

ORIGINAL RESEARCH

The relationship between Loughborough soccer passing test and ankle joint range of motion in amateur soccer players

Umut Çelik¹, Ahmet Can Saran¹, Abdurrahman Elitaş¹, Yusuf Bozçalı², Merve Çatalbaş³, Vedat Saçlı³, Gamze Yüce⁴

¹ School of Physical Education and Sports, Osmaniye Korkut Ata University, Osmaniye, Türkiye ¹, None Affiliation ², Institute of Graduate Studies, Osmaniye Korkut Ata University, Osmaniye, Türkiye ³, Graduate Education Institute, Tokat Gaziosmanpasa University, Tokat, Türkiye ⁴

Abstract

Received:
March 20, 2024

Accepted:
April 12, 2024

Online Published:
April 23, 2024

Keywords:
Joint range of motion,
Loughborough passing, soccer,
technique.

This study aimed to investigate the relationship between Loughborough soccer passing technique ability and ankle dorsiflexion and plantar flexion joint range of motion in amateur soccer players. A study was conducted with 38 male amateur (age; 20.18 ± 1.83 years, height; 179.29 ± 5.60 cm, weight; 70.61 ± 9.40 kg) soccer players to assess their physical abilities using various tests. The tests included Loughborough soccer passing and ankle dorsi/plantar flexion. The assumption of normality was made by employing the Kolmogorov-Smirnov test. Since the data were normally distributed, Pearson correlation test was used to examine the relationship between variables. A significant negative correlation between the Loughborough soccer passing ankle dorsiflexion right ($r = -.463$; $p < 0.01$), ankle dorsiflexion left ($r = -.458$; $p < 0.01$), ankle plantar flexion right ($r = -.354$, $p < 0.05$). A moderate negative correlation was observed between the Loughborough soccer passing test and ankle dorsiflexion right-left and ankle plantar flexion right range of motion. Based on these results, coaches can improve football players' passing technical skills by increasing their ankle dorsiflexion and plantar flexion joint range of motion.

Introduction

In soccer, players have to do a lot of high-intensity moves over and over again. For example, they have to quickly speed up and slow down, change directions a lot, jump and land, and tackle other players to keep or get the ball (Krustrup et al., 2010). In addition, fundamental skills including as passing, dribbling, heading, shooting, and ball control are of utmost importance for all players and must be developed and consistently enhanced (Burcak, 2015). One of these abilities, passing exchange, is used more often than the others. Chapman et al. (2008) stated that generally 80% of the game consists of passing passes. Therefore, players' passing skills are of great importance for the team to keep the ball under control (Vembiarto & Lismadiana, 2018). This skill must be acquired by the soccer player consciously and individually (Hargreaves, 1990). Because the number of passes, quality of passes and the rapid execution of this skill can directly affect the outcome of a match. In a study, it was stated that the number of passes made and the quality of passes were related to winning the match (Collet, 2013).

The quality and accuracy of passing technique can be affected by flexibility or range of motion in the ankle. Flexibility is the range of motion (ROM) in a joint or group of joints, or the ability to move joints effectively (Hofman, 2014). According to Werner et al. (2008), an insufficient or excessive range of motion in a joint might negatively affect the functional integrity of the movement. Especially in soccer, some range of motion deficits can limit certain technical skills and reduce players' performance (Nunume et al., 2006; García-Pinillos et al., 2015; Mills et al., 2015). For instance, the degree of ankle dorsiflexion and plantar flexion range of motion can have either a positively or negatively effect on passing technical ability.

When the literature is examined, the importance of joint range of motion is increasing for the successful realization of technical skills in soccer (Hofman, 2014; Nunume et al., 2006; García-Pinillos et al., 2015; Mills et al., 2015). In this context, the aim of the study is to examine the relationship between ankle dorsiflexion and ankle plantar flexion joint range of motion and Loughborough Soccer passing technical skill.

✉ V. Saçlı, e-mail: vedatsaccli802@gmail.com

Methods

Participants

The sample group of the study consisted of 38 amateur male soccer players (age; 20.18 ± 1.83 years, height; 179.29 ± 5.60 cm, weight; 70.61 ± 9.40 kg). Participants who volunteered for the study were informed about the study.

Measurement

Ankle joint dorsiflexion and plantar flexion

Given that the initial location of the ankle was 0° , a 90° angle was deemed appropriate between the 5th metatarsal and the fibula. Throughout the measurement, the individual assumed either a supine or seated position. The researchers conducted measurements by positioning a slender cushion beneath the knee (Otman et al., 2014).

Loughborough soccer passing test

Participants complete a total of 16 rounds throughout the examination, four for each colour. Duration, pass accuracy, and penalty points were documented. The athletes' objective is to finish the test with minimal errors and in the shortest time feasible. Eight passes are executed on the long target (green-blue) and eight passes are executed on the short target (white-red) in each trial (Le Moal et al., 2014).

