ORIGINAL ARTICLE

Physical Therapy Journal of Indonesia (*PTJI*) 2024, Volume 5, Number 2: 104-108
E-ISSN : 2722-6034 ; P-ISSN : 2722-0125

The relationship between leg muscle power and dribbling skills among futsal players

Rosyida Aprilia Wulandari[1*], Ni Komang Ayu Juni Antari[2], Made Hendra Satria Nugraha[2], Ni Luh Putu Gita Karunia Saraswati[2]

[1]Bachelor and Professional Program of Physiotherapy, Faculty of Medicine, Universitas Udayana, Denpasar, Bali, Indonesia;
[2]Department of Physiotherapy, Faculty of Medicine, Universitas Udayana, Denpasar, Bali, Indonesia.

*Corresponding author:
Rosyida Aprilia Wulandari;
Bachelor and Professional Program of Physiotherapy, Faculty of Medicine, Universitas Udayana, Denpasar, Bali, Indonesia;
rosyidaapriliawulandari@gmail.com

Received: 2024-02-07
Accepted: 2024-04-29
Published: 2024-06-03

ABSTRACT

Background: Futsal is a sport that involves using the feet to manipulate the ball and score as many goals as possible to reach the opponent's goal. It is crucial to have a strong command of basic techniques, including proficient dribbling skills. Dribbling talent is essential to getting past opponents' control and creating goal-scoring opportunities. The higher a player's skill in dribbling the ball, the greater his chances of winning. This study aimed to determine the potential correlation between leg muscle power and ball dribbling skills in futsal players.
Methods: This study used observational analytical methods with a cross-sectional approach. Consecutive sampling was the technique used for the sampling process. This research was carried out from September to December 2023 at My Stadium Futsal Arena. A total of 89 people were recruited to participate in this study. In data collection, participants' leg muscle power was measured using a vertical jump test, and their dribbling skills were assessed using a dribbling test.
Results: There was a significant relationship between leg muscle power and dribbling skills in futsal players. The higher the leg muscle power value, the better futsal players' dribbling skills.
Conclusion: The findings indicated a correlation between leg muscle power and ball dribbling skills in futsal players.

Keywords: dribbling skills, futsal players, leg muscle power, performance.
Cite This Article: Wulandari, R.A., Antari, N.K.A.J., Nugraha, M.H.S., Saraswati, N.L.P.G.K. 2024. The relationship between leg muscle power and dribbling skills among futsal players. *Physical Therapy Journal of Indonesia* 5(2): 104-108. DOI: 10.51559/ptji.v5i2.200

BACKGROUND

Futsal is a sport that is quite popular and widely favored among people, including in Indonesia. The rapid growth of futsal requires a comprehensive coaching and training approach that provides for mental aspects, tactics, strategy, physical components, and techniques. To achieve success in futsal requires mastery of fundamental techniques.[1] Sudrajat believes that to perform at a high level, one must first understand the essential techniques.[2] The futsal course requires students to learn scientific concepts and master basic futsal techniques. Futsal involves basic techniques such as dribbling, passing, control, heading, and shooting.[3] Mastery of basic skills is supported by the child's basic movement abilities, which can assist each individual in becoming independent and less reliant on others, allowing them to contribute to their psychomotor and intellectual development.[4] Understanding basic futsal tactics is crucial for reducing injury risks.[5]

Dribbling skills to achieve maximum performance are insufficient if you only master the technique. However, it must be reinforced by other supporting components, specifically physical fitness, which is the most dominant component and increases technical skills. According to the American College of Sports Medicine (ACSM), a person is considered physically healthy if they can perform various physical tasks with moderate to heavy force and maintain that fitness level throughout life.[6] There are two types of physical fitness: health-related and skill-related. When it comes to dribbling, the most essential fitness is skill-related fitness. Speed, strength, flexibility, balance, response time, and coordination are parts of physical fitness related to skills.[7] Good physical fitness can help players' performance to be optimal during matches. Hence, players' physical fitness needs to be improved or developed according to the characteristics and needs of each sport.[8]

