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Effect of Myofascial Release with Kinesiotaping on Flexibility, Strength, and Sprint Performance in Recreational Football Players with Hamstring Tightness: A Randomized Trial

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ABSTRACT

Background: Hamstring injuries are common among recreational football players, affecting their performance and potentially requiring expensive rehabilitation. Myofascial release and kinesiotaping are known to decrease tightness and enhance muscle flexibility and function. This study examines the effect of combining Myofascial Release (MFR) with kinesiotaping versus MFR alone, evaluating the impacts on hamstring flexibility, strength, and sprint performance in recreational football players.

Methods: Thirty-six participants were randomly assigned to MFR with kinesiotaping or MFR alone (18 each group) for 6 6-week program. Pre- and post-tests measured active knee extension for flexibility and strength using a modified sphygmomanometer, as well as 20m sprint performance.

Results: Statistical analysis revealed significant improvements in AKE test scores, hamstring strength, and sprint times for both groups ($p < 0.001$). The experimental group demonstrated superior performance in AKE scores ($p = 0.026$) and hamstring strength ($p = 0.002$) compared to the control group; however, sprint improvements were comparable ($p = 0.001$).

Conclusion: Combining MFR with kinesiotaping enhances hamstring flexibility and strength more effectively than MFR alone, in enhancing hamstring flexibility and strength among recreational football players.

Keywords: Hamstring tightness, MFR, Kinesiotaping, Flexibility, Strength, Active Knee Extension test, Sprint performance.

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INTRODUCTION

Physical fitness and performance are critical determinants of success in recreational sports, particularly in football, where agility, strength, and sprint performance significantly contribute to overall athleticism [1]. Hamstring tightness results from decreased flexibility in the muscles that comprise the hamstring group, leading to frequent hamstring injuries, the most common lower limb injury among football players. This can impair flexibility, decrease athletic performance, and increase the risk of injury [2]. Therefore, effective interventions that target musculoskeletal limitations are crucial for enhancing player performance and reducing the likelihood of injury.

Myofascial release (MFR) is a soft tissue therapy that aims to alleviate restrictions in the fascial system, thus improving mobility and function. Research has shown that MFR can enhance flexibility and decrease muscle tension, leading to improved range of motion [3]. This technique works by applying sustained pressure to the affected areas, which may promote blood flow, reduce pain, and enhance muscle recovery. However, while MFR has gained traction, limited studies have directly addressed its effectiveness in conjunction with other modalities, such as kinesiotaping, particularly in recreational athletes.

Kinesiotaping (KT), on the other hand, has emerged as a popular adjunctive therapy that enhances proprioception, provides support, and promotes recovery through its elastic properties [4]. The application of KT may offer additional benefits by stabilizing muscle function and facilitating more effective movement patterns during athletic performance. Studies have shown that KT can provide immediate relief for various musculoskeletal conditions and may enhance athletic performance when used in conjunction with therapeutic interventions [5].

The Active Knee Extension Test (AKET) is a widely accepted method for assessing hamstring flexibility. Strong correlations with other established measures of flexibility, such as the straight-leg raise and goniometric assessments, support the construct validity of this measure [6]. This test effectively reflects the functional performance of the hamstrings, making it particularly relevant for sports settings. In terms of reliability, the AKET has demonstrated high interrater and intrarater reliability, with ICC values typically ranging from 0.85 to 0.95. Such high reliability indicates that both different testers (interrater) and the same tester over time can achieve consistent results, thereby ensuring that observed changes in hamstring flexibility post-intervention are due to the treatment rather than measurement error [7].

The 20-Meter Sprint Test (20-MST) is a standard measurement for assessing speed and sprinting performance, particularly in sports like football, where quick bursts of speed are crucial.[8] It is considered a valid test because it closely replicates the demands of various sports. The test's validity is reinforced by its correlation with field performance measures and other speed assessments

conducted in competitive scenarios. Additionally, the 20-MST exhibits excellent reliability, with ICC values generally reported between 0.90 and 0.95 for both interrater and intrarater assessments. This high reliability ensures that the performance outcomes are stable across different testing environments and testers, making it an effective measure for evaluating the effects of training interventions on sprint performance [9].

The Modified Sphygmomanometer Test assesses muscular strength, specifically in evaluating the hamstrings and quadriceps. Its validity is established through its ability to accurately reflect isometric strength, which correlates well with dynamic strength measures [10]. This test is particularly useful in clinical and sports settings for assessing muscular imbalances. The Modified Sphygmomanometer Test has also demonstrated good reliability, with ICC values typically reported in the range of 0.80 to 0.90. This indicates that both interrater and intrarater reliability are satisfactory, signifying that clinicians and testers can expect consistent results when measuring muscular strength using this method [11].

