmu Olahraga Dan Kesehatan*, 12(2), 466–467. <https://doi.org/10.36706/altius.v12i2.31>
- Horgan, B. G., Halson, S. L., Drinkwater, E. J., West, N. P., Tee, N., Alcock, R. D., Chapman, D. W., & Haff, G. G. (2023). No effect of repeated post-resistance exercise cold or hot water immersion on in-season body composition and performance responses in academy rugby players: a randomised controlled cross-over design. *European Journal of Applied Physiology*, 123(2), 351–359. <https://doi.org/10.1007/s00421-022-05075-2>
- Ishak, M., Hasmarita, S., Sukma Anugrah, C., Jasmani kesehatan dan Rekreasi, P., Pasundan, S., Kata kunci, I., Jasmani, K., belajar, K., & Jasmani, P. (2022). HJSE 2 (1) (2022) HOLISTIC JOURNAL OF SPORT EDUCATION
- <https://journal.uniga.ac.id/index.php/hjse> TINGKAT KETERAMPILAN DASAR BERMAIN FUTSAL PESERTA EKSTRAKURIKULER FUTSAL DI SEKOLAH MENENGAH ATAS. *Holistic Journal of Sport Education*, 2(1), 10–20.
- Jaeggi, J. S., Achermann, B., & Lorenzetti, S. R. (2024). Female Lower Body Muscle Forces: A Musculoskeletal Modeling Comparison of Back Squats, Split Squats and Good Mornings. *Journal of Functional Morphology and Kinesiology*, 9(2). <https://doi.org/10.3390/jfmk9020068>
- Kamaruddin, A., & Djawa, B. (2022). Jurnal Pendidikan Olahraga dan Kesehatan Volume 10 Nomor 02 Tahun 2022 PENGARUH METODE DRILL DAN METODE BERMAIN TERHADAP KETERAMPILAN GERAK PASING FUTSAL PADA SISWA DI SDN BANYU URIP III / 364 SURABAYA. 10.
- KepriadiDwiPutra. (2025). Pengaruh Latihan Squat Jump Terhadap Daya Ledak Otot Tungkai Pemain Kuansing Soccer School (KSS) Kuantan Singingi Riau. <https://doi.org/https://doi.org/10.21831/jk.vXiY.00001>
- Latif, A. F., Studi, P., Keolahragaan, I., Pendidikan, D., Dan, K., Pendidikan, F., Dan, O., & Indonesia, U. P. (2018). PERBANDINGAN AEROBIC CAPACITY PEMAIN FUTSAL BERDASARKAN POSISI (ANCHOR , FLANK DAN PIVOT) SKRIPSI.



- Mendes, D., Travassos, B., Carmo, J. M., Cardoso, F., Costa, I., & Sarmento, H. (2022). Talent Identification and Development in Male Futsal: A Systematic Review. *International Journal of Environmental Research and Public Health*, 19(17). <https://doi.org/10.3390/ijerph191710648>
- Mirpana, K., & Mahfud, I. (2024). Jurnal Kejaora : Jurnal Kesehatan Jasmani dan Olah Raga Pengaruh Latihan Sirkuit Training terhadap Kelincahan Ekstrakulikuler Futsal Tingkat SMA. 9(November), 267–272.
- Na'afisari I, Anwar K, Hidayatullah F, P. S. . (2023). Jurnal Terapan Ilmu Keolahragaan. *Jurnal Terapan Ilmu Keolahragaan*, 01(April), 12–16. <https://doi.org/10.17509/jtikor.v7i2>
- Peprianti, P. (2023). Pengaruh Latihan Squat Menggunakan Resistence Band Terhadap Kekuatan Tungkai Tim Futsal Putri Universitas Muhammadiyah Palopo. <https://doi.org/https://doi.org/10.37058/sport>
- Ramadani, Z. I. (2025). TRATEGI PENINGKATAN PRESTASI EKSTRAKULIKULER FUTSAL DI MAN 1 TRENGGALEK.
- Rodrigues, M. E., Ramos, A., Leite, N., Ribeiro, J. N., Araújo, D., & Travassos, B. (2025). Decoding futsal defensive game situations through the eyes of coaches. *Motricidade*, 21(X), 1–11. <https://doi.org/10.6063/motricidade.37005>
- Sari, K. T., & Victorian, A. R. (2025). JTIKOR Boosting Explosive Power : The Impact of Squat Jump Training on Futsal Athletes. 10(November), 137–143. <https://doi.org/10.17509/jtikor.v10i2>
- Setiawan, D., Rusdiana, A., Ikhwan, I., Imanudin, I., Umaran, U., Haryono, T., & Kurniawan, T. (2024). Analisis Kontribusi Assist berdasarkan Posisi Pemain Futsal (Perbandingan antara Tim Profesional dan Amatir melalui Pendekatan Game Performance Analysis NacSport). *Jurnal Pendidikan Olahraga*, 14(6), 441–452. <https://doi.org/10.37630/jpo.v14i6.2243>
- Siff, mel c; Yuri, V. (2009). Supertraining. Verkhoshansky.
- Suchomel, T. J., McKeever, S. M., Nolen, J. D., & Comfort, P. (2022). Muscle Architectural and Force-Velocity Curve Adaptations following 10 Weeks of Training with Weightlifting Catching and Pulling Derivatives. *Journal of Sports Science and Medicine*, 21(4), 504–516. <https://doi.org/10.52082/jssm.2022.504>
- Sugiyono. (2019). Metode Penelitian Kuantitatif kualitatif & RnD. Bandung: Alfabeta.
- Sugiyono. (2022). Buku Metode Penelitian Kuantitatif, Kualitatif, dan R&D Tahun 2022 - Sugiyono.
- Zainuddin Iba, A. W. (2023). Metode Penelitian.