Leg muscle power refers to the capacity of a person or team to quickly apply maximal force when under stress. Muscle explosiveness refers to the body's ability to contract fast to perform abrupt tasks. Leg muscle explosiveness is defined by rapid and maximal muscle action.[9] As a motor component, leg muscle power is crucial for athletes to master sport-specific techniques, including dribbling the ball.[10] Leg muscle power is essential in dribbling techniques because dribbling movements require muscle strength to contract optimally to produce maximum movement.[11] Leg muscle power determines the range of motion for running, kicking, and jumping.[8] Based on the above, the author wants to know whether leg muscle power is related to ball dribbling skills in futsal players in Denpasar. This research aims to contribute to the health sector, especially physiotherapy, by highlighting the importance of physical fitness for futsal players to maximize their performance during matches and achieve game goals.

METHODS

This research used analytical research methods with a cross-sectional approach. This research was carried out from September to December 2023 at My Stadium Futsal Arena. Participants in this research were futsal players who were members of a futsal club in Denpasar.

Participants who met the inclusion and exclusion criteria were selected from the pool of futsal players registered at the Denpasar futsal club. The cross-sectional formula was used to determine the sample size for this study, namely 89 people.

Male futsal players aged 18–22 years have participated in tournaments (not in the process of training or studying), can communicate well verbally and cooperatively, are willing to take part in research and sign an informed consent form, and are in good physical condition, are all considered for inclusion. Injuries to the ankle in the last three months, players with a history of post-operative fractures in the lower leg area during the previous two years, and players undertaking additional training that might impact the test are all excluded.

This research used a non-probability sampling technique based on a consecutive sampling approach for the sampling procedure. This technique collects samples by selecting samples that match the inclusion criteria within a certain period until the sample limit is reached.[12] The variables of this study can be categorized as follows: age and gender as control variables; leg muscle power is the independent variable; and dribbling skill is the dependent variable.

This research used the SPSS program to process and analyze data. Univariate and bivariate analyses were the statistical tests used. The purpose of univariate analysis was to ensure the distribution and proportion of each variable in the research data. Leg muscle power, dribbling skills, age, and gender were some of the variables investigated in this study. Two variables suspected to have a high level of correlation were targeted for bivariate analysis. This bivariate analysis aimed to determine the correlation between the two variables under study. To ascertain the relationship between leg muscle power and dribbling skills in futsal players in Denpasar, this research employed bivariate analysis to test the hypothesis. *Spearman's rho* was the correlation test used in this study. The Research Ethics Commission of the Faculty of Medicine, Universitas Udayana/Sanglah Hospital Denpasar, with the number 747/UN14.2.2.VII.14/LT/2023 accepted this study based on its ethical feasibility. Each person in this study gave informed consent and agreed to participate.

RESULTS

This study included futsal players from a Denpasar futsal club. Eighty-nine study participants were selected using a subject selection procedure known as sequential sampling, all of whom were between 18 and 22 and met the inclusion and exclusion criteria. The following table displays the characteristics of the players in this study, organized by age, gender, leg muscle power, and dribbling ability.

Table 1 shows that the age range for futsal players, according to the inclusion criteria, is 18-22 years. The highest age was 18, namely 28 people (31.5%), and the lowest was 22, namely eight people (9.0%). It can be seen that the gender of the subjects in this study was all male, with a total of 89 people (100%). The individuals' most prominent leg muscle power was in the average category, with 30 people. The average category in this study is a category with a value range of 41-50 cm. Leg muscle power in each subject was measured using the vertical jump test with two repetitions for each subject. On average, each subject spent approximately 2 minutes doing this test. The dribbling skills of the most dominant subjects are in the inferior category, namely 31 people. The inferior category in this study is the category with a value of > 15.80 seconds. The dribbling skills of research subjects were measured using a dribbling skill test with two repetitions for each subject. On average, each subject spent approximately 1 minute doing this test.

