International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Correlation Between Hamstring Flexibility and Dynamic Balance in Male Recreational Football Players

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ABSTRACT

BACKGROUND: Dynamic balance is vital for athletic performance, particularly in football, where lower limb control is essential. Hamstring flexibility contributes to joint mobility and postural control. Despite individual importance, the correlation between hamstring flexibility and dynamic balance in recreational football players is underexplored. Understanding this relationship may aid in injury prevention and performance optimization.

OBJECTIVE: The objective of the study is to find the relationship between hamstring flexibility and dynamic balance in male recreational football players.

METHODOLOGY: The study was conducted on 40 male recreational football players aged between 18–30 years. Hamstring flexibility was assessed using the Active Knee Extension (AKE) test, and dynamic balance was evaluated through the Anterior Reach distance of the Y-Balance Test (YBT). Data were analysed using Pearson's correlation coefficient to determine the relationship between hamstring flexibility and dynamic balance performance.

RESULT: The result showed a strong positive correlation between hamstring flexibility and dynamic balance ($r = 0.888$, $p = 0.000$). Participants with higher Active Knee Extension values demonstrated better anterior reach in the Y-Balance Test.

CONCLUSION: The study concluded that greater hamstring flexibility is associated with improved dynamic balance in male recreational football players.

KEYWORDS: Active Knee Extension test, Dynamic balance, Hamstring flexibility, Recreational football players, Y-Balance test.

INTRODUCTION

Football is one of the most widely played and followed sports globally, known for its fast-paced and physically demanding nature. It requires a combination of strength, agility, coordination, flexibility, and balance. Players often engage in high-speed running, jumping, cutting, and kicking, which place considerable demands on the musculoskeletal system. Even recreational football players, who may not

follow structured training programs, are frequently involved in intense gameplay and are equally susceptible to sports-related injuries. Lack of proper conditioning, warm-up, and flexibility training can lead to compromised performance and increased injury risk in this population.[1]

Hamstring flexibility is a key factor in lower limb biomechanics. The hamstrings—comprising the biceps femoris, semitendinosus, and semimembranosus—are essential for smooth and controlled hip and knee movement. Tight hamstrings can limit hip flexion, alter pelvic alignment, and cause compensatory strain on the lumbar spine and other joints. This can result in reduced movement efficiency and a higher risk of injuries such as hamstring strains, lower back pain, and even ACL injuries. Measuring hamstring flexibility using the Active Knee Extension (AKE) test offers a reliable and objective method to assess muscle length and flexibility status.[2]

Dynamic balance is another critical component of football performance. It refers to the ability to maintain postural control during motion, especially when transitioning between different body positions or responding to external forces. In football, maintaining balance is essential while dribbling, changing direction, absorbing impact, or recovering from a tackle. Poor dynamic balance can lead to instability, falls, and performance limitations. The Y-Balance Test (YBT), particularly its anterior reach component, is widely used in sports settings to assess dynamic balance and single-leg stance control.[3]

While both hamstring flexibility and dynamic balance are known to influence athletic performance and injury risk, there is limited research examining their direct relationship, particularly in male recreational football players. Understanding this correlation could help guide the development of targeted training interventions aimed at enhancing flexibility and balance simultaneously.4 This study aims to determine whether greater hamstring flexibility is associated with improved dynamic balance. Findings may have practical implications for injury prevention, athletic conditioning, and rehabilitation strategies in football and similar sports.

MATERIALS AND METHODS

The study was conducted using a cross-sectional study design. Participants were selected using a convenience sampling technique. All participants were informed about the study and written consent was obtained prior to participation. The sample included 40 male recreational football players between the ages of 18 and 30 years, who regularly participated in football for at least one year.

Subjects were included if they were free from recent injuries, surgeries, or any neuromusculoskeletal disorders. Participants were excluded if they had any history of lower limb injury within the past six months, were currently undergoing physiotherapy, or had any neurological deficits affecting balance or flexibility. The study was conducted over a period of six weeks at football grounds and physiotherapy labs in Mangalore, Karnataka. Standardized tools and protocols were followed throughout the study to ensure reliability and consistency in measurements.

PROCEDURE

Participants who met the inclusion criteria were enrolled for the study. Prior to testing, the procedure was explained in detail and informed consent was obtained. Each subject's demographic details, including age, height, and weight, were recorded. A standardized warm-up session was provided to minimize muscular stiffness and prepare the body for assessment.