This study aims to investigate the effectiveness of MFR accompanied by kinesiotaping versus MFR alone in improving flexibility, strength, and sprint performance among recreational football players experiencing hamstring tightness. By conducting a randomized controlled trial, this research aims to provide evidence-based insights into optimal management strategies for enhancing performance while addressing common musculoskeletal issues in recreational athletes. Understanding the comparative effectiveness of these interventions not only holds implications for athletic training and rehabilitation practices but also underscores the importance of integrating multidisciplinary approaches into sports therapy.

METHODS

1.1 Study design

Based on a priori sample size calculations and previous studies, 36 participants were sufficient to detect a significant change in variables, with a power set at 80% and an alpha level of 0.05.[12]the complexity and difficulty of calculating sample size and power require broad statistical knowledge, there is a shortage of personnel with programming skills, and commercial programs are often too expensive to use in practice. The review article aimed to explain the basic concepts of sample size calculation and power analysis; the process of sample estimation; and how to calculate sample size using G*Power software (latest ver. 3.1.9.7; Heinrich-Heine-Universität Düsseldorf, Düsseldorf, Germany Ethical clearance was obtained, and the study was registered with Clinical Trials Registry-India (ICMR-NIMS) with registration number (REF/2024/06/086034) after receiving institutional ethical clearance. Participants included 36 male recreational football players, aged 18-30 years, who had bilateral hamstring tightness of more than 200 degrees of active knee extension angle. Football players with recent hip surgery, recent injury to the lower

extremities or lumbar spine, deep or superficial vein thrombosis, allergic reactions to kinesiotape, any skin disease or hypersensitivity, or acute severe low back pain were excluded [13, 14]. Participants were informed about the purpose and procedure of the study, and informed consent was obtained. Subjects were randomly allocated to two groups: the experimental group (MFR with Kinesiotaping) and the control group (MFR) through a computer-generated random number. Intervention was administered for three sessions a week for 6 weeks (18 sessions). Thus, this study investigates the effects of adding kinesiotaping to Myofascial Release (MFR) compared to using MFR alone, focusing on improvements in hamstring flexibility, strength, and sprint performance among recreational football players.

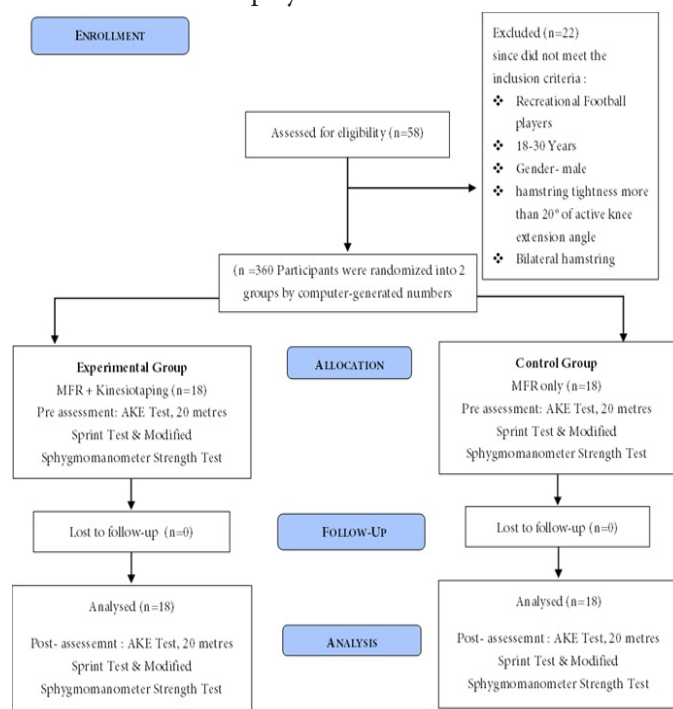


Figure 1: CONSORT Flow chart

1.2 Assessment Procedures and Outcome Measures

1.2.1 Active Knee Extension Test (AKE Test):

Hamstring flexibility was measured using AKE. To measure the hamstring muscle length, the participant was instructed to lie down in a supine position, with the other limb and pelvis secured by strapping to the couch for stabilization. The testing limb was positioned with its hips and knees in a 90-degree flexion. A crossbar was used to maintain the hip and thigh in the correct positions while preventing hip flexion. Subsequently, the participant was instructed to actively extend the knee as much as possible until a slight stretch was felt. The knee extension range of motion was measured using a universal goniometer in the appropriate position. This procedure was performed 3 times, and the best out of the three measurements was considered [15].