Table 2 shows that one subject with leg muscle power in the excellent category had dribbling skills that were classified as very poor. Furthermore, 11 subjects with leg muscle power in the outstanding category had excellent dribbling skills. In the above-average category, most subjects had exceptional skills: seven people, six people pleasing, three average, two poor, and five very poor. Meanwhile, for

Table 1. Frequency distribution of subject characteristics

Characteristic	Frequency (n)	Percentage (%)
Age		
18	28	31.5
19	17	19.1
20	26	29.2
21	10	11.2
22	8	9.0
Gender		
Male	89	100
Leg muscle power		
Excellent	1	1.1
Very Good	11	12.4
Above Average	23	25.8
Average	30	33.7
Below Average	20	22.5
Poor	4	4.5
Dribbling skills		
Very good	23	25.8
Good	12	13.5
Average	13	14.6
Poor	10	11.2
Very poor	31	34.8
Total	89	100

Table 2. Distribution of dribbling skills based on leg muscle power

Limb Muscle Power	Dribbling Skills					Total
	Very good	Good	Average	Poor	Very poor	
Excellent	0	0	0	0	1	1
Very Good	11	0	0	0	0	11
Above Average	7	6	3	2	5	23
Average	5	5	5	4	11	30
Below Average	0	1	5	4	10	20
Poor	0	0	0	0	4	4
Total	23	12	13	10	31	89

Table 3. Characteristics of research variables

Variables	Average	Standard deviation
Leg muscle power	47.82	10.16
Dribbling skills	14.21	2.97

Table 4. Relationship between leg muscle power and dribbling skills

Variable Correlation	Correlation	*p*-value
Leg Muscle Power	0.557	0.000
Dribbling Skills		

the average category, the distribution of dribbling skills is relatively even: perfect for five people, suitable for five people, ordinary for five people, poor for four people, and very poor for 11 people. As for the below-average category, most subjects showed very poor skills: ten people, four poor, five average, and one good. Then, four subjects with poor leg muscle power showed very poor skills.

Table 3 shows that the average leg muscle power of the whole subject was 47.82 cm, included in the average or moderate category, with a standard deviation of 10.160. Then, it was also found that the average value of dribbling skills of the whole subject was 14.2073 seconds, which was also included in the moderate category, with a standard deviation of 2.97412.

Table 4 shows that *Spearman's rho* analysis test shows a significant relationship between the two variables, namely leg muscle power and dribbling skills in futsal players in Denpasar, with a significance value of p=0.000 (p<0.05). In addition, the analytical test resulted in a positive correlation coefficient value of 0.557. Assuming the results are in the range of 0.51-0.75 and are positive, this indicates a strong level of correlation between the two variables with a unidirectional relationship. The higher the leg muscle power value, the better the dribbling skills of futsal players.

DISCUSSION

The age of 18 is considered adolescence, the phase between childhood and adulthood that typically lasts from 12 or 13 years until the late teens or early twenties. During adolescence, children enjoy exploring their environment and interacting with the individuals they meet.[13] Aside from the physical changes, adolescents have significant cognitive and social changes. One of the most important qualities of this transitional period is increased autonomy from parents and adults, also known as social reorientation, a process that eventually assists adolescents in developing into adults with social goals and responsibilities.[14]

Social group sports, including futsal, can be used as a medium for socialization through communication and interaction with other people or the surrounding environment. So, quite a few teenagers aged 18 socialize by joining a futsal team to fill their free time. Participants continue participating in futsal sports because they enjoy it and want to improve their performance. They have goals for the future, and they cannot escape their parents' constant encouragement and support during training and competition.[15] Sutarman (2015) stated that teenagers have more free time than other productive age groups.[16]

