Acta Scientific Orthopaedics (ISSN: 2581-8635)

Volume 7 Issue 12 December 2024

Research Article

A Comparative Study on Post Isometric Relaxation and Neurodynamic Sliding Technique to Improve Hamstring Flexibility in Male Soccer Players

Jasmal K and Kannabiran B*

Professor/Ph.D Guide, Department of Sports Physiotherapy, R.V.S College of Physiotherapy, Coimbatore, The Tamil Nadu Dr. M. G. R. Medical University, Chennai, India

***Corresponding Author:** Kannabiran B, Professor/Ph.D Guide, Department of Sports Physiotherapy, R.V.S College of Physiotherapy, Coimbatore, The Tamil Nadu Dr. M. G. R. Medical University, Chennai, India.

DOI: 10.31080/ASOR.2024.07.1002

Received: August 13, 2024

Published: November 22, 2024

Abstract

Background: Athletes most frequently suffer from hamstring injuries, which are caused by tightness in the hamstring muscles. These injuries take a long time to heal, cost a lot of money in medical expenses, and lower an athlete's level of performance. Many stretching techniques can help become more flexible, but the best one has not been well studied. MET has demonstrated positive effects on increasing muscular flexibility. The aim of the research was to evaluate the effectiveness of neurodynamic sliding technique and post isometric relaxation in enhancing the flexibility of hamstring muscle in male athletes who involved in soccer.

Methodology: The goal of the research is to determine whether post isometric relaxation and the neurodynamic sliding technique are useful in helping male soccer players with their hamstring flexibility. Thirty male soccer players were selected for current study. There were two groups of players. Group B received the neurodynamic sliding technique, while Group A had post-isometric relaxation. Pre-test outcome measures, a sit-and-reach test, were administered to groups A and B. The duration of the interventions was six weeks. Using statistical software called SSPS, the results were obtained by the application of methods such as the within-group comparison paired "t" test and the between-group comparison unpaired "t" test.

Result: There was a significant improvement in hamstring flexibility by applying Post isometric relaxation exercise in male Soccer players.

Conclusion: This study concluded that Post isometric relaxation is more significant than the neurodynamic sliding in improving hamstring flexibility of male soccer players.

Keywords: Hamstring Muscle Flexibility; Post Isometric Relaxation; Neurodynamic Sliding Technique; Sit-and-Reach Test

Introduction

Flexibility is regarded as the most essential component of human fitness, and decreased soft tissue flexibility can result in serious musculoskeletal ailments. Hamstring injuries are among the most common musculotendinous injuries in the lower extremities [1]. The main muscle involved in knee flexion is the hamstring muscle, which is also important for regular execution of functional tasks. This muscle group, which includes the semitendinosus, semimembranosus, and biceps femoris, is located in the posterior compartment of the thigh [2].

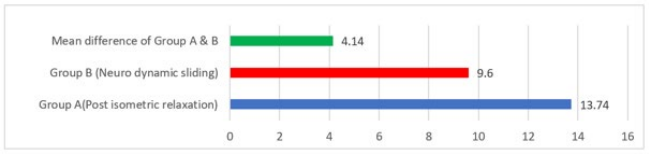
In India, college students between the ages of 18 and 25 have a very high prevalence of hamstring tightness. In Lahore, Pakistan,

university students also frequently experience this issue; there, 23.33% of males and 16.6% of females between the ages of 17 and 25 report having hamstring tightness. Sports participants and inactive people were both included in this study [3]. 12.7% of injuries in Iceland's top soccer division and 11% of injuries in British professional soccer were attributed to hamstring strains [4]. American football players also often sustain hamstring strains. According to an analysis of the National Football League's (NFL) medical database from 1987 to 2000, hamstring strains accounted for 10% of all injuries sustained by American college football players who were expected to play in the NFL [5]. The capacity to rotate a single joint or a group of joints smoothly and easily over an unlimited, pain-free range of motion is referred to as flexibility. The elements that determine flexibility are muscle length, joint integrity, and periarticular soft tissue extensibility. Activity and participation restrictions may result from soft tissue shortening or diminished flexibility [6]. Because of increased passive tensioning and compensatory activation of the knee extensors during running, individuals with low hamstring flexibility place greater pressures on the knee joint [7]. Numerous risk factors for hamstring injuries have been proposed in the literature, such as inadequate warm-up, low flexibility, imbalanced muscles, tension in the nervous system, and past injuries. In both the general and athletic populations, limited hamstring extensibility is frequently seen. Even if the cause of hamstring injuries is unknown, insufficient hamstring extensibility could be the cause [8]. A reduction in hamstring length has been associated in numerous studies with an elevated risk of hamstring strain [9]. People who are physically active and athletes who play competitive sports like football, rugby, soccer, and sprinting frequently sustain hamstring [10]. Inadequate extensibility inside the posterior thigh compartment seems to be one of the most widely recognized causes of hamstring injuries among risk factors [11]. Post isometric relaxation (PIR) exercise lengthens tight hamstrings through a contraction and relaxation strategy. The term PIR refers to the subsequent decrease in tone of the agonist muscle following isometric contraction. This is caused by stretch receptors known as Golgi tendon organs, which are found in the tendon of the agonist muscle [12]. Post-isometric relaxation is a technique that promotes muscular relaxation. The process begins with stretching a muscle. The patient then performs an isometric contraction against minimal resistance, which is around 20% of their maximal strength. As the muscle releases, there is relaxation followed by a mild stretch. This technique is repeated, with each pass allowing for a longer stretch of the muscles before isometric contraction [13].