Modified Sphygmomanometer Test- For assessing hamstring strength:

Before undergoing strength testing, participants were instructed to complete a brief warm-up. They were

instructed to sit on the couch with their legs placed on the side of it. Participants were instructed to position their knees in 90 degrees of flexion at the end of the couch. Then the cuff of the Sphygmomanometer was inflated to 40 mmHg and placed between the posterior aspects of the legs at the distal end. Then, the participant was instructed to press the inflated cuff with maximal pressure and hold it for 5 seconds [16].

1.2.2 20 Meter Sprint Test:

The 20-MST began with the participant standing upright, their feet about 8 centimeters apart, with their toes placed on the starting line at 0 meters, side by side. The feet were positioned parallel to each other, and the toes were pointed straight ahead. The weight was shifted forward onto the balls of the feet, with the heels slightly lifted off the ground. The hips and knees were not bent or completely straight. Participants were instructed to sprint at maximum speed for a distance of 20 meters and were told not to stop until they had passed the 20-meter mark. A 5-minute rest was taken between the three sprints. This procedure was performed three times with a rest period between each run, and the best timing out of the three sprints was considered [17].

1.3 Interventions

1.3.1 Application of Myofascial Release Technique (MFR) for Hamstring Muscle.

The MFR was implemented over six weeks, with 18 sessions per week, conducted every week. [Figure 2] Each session lasted 30-45 minutes, with 20-30 minutes dedicated to MFR. Participants were provided with a comfortable environment, consent, and comfortable clothing. The session began with a warm-up, followed by a thorough assessment of the hamstrings to identify areas of tightness, trigger points, or discomfort. The practitioner applied various MFR techniques, focusing on the entire hamstring group, including the biceps femoris, semitendinosus, and semimembranosus.

The direct pressure technique was used to locate trigger points along the hamstrings and apply firm pressure for 30 to 90 seconds. The session included gentle stretching, skin rolling, cross-fiber techniques, and passive stretching to enhance flexibility. A cool-down phase followed, involving gentle static stretches and breathing exercises. Participants provided feedback on their experience, and the practitioner documented their progress on a weekly basis. Techniques were adjusted to accommodate individual needs, and post-care advice was provided to enhance the effectiveness of the intervention. By the end of the six weeks, participants experienced significant benefits in hamstring flexibility and function [18].

1.3.2 Application of Kinesiotaping for Hamstring Muscles after MFR

The MFR was combined with Kinesiotaping to support muscle recovery and functionality in the hamstring muscles. [Figure 3] The treatment protocol included three weekly sessions, with each session lasting 30-40 minutes.

After the MFR session, the practitioner assessed the hamstring muscles for any residual tightness or discomfort and prepared the area for the taping process by cleaning the skin. Kinesiotaping was cut into appropriate lengths and anchored at the origin of the hamstring muscles, leaving a 2 to 3 inch unstretched portion for proper adhesion. The first strip was applied along the muscle's length toward the knee, smoothing out the tape to prevent discomfort. A "Y" strip was used to maximize support and proprioceptive feedback. The practitioner gently rubbed the tape to activate its adhesive properties, and participants were advised to avoid moisture on the taped area for several hours to extend its effectiveness. This comprehensive approach facilitated optimal recovery and strengthened the hamstring muscles, ensuring a seamless continuation of care throughout the six-week treatment plan [19].



Figure 2: Myofascial release



Figure 3: Kinesiotaping

1.4 Statistical Analyses

The collected data were summarized using descriptive statistics, including frequencies and percentages for demographics, as well as data on age, height, weight, BMI, and the Shapiro-Wilk test to assess the distribution of the data. Mean and standard deviation (SD) were also calculated. The Wilcoxon Rank test was used for within-group analysis to compare the active knee extension test, strength test, and 20-meter sprint test. The Mann-Whitney U test was used for the pre- and post-test comparisons of the active knee extension test, strength test, and 20-meter sprint test between groups [20]. Data were analyzed by using the SPSS software (SPSS Inc., Chicago, IL) version 29.0.10.