Psychologically, boys will be more interested in games that require various types of movement because most boys always show their movement skills in multiple situations.[17] Many boys channel their energy and enthusiasm positively by participating in futsal, a popular activity that demands high-intensity movements, including dribbling, sprinting, kicking, and jumping.[18] From an anatomical and physiological standpoint, males are stronger than females in terms of muscle mass. Males experience a 50% greater increase in muscle mass than females after puberty, associated with increased muscle strength. Both males and females experience differences in testosterone hormone levels after puberty, with testosterone levels in males being ten times higher than in females. Testosterone is one of the hormones that can increase muscle strength and size by activating satellite cells and enhancing protein synthesis.[19]

Subjects with leg muscle power in the excellent category showed dribbling skills in the very poor category. This condition occurs due to a lack of specific training in dribbling techniques applied every training session, which causes a lack of mastery of the method. Furthermore, subjects with leg muscle power in the very good category had excellent dribbling skills. This condition can be caused by the subject's good leg muscle strength. This is in line with the research findings of Azhuari et al. (2022), which show a correlation between leg muscle power and a person's dribbling ability. Dribbling the ball becomes easier as leg muscle power increases.[20]

Based on the results of interviews with futsal coaches from futsal groups, research showed that during training sessions, no special exercises were applied to each futsal group. The training tends to be different each time, involving several physical exercises such as agility ladder

drills, knee tuck jumps, and speed training. Apart from that, technical exercises such as passing, control, and dribbling, as well as tactical aspects such as playing patterns and player positioning, are also covered in the training. Despite efforts to involve various aspects of practice, the lack of specific, focused practice and consistency may hinder the development of particular skills. Physical exercise is subjecting the body to controlled and repeated physical stress to strengthen its functional capacity to perform certain tasks.[21]

In the ball dribbling technique, there are several movements, including hip flexion and extension, which occur when the player steps forward and backward to run while dribbling the ball. Next are hip abduction and adduction movements, which are movements of the legs to the right and left when playing the ball to outwit the opponent. Meanwhile, leg movement when dribbling is limited to plantar and dorsal flexion.[22]

Dribbling involves complex coordination between muscles, nerves, and the brain. When dribbling the ball, the muscles that play a role in each movement will contract if the cerebellum transmits signals to the muscles via motor nerves. When the signal is at the axon terminal, the nerve will release the neurotransmitter acetylcholine into the synaptic cleft and attach to the acetylcholine receptor in the neuromuscular junction sarcolemma, causing the sodium channels to open. The opening of sodium channels causes sodium ions to diffuse into the muscle fiber membrane, causing depolarization. The action potential in the muscle fiber will be distributed along the muscle membrane through the transverse tubule T system, stimulating the sarcoplasmic reticulum to release calcium ions.[23]

Then, the released calcium ions will attach to troponin, thereby stimulating changes in the structure of tropomyosin, which causes the tropomyosin bond to be released from actin and allows the myosin head to bind to actin, especially at the binding side. Then, the energy in the form of ATP will attach to the myosin head and be converted into ADP and phosphate to support contraction. With this energy, the myosin heads can shift the actin so that the actin approaches each other and the sarcomere shortens.[24] The rate of muscle contraction is directly proportional to the rate of receipt of the stimulus and the rate of response to the actin and myosin filaments. The stronger the leg muscles contract, the better the power of the leg muscles so that movements such as running and kicking can be produced optimally.[8] Lower quadriceps muscle strength is linked to poorer functional performance.[25]

In futsal games, players are required to carry out movements such as dribbling the ball continuously quickly and be able to face opponents at a fairly close distance due to the short playing time and relatively narrow field, so good leg muscle power is needed to achieve maximum results and achieve goals desired.[26] Leg muscle strength is one of the main components in creating good movements when dribbling the ball, where muscle strength and speed of muscle contraction are needed to build strong and fast movements to keep the ball in control and not easily blocked or seized by opposing players.[27]

This research has limitations. This study did not control the factors affecting leg muscle power and dribbling skills, such as flexibility, speed, and confidence. The restricted range of independent variables and this study's relatively small sample size may limit the identification of factors influencing dribbling ability and lower the findings' generalizability. Future research should include a more diverse set of variables, a bigger sample size, and could consider other factors that could affect dribbling skills.