Duration of errors made during the test;

- +5 seconds are added to the time for a pass that does not hit the target stand or is thrown to the wrong target.
- A pass that does not hold the target center is added to the +3 seconds duration.
- When the ball is handled by hand, +3 seconds are added to the time.
- When he passes the ball to the target from outside the passing area, +2 seconds are added to the duration.
- When you touch each of the cones, +2 seconds are added to the duration.

- Every second that the test time (43 seconds) was exceeded was added to the total passing time.
- 1 second was subtracted from the total time for passes that found the target (Le Moal et al., 2014).

Experimental Procedures

This study aimed to determine the relationship between the results of ankle joint range of motion and passing technical ability in amateur male soccer players. The tests were conducted on different days. Joint range of motion measurements were performed with a goniometer. A standard warm-up of 15 minutes was performed before the loughborough tests were performed.

The study was approved by the Osmaniye Korkut Ata University Ethics Committee (07.02.2024-21221). The study was conducted in accordance with the Declaration of Helsinki.

Statistical Methods

An essential assumption test, a normalcy test, was done before analysis. The data were normally distributed; hence Pearson's correlation was used. The 95% CI was determined. Statistical significance was defined at $P < 0.05$. For the classification of effect size in correlation values, 0-0.30 weak correlation, 0.31-0.50 medium correlation, 0.51-0.70 high correlation and 0.71-1 correlation coefficient valid in the field of sports sciences, (R) was used (Hopkins et al., 2009). This study utilized SPSS 26.

Results

The study results indicate a significant negative correlation between the Loughborough soccer passing ankle dorsiflexion right ($r = -.463$; $p < 0.01$), ankle dorsiflexion left ($r = -.458$; $p < 0.01$), ankle plantar flexion right ($r = -.354$; $p < 0.05$) ROM (Table 1). A moderate negative correlation was observed between the Loughborough soccer passing test and ankle dorsiflexion right-left and ankle plantar flexion right range of motion.

Table 1

Correlation between test results Loughborough soccer passing and ankle joint range of motion.

Variables	Ankle Dorsiflexion Right	Ankle Dorsiflexion Left	Ankle Plantar Flexion Right	Ankle Plantar Flexion Left
Loughborough Soccer Passing	-.463**	-.458**	-.354*	-.273

* There is a significant correlation at the $p < 0.05$.

** There is a significant correlation at the $p < 0.01$.

Discussion

The present study examined the correlation between the Loughborough soccer passing test and the range of motion (ROM) of ankle dorsiflexion and ankle plantar flexion joints in male amateur soccer players. The study results indicate a moderate negative correlation between the Loughborough soccer passing test and the ROM of ankle dorsiflexion (right-left) and ankle plantar flexion (right).

These results show that as the joint range of motion in the ankle increases, the Loughborough Soccer passing test time decreases. In other words, the increase in the amount of ankle joint range of motion positively affects passing technical skills. It seems that there is no study in the literature investigating the relationship between ankle joint range of motion and passing technical skill.

In soccer, high requirements are needed to perform technical movements such as dribbling, passing, and shooting (Kraynik et al., 2020). Especially, more ankle control is needed compared to other sports branches (Han et al., 2014). Because the accuracy of short passes is affected by ankle coordination (Vembiarto & Lismadiana, 2018).

The sport-specific adaptation and ankle range of motion can be influenced by the level of muscle strength and tension in the leg muscles (De Noronha et al., 2006; Youdas et al., 2009). This may prevent the successful implementation of passing technical skills in soccer. Specifically, the restricted range of motion in ankle dorsiflexion and plantar flexion might have a negatively effect on the ankle's mobility during ball striking. It has been stated that the decrease in dorsiflexion joint range of motion in the ankle has a negative effect on the function of the lower extremities and the biomechanics of sports performance (Liska et al 2021). Ankle proprioception plays an important role in controlling basic movements such as jumping, landing or balancing, and in technical skills such as controlling the ball while playing football. (Han et al 2014). In this context, increased ankle dorsiflexion joint range of motion increases ankle proprioception, and this increase may help make football-specific technical skills more precise.

Conclusion

In order to achieve successful results in football, athletes must have good technical skills. Achieving these requirements is affected by physical characteristics such as ankle joint range of motion. The results of the study show that as the amount of ankle joint range of motion increases, the Loughborough Soccer passing test time decreases. According to these results, coaches can improve the

athletes' passing skills by doing exercises that will increase the amount of ankle joint range of motion.

Acknowledgments

None

Authors' Contribution

Study Design: UÇ, ACS, AE, YS, MÇ, VS, GY; Data Collection: UÇ, ACS, AE, YS, MÇ, VS, GY; Statistical Analysis: Manuscript Preparation: UÇ, ACS, AE, YS, MÇ, VS, GY; Funds Collection: UÇ, ACS, AE, YS, MÇ, VS, GY.