RESULTS

1.1 COMPARISON OF GENDER, LEG DOMINANCE, AGE, HEIGHT, WEIGHT, AND BMI BETWEEN GROUPS

The demographic data presents descriptive statistics for both the Control and Experimental Groups, each consisting of 18 participants. The mean weight of the Control Group is 68.4 kg with a standard deviation of 10.97, indicating a moderate variation in weight within this group. In comparison, the Experimental Group has a slightly lower mean weight of 68.1 kg and a smaller standard deviation of 6.47, suggesting less variability in weight among the participants. For BMI, the Control Group has a mean of 23.8 kg/m² with a standard deviation of 5.19, showing some degree of variation in body composition. The Experimental Group's mean BMI is slightly lower at 23.3 kg/m², with a standard deviation of 3, reflecting more consistency in BMI values.

Regarding hand dominance, both groups exhibit an equal distribution, with 5.6% (2 participants) being left-handed and 44.4% (16 participants) being right-handed. This indicates a similar pattern of handedness across both groups, with right-handed participants being the majority, which is typical in the general population. Overall, the findings suggest that the two groups are relatively well-matched in terms of weight, BMI, and hand dominance, with some minor variations in the dispersion of weight and BMI values. (Table 1).

Table 1: Descriptive Demographic Data of Control and Experimental Groups: Weight, BMI, and Hand Dominance

	Group	N	Mean/ Percentage	SD
GENDER	Control Group	18	-	-
	Experimental Group	18	-	-
WEIGHT (in kgs)	Control Group	18	68.4	10.97
	Experimental Group	18	68.1	6.47
BMI (kg/m ²)	Control Group	18	23.8	5.19
	Experimental Group	18	23.3	3
DOMINANCE				
LEFT	Control Group	2	5.6%	-
	Experimental Group	2	5.6%	-
RIGHT	Control Group	16	44.4%	-
	Experimental Group	16	44.4%	-

1.2 Comparison of PRE-VALUES for the outcome variable between groups

The pre-test results for right leg active AKET show no significant difference between the Control and Experimental groups in terms of right leg flexibility. The Control group had a mean of 31 degrees, while the Experimental group had a slightly lower mean of 30.56 degrees. The similar results were found for left leg AKE, indicating that both groups were comparable and maintained homogeneity at baseline.

For the 20-MST, which measures endurance, the Control Group has a mean time of 4.08 seconds (SD = 0.444), while the Experimental Group records a slightly lower mean of 3.92 seconds (SD = 0.397). The p-value of 0.168 indicates no significant difference between the two groups in their pre-test endurance levels. This suggests that both groups have comparable anaerobic capacities before the intervention, and there is no violation of the homogeneity

assumption for this variable.

The pre-test strength measurements revealed a significant difference between the Control and Experimental groups for the right leg, with the Control group exhibiting a higher mean and the Experimental group a lower mean. However, the p-value was 0.229, indicating no statistically significant difference and confirming homogeneity in the right leg strength of both groups at baseline. (Table 2).

Table 2: Mann-Whitney U Test for Homogeneity: Pre-Test Measures of Flexibility, Endurance, and Strength in Control and Experimental Groups

	Group	N	Mean	SD	SE	F	p
PRE AKET (in degree) Right	Control Group	18	31	4.79	1.129	0.5314	0.91
	Experimental Group	18	30.56	4.501	1.061		
PRE AKET (in degree) Left	Control Group	18	28.72	2.845	0.671	2.457	0.511
	Experimental Group	18	29.83	3.989	0.9402		
Pre-20- MST (in secs)	Control Group	18	4.08	0.444	0.105	0.0455	0.168
	Experimental Group	18	3.92	0.397	0.0937		
Pre-STRENGTH TEST (in mm Hg) Right	Control Group	18	132.22	20.406	4.81	7.7929	0.229
	Experimental Group	18	116.44	33.156	7.8149		
Pre-STRENGTH TEST (in mm Hg) Left.	Control Group	18	119.33	19.299	4.549	1.1028	0.763
	Experimental Group	18	118.72	23.887	5.6301		

Note. A low p-value (<0.05) suggests a violation of the assumption of equal variances.

1.3 Comparison of active knee extension test, strength test, and 20-meter sprint test within the groups

The Wilcoxon Rank test was used to compare the active knee extension test, strength test, and 20-meter sprint test within the groups. There was a difference ($p < 0.05$) in AKET (both right and left) (Figure 4), as well as in the strength test (both right and left) (Figure 5), and the 20-MST within both groups (Figure 6): Experimental and Control. (Table 3).