CONCLUSION

There was a significant relationship between leg muscle power and ball dribbling skills in futsal players. It was also found that the higher the vibrating muscle power value, the better the ball dribbling skills of futsal players. Training ideal dribbling skills for all players in a club can lead to increased productivity and improved ball-handling coordination.

ETHICAL CLEARANCE

The Research Ethics Commission of the Faculty of Medicine, Universitas Udayana, approved this study under registration number 747/UN14.2.2.VII.14/LT/2023. Informed consent was also obtained from survey respondents, who approved the use of sampling.

CONFLICT OF INTEREST

The author confirms there are no conflicts of interest.

FUNDING

This study was not funded or sponsored by any organization.

AUTHOR CONTRIBUTIONS

RAW developed the study's methodology, gathered the data, and wrote the article. He also conducted a literature search, edited the draft, and reviewed the final version of the paper. FR used SPSS to process the data.

REFERENCES

1. Gunawan G. Hubungan power tungkai dan kelincahan dengan keterampilan menggiring bola pada permainan futsal. Jurnal Speed. 2018; 1(1): 30–9.
2. Affrianty FN, Marzuki, Chiar M. Studi keterampilan teknik dasar menggiring bola dengan kecakapan bermain Futsal Club Wanita Starlight. Jurnal Pendidikan dan Pembelajaran Khatulistiwa. 2013; 2(9): 1–10.
3. Ardiansyah M. Hubungan kekuatan otot tungkai dan otot perut terhadap akurasi shooting pada ekstrakurikuler Futsal. Jendela Olahraga. 2020; 5(2): 160–7.
4. Syahruddin S. Profil tingkat gerak dasar siswa sekolah dasar Kota Makassar. Jendela Olahraga. 2021; 6(1): 213–21.
5. Sudirman A, Mahyuddin R, Asyhari H. Memahami faktor penyebab terjadinya cedera dalam permainan sepakbola. Jendela Olahraga. 2021; 6(2): 1–9.
6. Luo S, Soh KG, Zhao Y, Soh KL, Sun H, Nasiruddin NJM, et al. Effect of core training on athletic and skill performance of basketball players: A systematic review. PLoS One. 2023; 18(6): 1–15.
7. Purnomo A, Irawan FA. Analisis kecepatan dan kelincahan dalam menggiring bola pada tim futsal. Sepakbola. 2021; 1(1): 1–7.
8. Pramadewa PKI, Tianing NW, Sundari LPR. Hubungan kekuatan otot tungkai dengan kelincahan pemain sepak bola Mahasiswa Fakultas Kedokteran Universitas Udayana. Majalah Ilmiah Fisioterapi Indonesia. 2019; 7(1): 37–40.
9. Putra IMWP, Dewi AANTN, Wahyuni N, Ruma IMW. Relationship between leg muscle explosive power and lay-up shoot ability. Physical Therapy Journal of Indonesia. 2023; 5(1): 5–8.