Ethical Approval

The study was approved by the Osmaniye Korkut Ata University Ethics Committee (07.02.2024-21221) .

Funding

The authors received no financial support for this research or authorship.

Conflict of Interest

Data are available upon reasonable request from the corresponding author.

References

- Burcak, K. (2015). The Effects on Soccer Passing Skills When Warming Up with Two Different Sized Soccer Balls. *Educational Research and Reviews*, 10(22), 2860-2868.
- Chapman, S., Derse, E., & Hansen, J. (2008). Soccer coaching manual. Los Angeles: LA84 Foundation.
- Collet, C. (2013). The possession game? A comparative analysis of ball retention and team success in European and international football, 2007–2010. *Journal of Sports Sciences*, 31(2), 123-136.
- De Noronha, M. A., Refshauge, K. M., Herbert, R. D., & Kilbreath, S. L. (2006). Do voluntary strength, proprioception, range of motion or postural sway predict occurrence of lateral ankle sprain? *British Journal of Sports Medicine*.
- García-Pinillos, F., Ruiz-Ariza, A., Moreno del Castillo, R., & Latorre-Román, P. Á. (2015). Impact of limited hamstring flexibility on vertical jump, kicking speed, sprint, and agility in young football players. *Journal of Sports Sciences*, 33(12), 1293-1297.
- Han, J., Anson, J., Waddington, G., & Adams, R. (2014). Sport attainment and proprioception. *International Journal of Sports Science & Coaching*, 9(1), 159-170.
- Hopkins, W., Marshall, S., Batterham, A., & Hanin, J. (2009). Progressive statistics for studies in sports medicine and exercise science. *Medicine & Science in Sports & Exercise*, 41(1), 3.
- Hargreaves A (1990). Skills and Strategies for Coaching Soccer. United States of America: Leisure Press. *Human Kinetics*.
- Hoffman, J. (2014). Physiological aspects of sport training and performance. *Human Kinetics*.
- Krustrup, P., Aagaard, P., Nybo, L., Petersen, J., Mohr, M., & Bangsbo, J. (2010). Recreational football as a health promoting activity: a topical review. *Scandinavian Journal of Medicine & Science in Sports*, 20, 1-13.
- Kraynik, Y., Mulyk, V., Perevoznik, V., & Koval, S. (2020). The use of running and jumping exercises in special motor training

- of young forwards 13–14 years old. *Slobozhanskyi Herald of Science and Sport*, 8(1), 41-44.
- Liška, D., Liptakova, E., Batalik, L., & Rutkowski, S. (2021). The ankle joint dorsiflexion range of motion in the closed kinematic chain of judokas and football players-pilot study. *Archives of Budo*, 17, 145-150.
- Le Moal, E., Rue, O., Ajmol, A., Abderrahman, A. B., Hammami, M. A., Ounis, O. B., ... & Zouhal, H. (2014). Validation of the Loughborough Soccer Passing Test in young soccer players. *The Journal of Strength & Conditioning Research*, 28(5), 1418-1426.
- Mills, M., Frank, B., Goto, S., Blackburn, T., Cates, S., Clark, M., ... & Padua, D. (2015). Effect of restricted hip flexor muscle length on hip extensor muscle activity and lower extremity biomechanics in college-aged female soccer players. *International Journal of Sports Physical Therapy*, 10(7), 946.
- Nunome, H., Ikegami, Y., Kozakai, R., Apriantono, T., & Sano, S. (2006). Segmental dynamics of soccer instep kicking with the preferred and non-preferred leg. *Journal of Sports Sciences*, 24(05), 529-541.
- Otman A. S., Demirel, H., Sade A. (2014). *Tedavi hareketlerinde temel değerlendirme prensipleri*. Ankara: Pelikan Yayıncılık. [In Turkish]
- Vembiarto, E. G., & Lismadiana, M. (2018). The Effect of Various Passing Exercise and Ankle Coordination on the Accuracy of Short Passing in Football. In 2nd Yogyakarta International Seminar on Health, Physical Education, and Sport Science and 1st Conference on Interdisciplinary Approach in Sports, 322-326.
- Youdas, J. W., McLean, T. J., Krause, D. A., & Hollman, J. H. (2009). Changes in active ankle dorsiflexion range of motion after acute inversion ankle sprain. *Journal of Sport Rehabilitation*, 18(3), 358-374.
- Werner, S. L., Suri, M., Guido Jr, J. A., Meister, K., & Jones, D. G. (2008). Relationships between ball velocity and throwing mechanics in collegiate baseball pitchers. *Journal of Shoulder and Elbow Surgery*, 17(6), 905-908.