Table 3: Comparison of Pre- and Post-Test Measures Within and Between Control and Experimental Groups: Wilcoxon Rank and Mann-Whitney U Test Results

Control Group								Experimental Group						Comparison Between Groups
		Mean difference	statistic	df	SE difference	Effect Size	p*	Mean difference	statistic	df	SE difference	Effect Size	p*	p**
PRE AKET (in degree) Right	Post AKET (in degree) Right	5.72	14.2	17	0.403	3.35	<.001	1.778	8	17	0.2222	1.886	<.001	0.026
PRE AKET (in degree) Left	Post AKET (in degree) Left	6.17	14.1	17	0.437	3.32	<.001	1.667	5	17	0.3333	1.179	<.001	<.001
Pre-STRENGTH TEST (in mm Hg) Right	Post STRENGTH TEST (in mm Hg) Right	-19.11	-20	17	0.956	-4.71	<.001	-3.167	-4.08	17	0.7765	-0.961	<.001	0.002
Pre-STRENGTH TEST (in mm Hg) Left	Post STRENGTH TEST (in mm Hg) Left	-18.94	-18.5	17	1.024	-4.36	<.001	-3.611	-5.67	17	0.6373	-1.336	<.001	0.036
Pre-20- MST (in secs)	Post 20- MST (in secs)	0.751	12.2	17	0.0615	2.88	<.001	0.189	9.43	17	0.02	2.223	<.001	0.001

p*: Comparison within Group by Wilcoxon Rank Test, p**: Comparison between Groups by Mann-Whitney U Test, Significance at $p < 0.05$

The Whitney U test was used to compare the active knee extension test, strength test, and 20-meter sprint test between the groups. Compares the pre- and post-test measures of flexibility, strength, and the 20 m Sprint test for the Control and Experimental Groups with significance assessed at $p < 0.05$.