10. Haryono S, Pribadi FS. Pengembangan jump power meter sebagai alat pengukur power tungkai. Jurnal Media Ilmu Keolahragaan Indonesia. 2012; 2(1): 15–27.
11. Muchlisin A, Pasaribu N, Kurniawan F. Hubungan kekuatan tungkai dan koordinasi mata kaki dengan kemampuan menggiring bola dalam permainan sepakbola pada Mahasiswa Pendidikan Kepelatihan Olahraga FIP Ubhara Jaya. Competitor: Jurnal Pendidikan Kepelatihan Olahraga. 2019; 11(1): 1–7.
12. Wijaya GWP, Adhitya IPGS, Negara AAGAP. Relationship between lower limb muscle strength and kinesiophobia with functional stability and knee function in anterior cruciate ligament reconstruction patients: a literature review. Kinesiology and Physiotherapy Comprehensive. 2023; 2(1): 1–4.
13. Papalia E, Olds S, Feldman R. Human Development. 11th ed. New York: McGraw-Hill; 2009.
14. Güroğlu B. Adolescent brain in a social world: Unravelling the positive power of peers from a neurobehavioral perspective. European Journal of Developmental Psychology. 2021; 18(4): 471–93.
15. Jumain. Survei motivasi siswa dalam mengikuti ekstrakurikuler futsal di SMK Negeri 1 Tolitoli. Musamus Journal of Physical Education and Sport. 2023; 5(2) :201–8.
16. Sutarman W. Ruang kota sebagai wadah aktivitas remaja dalam mengisi waktu luang di Kota Denpasar. Jurnal Lingkungan Binaan. 2015; 2(2): 254–66.
17. Akabar A. Meningkatkan hasil belajar teknik passing kaki bagian dalam pada permainan sepakbola melalui metode bermain berpasangan pada siswa Kelas VII SMP Negeri 14 Bengkulu Tengah. Educative Sportive-EduSport. 2020; 1(2): 52–5.
18. Aswadi, Amir N, Karimuddin. Penelitian tentang perkembangan cabang olahraga futsal di Kota Banda Aceh Tahun 2007-2012. Jurnal Ilmiah Mahasiswa Pendidikan Jasmani, Kesehatan dan Rekreasi. 2015; 1(1): 39–40.
19. Purnami NKR, Kuswardani RT, Aryana IGPS, Astika IN, Putrawan IBP, Wande IN, et al. Hubungan kadar testosteron serum dengan kekuatan genggaman pada lanjut usia laki-laki. Jurnal Penyakit Dalam Udayana. 2020; 4(1): 19–23.
20. Azhuari F, Syaputra R, Apriansyah D. Hubungan power otot tungkai terhadap keterampilan dribbling bola futsal di Tim Futsal SMA N 2 seluma. Educative Sportive-EduSport. 2022; 3(2): 230–4.
21. Brooks G, Fahey T. Exercise Physiology, Human Bioenergetics and its Applications. 4th ed. New York: John Wiley & Sons; 1984.
22. Rahardjo ASB, Winarni TI, Susanto H. Hubungan obesitas dengan range of motion sendi panggul dan fleksi lumbal pada dewasa muda. Jurnal Kedokteran Diponegoro. 2016; 5(4): 430–9.
23. Fajrin SN, Mahayati DS. Hubungan koordinasi terhadap keterampilan menggiring bola pada pemain sepak bola. Indonesian Journal of Physiotherapy. 2021; 1(1): 6–12.
24. Nugraha MHS, Wahyuni N, Muliarta IM. Pelatihan 12 balance exercise lebih meningkatkan keseimbangan dinamis daripada balance strategy exercise pada lansia di Banjar Bumi Shanti, Desa Dauh Puri Kelod, Kecamatan Denpasar Barat. Majalah Ilmiah Fisioterapi Indonesia. 2016; 1(1): 1–12.
25. Hidayat A, Aziz. Metodologi penelitian keperawatan dan tekhnik analisis data. Jakarta: Salemba Medika; 2009.
26. Saputro R, Maurizal L, Armade M. Hubungan koordinasi mata-kaki dan kecepatan dengan dribbling bola pada atlet futsal. Journal of Sport Education and Training. 2021; 2(2): 158–9.
27. Alfaroby MI, Galuh N, Denata Y. The relationship between agility, eye-foot coordination, leg muscle strength, and soccer dribbling skills of football school (SSB) Players. Journal of Coaching and Sports Science. 2022; 1(1): 2963–1483.