Neurodynamic sliding procedures are utilized to lengthen hamstring muscle fibers. Flexibility is influenced by both muscle elasticity and neural tissue extensibility. Limited range indicates decreased hamstring flexibility caused by abnormal neurodynamics impacting the sciatic and tibial nerves [14]. Neurodynamics is the study of how the nervous system's mechanics and physiology interact. Any changes in neuronal mechanics or physiology may result in pathodynamics. The mechanosensitivity of neural regions in the posterior leg, thigh, buttock, and spinal canal regulates hamstring flexibility. Protective muscular contraction of the hamstring in the context of neural mechanosensitivity causes hamstring tightness and consequent muscle strain injury. Neurodynamic sliding is a technique that reduces neural mechanosensitivity and is useful for managing hamstring flexibility [15]. The sliding technique incorporates a sequence of movements that result in extension of the nerve bed at one joint while shortening the nerve bed at another [16]. A popular test for assessing flexibility is the sit and reach test, which focuses on hamstring and lower back flexibility. It is frequently used in assessments of physical fitness, most famously in the Presidential Challenge Physical Fitness Test, which is required for physical education in elementary and secondary schools across the country [17].

Methodology

Review Board of RVS College of Physiotherapy, Coimbatore has approved this comparative study and a written consent was obtained from the participants after giving clear instructions regarding the procedure and its implications. This study was conducted in physiotherapy outpatient department of RVS College of Physiotherapy, Sulur, Coimbatore.30 male soccer players between 20 to 30 years were selected for the comparative study, equally divides into two groups. Pre and Post hamstring flexibility is measured by using sit and reach box. Group A treated with Post isometric relaxation exercise and Group B treated with Neurodynamic gliding exercise. The values were analyzed by application of statistical methods and statistical software, SPS.



Graph 1: Shows Graphical display of the mean and mean difference data for the sit-and-reach test for group A and group B.

The above bar diagram shows the graphical display of the mean and mean difference data for the sit-and-reach test for group A and group B. In the sit-and-reach test, participants in Group A who had post-isometric relaxation showed greater difference in mean values than those in Group B. Therefore, it can be said that post-isometric relaxation is a better method for increasing flexibility in hamstring in male soccer players than neurodynamic sliding.

Discussion

In order to increase hamstring flexibility in male soccer players, the study compared the efficacy of post isometric relaxation and neurodynamic sliding approach. This study involved thirty individuals. Groups A and B were created from the subjects. Subjects in Group A received post-isometric relaxation therapy, whereas those in Group B received neurodynamic sliding. The current study's findings demonstrate that post isometric relaxation significantly enhanced the hamstring extensibility of male soccer players. The outcome validates the research of Patrick J. Healy, BS, who used the sit-and-reach test to examine the impact of post-isometric relaxation on hamstring mobility. On the first day of class, 26 chiropractic students were split into two equal groups at random and their flexibility measured in inches using the sit and reach test. Following a five-minute period of sitting rest, the experimental group had post-isometric relaxation used to stretch their hamstrings. Five minutes after the first test, both groups took the sit and reach test again. On test days three and five, this process was repeated. In both males and females, the PIR group had a statistically significant improvement on the left and right sides. According to the study's findings, post-isometric relaxation is a useful stretching method that, when combined with a progressive treatment plan, increases muscle flexibility. After PIR stretching, the sit and reach test yields good measurements and can identify improvements in hamstring flexibility [18]. This finding was corroborated by Cornelius, W. L. Rauschuber, M. R., who found that the post-isometric relaxation group significantly improved their knee joint's range of motion. A 10-second isometric contraction was required of the PIR participant, according to Lewit. An isometric contraction longer than six seconds, up to ten seconds, was found to be sufficient by Cornelius, W. L. Rauschuber, and M. R. to achieve the desired result. After five seconds of holding the muscle relaxed, the second phase involved passively stretching the knee to a new barrier and holding it there for thirty seconds. Following an isometric contraction phase, the muscle would exhibit less resting tension and more flexibility. This was caused by either lower motor neuron excitability or post-contraction suppression of alpha motor neuron [19].