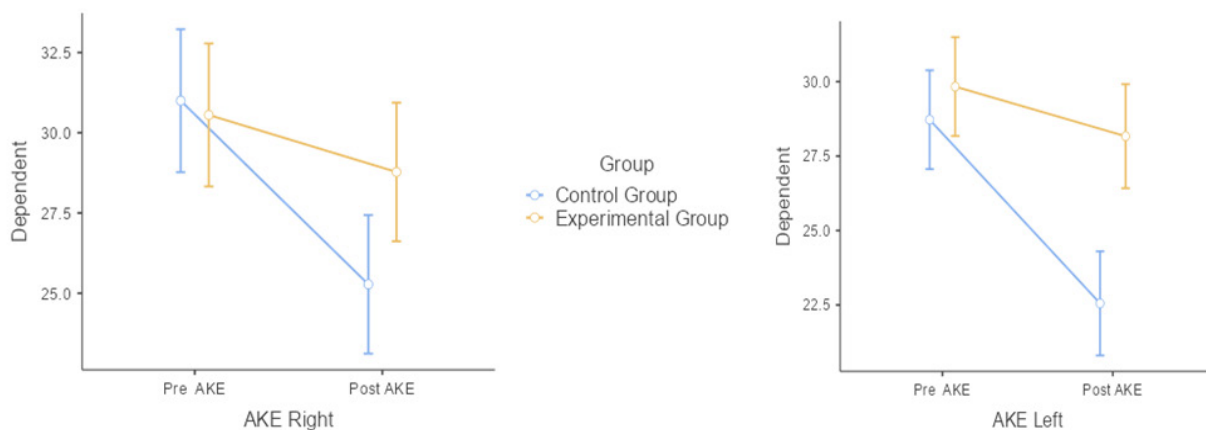


Figure 4: Pre and Post AKET (Right & Left) between Control and Experiment group

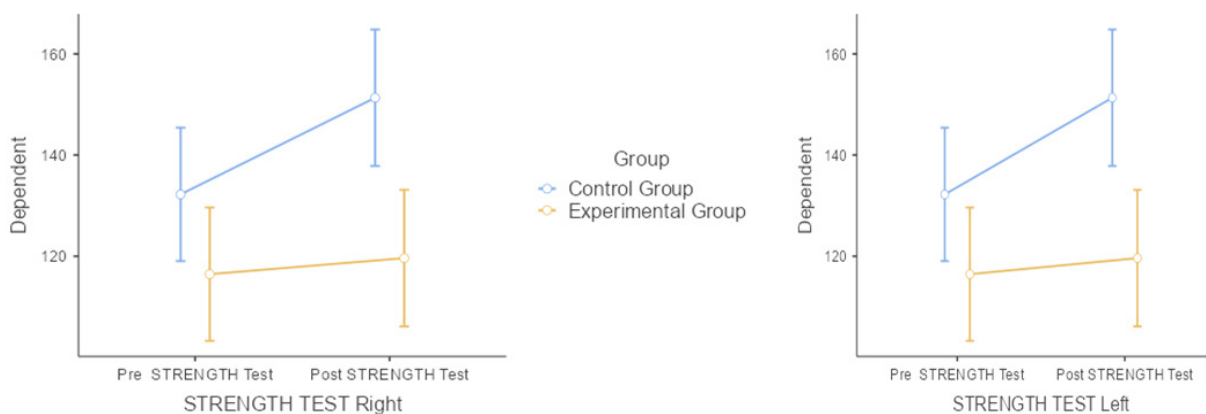


Figure 5: Pre and Post strength test (Right & Left) between Control and Experiment group

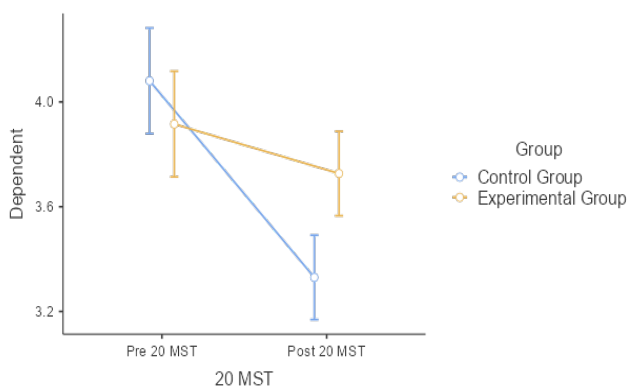


Figure 6: Pre and Post-20-MST between the Control and Experiment groups

DISCUSSION

The current study compared MFR with a kinesiotaping combination and MFR. The results of this study demonstrate significant improvements in flexibility, strength, and sprint performance among recreational football players with hamstring tightness, highlighting the effectiveness of both interventions: manual fascial release (MFR) with kinesiotaping and MFR alone. The pre- to post-test comparisons show that, irrespective of groups, participants exhibited significant gains in flexibility. This

suggests that both interventions had a positive impact on reducing hamstring tightness and improving overall physical performance. Additionally, there was a significant improvement within the group in all domains. Both the experimental and control groups showed the previously mentioned improvements in physical performance, which were determined to be statistically significant.

Tight hamstrings are commonly implicated in sports-related injuries, making interventions to enhance flexibility crucial for preventing these injuries. The studies by Navid Poor Beirami et al. (2020) and Zainab Saeed Albeshri et al. (2023) explore the efficacy of static stretching and kinesiotaping, with findings suggesting both interventions significantly improve hamstring flexibility and range of motion (ROM). This aligns with the broader understanding that MFR helps elongate muscle fibers over time, while kinesiotaping may potentially enhance proprioception and provide mechanical support [21, 22].

Post-test results showed the experimental group (Myofascial release with kinesiotaping) had greater improvements in flexibility, strength, and sprint performance than the control group. This suggests that while MFR alone is beneficial, the addition of kinesiotaping enhances outcomes by providing prolonged support and improving neuromuscular control.

Studies by Dilber Karagozoglu Coskunsu et al. (2020) and Nurul Afiqah Bakar et al. (2020) investigate more complex interventions that combine techniques such as proprioceptive neuromuscular facilitation (PNF) stretching and myofascial release (MFR). These studies suggest that combining modalities, such as PNF, with kinesiotaping or foam rolling, can lead to synergistic benefits in improving both flexibility and athletic performance. The synergistic effects observed underscore the potential advantages of multimodal interventions in sports rehabilitation and training programs [23, 24]. Additionally, studies by Peng Cai et al. (2023) and Maria et al. (2023) investigate the use of foam rolling and MFR techniques, demonstrating their effectiveness in improving hamstring flexibility and overall performance in football and soccer players. These techniques are believed to release muscle tension and improve tissue mobility, facilitating better movement patterns and reducing the risk of injury [25, 26].

In terms of acute versus long-term effects, studies by Aric J. Warren et al. (2020) and Ketaki Nitin Sakhalkar et al. (2022) examine the immediate versus sustained benefits of interventions such as myofascial decompression (cupping therapy) and manual resistance training (MRT), respectively. They indicate that while acute effects may show immediate improvements, sustained interventions over several weeks yield more significant and lasting benefits in terms of flexibility and performance [27, 28].