Hamstring flexibility was assessed using the Active Knee Extension (AKE) test. The participant lay in a supine position with the hip of the tested leg flexed to 90 degrees. While maintaining this position, the

participant was instructed to actively extend the knee as much as possible. The angle between the thigh and lower leg was measured using a universal goniometer. Two trials were recorded for each leg, and the average was taken as the final value.

Dynamic balance was evaluated using the Anterior Reach component of the Y-Balance Test (YBT). A customized YBT platform was used to conduct the test. Participants stood on the dominant leg while attempting to reach forward with the non-dominant leg as far as possible without losing balance. Three practice and three test trials were allowed, and the maximum reach distance was recorded. The reach distance was then normalized to leg length to account for individual differences.

The collected data were analyzed using Pearson's correlation coefficient to determine the relationship between hamstring flexibility and dynamic balance performance. A p-value of less than 0.05 was considered statistically significant.

OUTCOME MEASURES

Active Knee Extension (AKE) Test:

The Active Knee Extension (AKE) Test is a reliable clinical assessment tool used to measure hamstring flexibility. The participant lies supine on a flat surface, with one hip flexed to 90 degrees and the other leg flat on the table. The subject is instructed to actively extend the knee of the flexed hip as far as possible without moving the hip joint. The angle between the femur and tibia is measured using a universal goniometer.

A higher degree of knee extension (closer to 0 degrees) indicates better hamstring flexibility, whereas a lower angle suggests tightness of the hamstring muscles. The AKE test is considered to have good intra-rater and inter-rater reliability and is commonly used for assessing muscle length limitations in athletes and active individuals.[2]

Y-Balance Test (YBT) – Anterior Reach:

The Y-Balance Test (YBT) is a dynamic test that evaluates balance, strength, and neuromuscular control. It is a simplified version of the Star Excursion Balance Test (SEBT) and involves reaching in three directions while maintaining single-leg stance. For the purpose of this study, only the Anterior Reach direction was assessed.

The participant stands on the dominant leg at the centre of the Y-grid and is instructed to reach forward (anteriorly) as far as possible with the opposite leg, lightly touching the reach indicator without losing balance or shifting the stance foot.

The reach distance is measured and then normalized to the participant's leg length, expressed as a percentage:

$$\text{Normalized Reach} = \frac{[\text{Reach Distance (cm)}]}{\text{Leg Length (cm)}} \times 100$$

Higher reach percentages indicate better dynamic balance and postural control. The YBT is widely accepted in sports science and rehabilitation settings for its high reliability and validity in assessing dynamic balance among athletic populations.3

RESULT

There was a strong positive correlation between Active Knee Extension (AKE) Test values and the anterior reach distances in the Y-Balance Test, with an r-value of 0.888 and a p-value of 0.000.

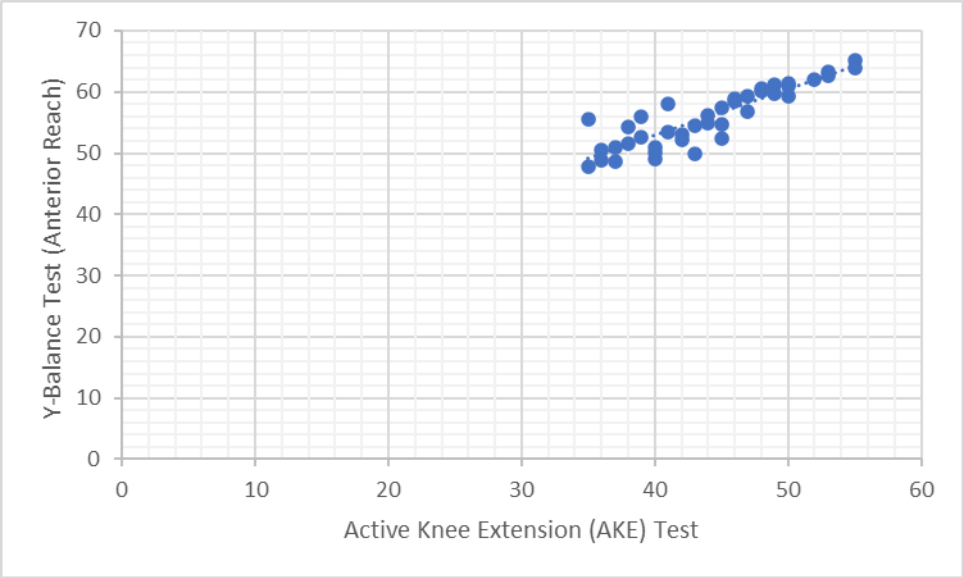

figure 1.1: There was a strong positive correlation between the Active Knee Extension (AKE) Test and the Y-Balance Test (Anterior Reach), with an r-value of 0.888.