Conclusion

The purpose of the research was to evaluate the effects of neurodynamic sliding technique and post isometric relaxation on male soccer players' hamstring flexibility. For this study, thirty male soccer players were split into two groups at random. Group B received treatment using the neurodynamic sliding approach, whereas Group A received post isometric relaxation. The statistical result indicates that both groups' hamstring flexibility has significantly improved. However, a comparison of the mean value reveals that for male soccer players' hamstring flexibility, post isometric relaxation is effective better than the neurodynamic sliding technique.

Bibliography

1. Shadmehr A., *et al*. "Hamstring flexibility in young women following passive stretch and muscle energy technique". *Journal of Back and Musculoskeletal* 22.3 (2009): 143-148.

2. Moore KL., *et al*. "Clinically oriented anatomy". Lippincott Williams and Wilkins: Philadelphia (2013).

3. Koli BK and Anap DB. "Prevalence and severity of hamstring tightness among college students: A cross-sectional study". *International Journal of Clinical and Biomedical Research* 4.2 (2018): 65-68.

4. Arnason A., *et al*. "Soccer injuries in Iceland". *Scandinavian Journal of Medicine and Science in Sports* 6 (2004): 40-45.

5. Brophy RH., *et al*. "Predictive value of orthopedic evaluation and injury history at the NFL combine". *Medicine and Science in Sports and Exercise* 40 (2008): 1368-1372

6. Kisner C., *et al*. "Preface to the seventh edition, in therapeutic exercise: Foundations and techniques". McGraw-Hill Education Newyork, NY (2018): 7e.

7. Williams DSB and Welch LM. "Male and female runners demonstrate different sagittal plane mechanics as a function of static hamstring flexibility". *Brazilian Journal of Physical Therapy* 19.5 (2015): 421-428.

8. Witrouw E., *et al*. "Muscle flexibility as a risk factor for developing muscle injuries in male professional soccer players: a prospective study". *The American Journal of Sports Medicine* 31.1 (2003): 41-46.

9. R Bahr and I Holme. "Risk factors for sports injuries- a methodological approach". *British Journal of Sports Medicine* 37.5 (2003): 384-392.

10. DS Davis., *et al*. "The effectiveness of 3 stretching techniques on hamstring flexibility using consistent stretching parameters". *Journal of Strength and Conditioning Research* 19.1 (2005): 27-32.

11. Norkins CC. "Measurement of joint motion: A guide of goniometry, 2nd edition page num (2009): 142-144.

12. Lewit K and Simons DG. "Myofascial pain: relief by post isometric relaxation". *Archives of Physical Medicine and Rehabilitation* 65.8 (1984): 452-456.

13. S Singh., *et al*. "Effect of neural mobilization and PNF stretching on hamstring flexibility in working women". *International Journal of Health Sciences and Research* 5.8 (2015): 361-368.

14. AK Singh., *et al*. "Neurodynamic sliding versus PNF stretching on hamstring flexibility in collegiate students: a comparative study". *International Journal of Physical Education, Sports and Health* 4.1 (2017): 29-33.

15. RK Kutty., *et al*. "Neural mobilization a therapeutic efficacy in a piriformis syndrome model: an experimental study". *International Journal of Physiotherapy and Research* 2.3 (2014): 577-583.

16. Wells KF and Dillion EK. "The sit and reach test. A test of back and leg flexibility". *Research Quarterly* (1952).

17. Mhatre BS., *et al*. "Which is the better method to improve perceived hamstring tightness- Exercises targeting neural tissue mobility or exercises targeting hamstring muscle extensibility". *International Journal of Osteopathic Medicine* 3 (2013): 153-162.

18. Patrick J Healy., *et al*. "Effects of post-isomrtric relaxation on hamstring mobility using sit-and- reach test" 22 (2011): 1-14.

19. Lewit K and Simons DG. "Myofascial pain: relief by post isometric relaxation". *Archives of Physical Medicine and Rehabilitation* 65.8 (1984): 452-456.