These results contribute to our understanding of how interventions or specific conditions can influence physical performance outcomes and underscore the importance of rigorous experimental design and statistical analysis in research studies. The findings have important implications for clinical practice, particularly in managing hamstring tightness in athletes. The combination of Myofascial release with kinesiotaping appears to offer an edge over Myofascial release alone, especially in enhancing functional performance such as sprinting, which is critical for football players.

CONCLUSION

In conclusion, our study examined the effectiveness of combining MFR (using a foam roller) with kinesiotaping versus MFR alone in enhancing hamstring flexibility, strength, and sprint performance in recreational football players with hamstring tightness. Results showed significant improvements in both groups for hamstring flexibility, strength, and sprint performance from pre-test to post-test, as indicated by AKET, strength test using a modified sphygmomanometer, and the 20-MST. However, the experimental group, which received both MFR and kinesiotaping, demonstrated greater improvements compared to the control group in AKET and strength test post-intervention. These findings suggest that combining Myofascial release with kinesiotaping may have a synergistic effect in enhancing hamstring function.

Institutional Review Board Statement: The ethical clearance was obtained with Clinical Trials Registry-India (ICMR-

NIMS) with a registration number after receiving ethical clearance (REF/2024/06/086034)

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REFERENCES

- [1] França C, Gouveia É, Caldeira R, Marques A, Martins J, Lopes H, Henriques R, Ihle A. Speed and agility predictors among adolescent male football players. *International journal of environmental research and public health*. 2022 Mar 1;19(5):2856.
- [2] Rudisill SS, Varady NH, Kucharik MP, Eberlin CT, Martin SD. Evidence-based hamstring injury prevention and risk factor management: A systematic review and meta-analysis of randomized controlled trials. *Am J Sports Med* 2023;51(7):1927–42. Available from: <https://journals.sagepub.com/doi/abs/10.1177/03635465221083998>.
- [3] Dhiman NR, Das B, Mohanty C, Singh OP, Gyanpuri V, Raj D. Myofascial release versus other soft tissue release techniques along superficial back line structures for improving flexibility in asymptomatic adults: A systematic review with meta-analysis. *J Bodyw Mov Ther* 2021;28:450–7.
- [4] Qin Y, Li M, Han J, Cui G, Du W, Yang K. Research hotspots and trends of Kinesio Taping from 2011 to 2020: A bibliometric analysis. *Environ Sci Pollut Res Int* 2023;30(1):2029–41. doi:10.1007/s11356-022-22300-9.
- [5] Lin CH, Lee M, Lu KY, Chang CH, Huang SS, Chen CM. Comparative effects of combined physical therapy with Kinesio taping and physical therapy in patients with knee osteoarthritis: A systematic review and meta-analysis. *Clin Rehabil* 2020;34(8):1014–27. Available from: <https://journals.sagepub.com/doi/abs/10.1177/0269215520928398>.
- [6] Liu H, Shen Y, Xiong Y, et al. Psychometric properties of four common clinical tests for assessing hamstring flexibility in young adults. *Front Physiol* 2022; 13:911240. Published 2022 Jun 15. doi:10.3389/fphys.2022.911240.
- [7] Olivencia O, Godinez GM, Dages J, Duda C, Kaplan K, Kolber MJ, et al. The reliability and minimal detectable change of the Ely and active knee extension tests. *Int J Sports Phys Ther* 2020;15(5):776–82. Available from: <https://pubmed.ncbi.nlm.nih.gov/articles/PMC7575148/>
- [8] Gísladóttir T, Petrović M, Sinković F, Novak D. The relationship between agility, linear sprinting, and vertical jumping performance in U-14 and professional senior team sports players. *Front Sport Act Living* 2024; 6:1385721.
- [9] Byrne PJ, Moody JA, Cooper SM, Kinsella S. Reliability of sprint acceleration performance and three repetition maximum back squat strength in hurling players. *ARC J Res Sport Med* 2022;2(2):9. Available from: <https://pubmed.ncbi.nlm.nih.gov/articles/10.1080/20447085.2022.2081999/>