Interpretation: This means that as hamstring flexibility increases, dynamic balance also improves. The positive correlation (r = 0.888) suggests that participants who showed greater knee extension (i.e., better hamstring flexibility) were able to reach farther in the YBT, demonstrating better dynamic balance. Since the p-value is less than 0.05, the result is statistically significant. Therefore, the null hypothesis is rejected, and the alternative hypothesis is accepted.

DISCUSSION

The present study aimed to determine the relationship between hamstring flexibility and dynamic balance in male recreational football players. The results demonstrated a statistically significant strong positive correlation (r = 0.888, p = 0.000) between Active Knee Extension (AKE) test scores and anterior reach distances in the Y-Balance Test (YBT). These findings suggest that individuals with greater hamstring flexibility have better dynamic balance performance. The observed correlation indicates that limitations in hamstring extensibility may adversely affect the body's ability to maintain stability during functional activities, especially in athletes involved in high-intensity sports such as football.

Football is a sport that demands rapid changes in direction, deceleration, acceleration, and single-leg control. All of these movements heavily depend on both flexibility and balance. The hamstring muscle group plays a vital role in stabilizing the hip and knee joints during functional lower limb activities. Limited flexibility in these muscles can lead to compensatory trunk and pelvic movements, which in turn affects neuromuscular coordination and balance. This study's findings reinforce the biomechanical importance of muscle flexibility in enabling effective neuromuscular control during dynamic postural tasks.[2]

The results are supported by previous research. Harshini BN et al. (2024) observed a significant positive correlation between hamstring flexibility and balance among physiotherapy students, indicating that increased flexibility contributed to better postural control.[4] Sujata S et al. (2014) compared static and dynamic hamstring stretching and concluded that improved flexibility led to enhanced anterior reach performance on the YBT.[6] Similarly, Pratik Phansopkar et al. (2022) reported that restricted hamstring

mobility could affect pelvic alignment and trunk stability, impairing dynamic postural control. Their study emphasized that inflexible hamstrings are associated with altered movement mechanics, which may compromise balance and increase injury risk.[5]

Further evidence supporting these results is provided by a study conducted by Bhagyashree S. et al. (2023), who investigated the correlation between hamstring tightness and dynamic postural stability in young adults. Their results confirmed that hamstring tightness adversely influenced both balance and functional mobility, reinforcing the importance of flexibility in neuromuscular control.[12] Another study by Azeem S. et al. (2014) compared the effects of static and dynamic stretching on dynamic balance among recreational football players. They concluded that enhanced hamstring flexibility, particularly after dynamic stretching protocols, significantly improved anterior reach performance, consistent with the present study's findings.[13]

The outcome measures used in this study, namely the Active Knee Extension test for flexibility and the Y-Balance Test for dynamic balance, are widely validated in clinical and sports settings. The AKE test is known for its objectivity, high intra-rater and inter-rater reliability, and its ability to isolate hamstring extensibility by controlling for compensatory hip movement.3 Similarly, the Y-Balance Test, especially the anterior reach component, is a sensitive tool for identifying functional asymmetries and predicting injury risk. Plisky et al. (2013) confirmed that poor performance on the YBT was predictive of lower limb injuries in football players, highlighting its clinical relevance.[14]

In the current study, the mean AKE value was 44.075° with a standard deviation of ±5.713, indicating moderate variation in hamstring flexibility across the sample. The YBT anterior reach scores averaged 55.953 cm with a standard deviation of ±4.831, suggesting a fairly uniform distribution of dynamic balance capability. The strong correlation between these two measures underscores the functional connection between passive flexibility and active stability. This is in line with findings by Jain A et al. (2023), who emphasized the importance of maintaining hamstring flexibility for balance, mobility, and injury prevention in athletes.

Furthermore, flexibility is a component of neuromuscular control, which refers to the body's ability to coordinate movement patterns efficiently. Adequate hamstring length allows for smooth deceleration, stable joint alignment, and optimal joint proprioception. Shirazi MH and Jahangirzadeh F (2022) demonstrated that core stability and flexibility training enhanced balance outcomes in young athletes by improving overall neuromuscular integration. Thus, it is plausible that tightness in the hamstrings disrupts this control, leading to compromised balance strategies during single-leg tasks.[7]

Limitation of the study:

Despite the significant findings, this study had limitations. The sample size was relatively small (n = 40) and limited to male recreational football players within a specific age group and geographic location. This restricts the generalizability of the results to other athletic populations such as female players, elite athletes, or participants from different sports. Other potential influencing factors, such as core strength, vision, vestibular input, and psychological readiness, were not assessed in this study.