- [10] Benfica P do A, Brito SAF de, Carmargo LB, Estarlino LD, Reis MTF dos, Santana M de M, et al. Predictors of muscle strength assessed with the modified sphygmomanometer test. *J Bodyw Mov Ther* 2024; 38:425–36.
- [11] Berry MJ, Hughes CJ. Muscle and Sensory Testing. *Medicine & Science in Sports & Exercise*. 1999 Oct 1;31(10):1490.
- [12] Kang H. Sample size determination and power analysis using the G*Power software. *J Educ Eval Health Prof* 2021; 18:1–12.
- [13] Takei H. Myofascial release. *Rigakuryoho Kagaku* 2001;16(2):103–107.
- [14] Aldakheel D. Kinesio taping for the management of athletic conditions. *Saudi J Sport Med* 2023;23(1):1. Available from: https://journals.lww.com/sjmm/fulltext/2023/23010/kinesio_taping_for_the_management_of_athletic.1.aspx
- [15] Lim WT. Influence of successive active knee extension tests on hamstring flexibility. *J Korean Acad Phys Ther Sci* 2021;28(1):76–84.
- [16] Magro KH, Magro HK, Muscat-Inglott M. A study of lower-limb bilateral and unilateral strength asymmetry in Maltese sprinters using the modified sphygmomanometer test. *J Theory Pract Sport* 2022;1(1):1–20.
- [17] Ben Hassen D, Zghal F, Peyrot N, Samozino P, Rebai H, Rahmani A. Jump and sprint force velocity profile of young soccer players differ according to playing position. *J Sports Sci* 2023;41(21):1915–26. Available from: <https://www.tandfonline.com/doi/abs/10.1080/02640414.2024.2307768>.
- [18] Itotani K, Kawahata K, Takashima W, Mita W, Minematsu H, Fujita H. Myofascial release of the hamstrings improves physical performance—a study of young adults. *Healthc* 2021;9(6):674. Available from: <https://www.mdpi.com/2227-9032/9/6/674/htm>.
- [19] Fereydounnia S, Shadmehr A, Salemi P. Acute effect of inhibitory kinesio tape on range of motion, dynamic balance, and gait in athletes with hamstring shortness. *Foot* 2022; 53:101925.
- [20] Vrbin CM. Parametric or nonparametric statistical tests: Considerations when choosing the most appropriate option for your data. *Cytopathology* 2022;33(6):663–7. Available from: <https://onlinelibrary.wiley.com/doi/full/10.1111/cyt.13174>.
- [21] Beirami NP, Kazani A, Nakhostin-Roohi B, Skrypchenko I, Joksimović M, Gardašević N. The effect of 6 weeks static stretching and kinesiotaping on hamstring shortness in soccer players. *Eur J Phys Educ Sport Sci* 2020;6(8):37–47. Available from: <https://oapub.org/edu/index.php/ejep/article/view/3382>.
- [22] Albeshri Z, Youssef E. The immediate effect of Kinesio tape on hamstring muscle length and strength in female university students: A pre-post experimental study. *Saudi J Med Med Sci* 2023;11(1):73–80. Available from: https://journals.lww.com/sjmm/fulltext/2023/11010/the_immediate_effect_of_kinesio_tape_on_hamstring.10.aspx.
- [23] Coskunsu DK, Mutlu EK, Ozdinciler AR. Proprioceptive neuromuscular facilitation stretching combined with Kinesio taping for hamstring flexibility in amateur athletes: A single-blind, randomized, controlled trial. *Physiother Q* 2021;29(3):56–61.
- [24] Bakar NA, Amir NH, Md Zaini A, Nikol L, Abdul Halim MHZ. The effects of myofascial release using foam rolling and resistance band assisted stretching on Malaysian rugby players' lower body power and flexibility. *Lecture Notes in Bioengineering* 2020;32–41. Available from: https://link.springer.com/chapter/10.1007/978-981-15-3270-2_4.
- [25] Cai P, Liu L, Li H. Dynamic and static stretching on hamstring flexibility and stiffness: A systematic review and meta-analysis. *Heliyon* 2023;9(8). Available from: <http://www.cell.com/article/S2405844023060036/fulltext>.
- [26] Cochrane ME, Nkuna FS, Dawood MA. The short-term effect of Kinesio tape application on running speed, agility, and plyometric performance in amateur soccer players. *South African J Res Sport Phys Educ Recreat* 2023;45(1):28–38.
- [27] Warren AJ, LaCross Z, Volberding JL, O'Brien MS. Acute outcomes of myofascial decompression (cupping therapy) compared to self-myofascial release on hamstring pathology after a single treatment. *Int J Sports Phys Ther*. 2020 Aug;15(4):579–592.
- [28] Sakhalkar KN, Nagulkar J, Mahajan P. Effectiveness of myofascial release versus passive stretching on hamstring flexibility in amateur football players – a comparative study. *Int J Health Sci Res*. 2022;12(8):237–244.