Scope of the study:

Future studies can focus on evaluating these additional factors and comparing different training interventions that target both flexibility and dynamic balance. It may also be beneficial to assess bilateral symmetry in hamstring flexibility and balance, as asymmetries are known predictors of lower limb injuries. Longitudinal studies could help establish whether improving hamstring flexibility over time leads to measurable improvements in dynamic balance and reduced injury rates.

CONCLUSION

The present study aimed to investigate the relationship between hamstring flexibility and dynamic balance in male recreational football players. Based on the findings, it is concluded that there is a strong positive correlation between the two variables.

Participants with greater hamstring flexibility, as measured by the Active Knee Extension (AKE) Test, demonstrated better dynamic balance, indicated by longer anterior reach distances in the Y-Balance Test (YBT). This suggests that improved hamstring flexibility is significantly associated with enhanced dynamic balance performance.

Therefore, the study supports the alternative hypothesis and provides evidence that increasing hamstring flexibility may contribute to better balance control in recreational football players.

Declaration of the patient's consent

The authors certify that appropriate consent was obtained from all participants. They have agreed for their data to be used for academic purposes. Names or personal details were not disclosed, and confidentiality was maintained throughout the study.

REFERENCES

1. Yadav R, Negi S. Effect of structured warm-up program on flexibility and balance among football players. Journal of Physical Education and Sports Management. 2022;11(1):52-58.
2. Sharma S, Pearlson K, Nagaraj S. Impact of hamstring flexibility on functional performance of collegiate football players. International Journal of Yogic, Human Movement and Sports Sciences. 2022;7(1):227-234.
3. Walker O. Y balance test™: A reliable tool for assessing dynamic balance. Science for Sport. 2025.
4. Harshini BN, Vijaykumar R. The relationship between hamstring flexibility and dynamic balance among physiotherapy students. Journal of Physiotherapy Science. 2024;6(4):117-124.
5. Phansopkar P, Gupta H, Rao R. Influence of hamstring flexibility on functional performance and dynamic postural control. Journal of Sports Medicine and Physical Fitness. 2022;62(9):1091-1097.
6. Sujata S, Bharathi B. Effect of static and dynamic hamstring stretching on dynamic balance in healthy individuals. Indian Journal of Physiotherapy and Occupational Therapy. 2014;8(1):45-52.
7. Abbasi L, Nabavi N. Impact of corrective exercises on static and dynamic balance in male soccer players. Journal of Sports Rehabilitation. 2022;32(2):211-218.
8. Malekzadeh M, Ghaffari M, Zarei A. Relationship between dynamic balance and ankle proprioception in athletes with functional ankle instability. Journal of Sports Science & Medicine. 2023;20(3):300-306.
9. Shirazi MH, Jahangirzadeh F. Effectiveness of core stability and balance training on young athletes' performance. International Journal of Sports Science and Coaching. 2022;17(5):645-652.
10. Jain A, Gupta S, Sharma R. Association between flexibility exercises and injury prevention in athletes. International Journal of Exercise Science. 2023;16(2):72-80.
11. Shin HJ, Kim EJ, Kim SY. The immediate effect of static and dynamic stretching on flexibility of hamstring, dynamic balance ability, function of lower extremity: Randomized controlled trial. Journal of Korean Physical Therapy. 2023;35(5):125-132.
12. Bhagyshree S, Kumar A, Jain P, et al. Correlation of hamstring tightness with balance and mobility in young adults. Pakistan Journal of Medical & Health Sciences. 2023;17(1):189-192.

13. Azeem S, Khan M, Ahmed J, et al. Comparison of dynamic and static stretching on dynamic balance performance in recreational football players. South African Journal of Sports Medicine. 2014;26(2):75-81.
14. Plisky PJ, Gorman PP, Bradley PJ, et al. Dynamic balance performance and noncontact lower extremity injury risk in football players. Journal of Athletic Training. 2013;48(5):539-544.
15. Antanas J, Kostiuk M, Ekevad M, et al. Relationship between muscle strength of dominant and non-dominant ankle and dynamic balance in football players. Baltic Journal of Sport and Health Science. 2022;1(15):78-85.