

Effect of Myofascial Pain Release versus Kinesiotaping on Muscle Length and Popliteal Angle among College Going Female Students with Hamstring Tightness - A Comparative Study

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Abstract: ***Introduction:** Hamstring muscle plays an important role on daily activities. Such as controlled movement of trunk, walking, and it is an important muscle involved in maintaining balance and posture. **Aim & Objectives:** this study aimed to compare the effects of myofascial pain release (MFR) and Kinesio taping (KT) on muscle length and popliteal angle in college-going female students (ages 19-25) with hamstring tightness. **Methodology:** Fifty subjects were randomly divided into two groups: Group A received MFR with stretching, and Group B received KT with stretching, over a 4-week treatment period. Pre- and post-treatment measurements of muscle length and popliteal angle were taken using an inch tape and goniometer. **Results:** Results indicated that both treatments improved muscle length and popliteal angle; however, Group A, which received MFR, showed significantly greater improvement compared to Group B. **Conclusion:** The study concludes that myofascial pain release is a more effective treatment for hamstring tightness than Kinesio taping and can be recommended for improving muscle length and flexibility in individuals with hamstring tightness.*

Keywords: hamstring tightness, MFR, Popliteal angle, Muscle length, Inch tape, Goniometer, Kinesio taping

1. Introduction

The hamstring muscles are crucial for lower limb mobility and postural stability, playing a key role in activities like walking, sprinting, and jumping. These muscles, which include the biceps femoris, semimembranosus, and semitendinosus, facilitate knee flexion and hip extension. However, they often experience reduced flexibility, particularly due to a sedentary lifestyle, leading to prolonged sitting ⁽¹⁾.

The hamstring muscle's primary role during the gait cycle is to help stabilize and generate movement in the knee joint. Due to the numerous tensional pressures it experiences, the hamstring muscle's multi-joint connections and range of functions tend to shorten the muscle ⁽²⁾ This decrease in flexibility can cause postural issues, tightness, and discomfort ⁽³⁾.

The hamstring's role as knee flexors. However, as the medial and lateral muscle groups link to the knee joint on both sides,

they are used in pure knee flexion. The medial hamstring muscles (semimembranosus and semitendinosus) are the only muscles that can cause knee flexion during medial rotation of the knee joint, whereas the lateral muscle mass (biceps femoris) is the only muscle that can cause knee flexion during lateral rotation of the knee joint. ⁽⁴⁾ Symptoms could accompany the tight hamstrings. such as bruises, tenderness, swelling, cramps and soreness. ⁽⁵⁾

Tight hamstrings are associated with reduced knee extension, changes in spine curvature, and pelvic tilt, which may lead to lower back pain ⁽⁶⁾. Muscle shortening in the hamstrings can cause discomfort and limit range of motion, often exacerbated by poor posture or inactivity ⁽⁷⁾. A posterior pelvic tilt resulting from tight hamstrings can reduce lumbar lordosis and increase the risk of spine injuries ⁽⁸⁾.

A common method for assessing hamstring flexibility is the popliteal angle test, which involves extending the knee and flexing the hip to 90° ⁽⁸⁾. Myofascial release (MFR) is a technique used to address hamstring tightness by applying continuous pressure to fascial layers to reduce pain and

improve mobility ⁽⁹⁾. Kinesio taping, developed in 1970, is another technique that promotes flexibility and pain relief. Its elastic properties allow for skin ventilation and a natural range of motion, making it ideal for athletes ⁽¹⁰⁾.

2. Review of Literature

Lee Herrington et al ⁽⁴⁾ in their study on 60 subjects found that pelvic position has a significant effect on popliteal angle and therefore should be taken into account when measuring hamstring muscle length

Rutuja Pusegaonkar et al ⁽⁸⁾ conducted a study on 100 subjects with hamstring tightness found that prevalence of hamstring tightness is very high among college-going students in the age group between 18–25 years between the angle 45-°60°

Akshata Basti et al ⁽¹¹⁾ in their experimental pre-post study on 67 subjects with hamstring tightness concluded that combined effect of myofascial release and passive stretching in an individual with hamstring tightness resulted in a significant increase in popliteal angle and plantar pressure.

Özge Çınar-Medeni et al ⁽¹²⁾ studied on 15 female students with bilateral hamstring tightness concluded that Kinesio taping improves flexibility and decreases pain when evaluated by active knee extension test and VAS. Application of Kinesio tape muscle technique might be used by clinicians to improve muscle flexibility and decrease pain during stretching in acute conditions

Salvi Shah et al ⁽¹³⁾ in their a comparative study on 31 subjects with hamstring tightness can be concluded that, by Myofascial release there was significant improvement in passive SLR range. But no significant difference in improvement of passive SLR if we hold the end position for 30 seconds or 60 seconds.

3. Methodology

Materials:

- Inch tape
- Universal Goniometer
- Kinesio tape

Methods

The study utilizes a quasi-experimental design with a sample size of 50 subjects, selected through simple random sampling. The sample was sourced from the College of Physiotherapy at SVIMS in Tirupathi, which also serves as the study setting. The treatment duration is 4 weeks, and the overall study period lasts for 6 months.

Inclusion and Exclusion Criteria

Inclusion Criteria:(1) Subjects who are willing to participate in the study, (2) Age: 19 to 25 years, (3) Only female students, (4) Normal healthy college students, (5) Subjects unable to do knee extension beyond 15 -20 degrees of flexion.

Exclusion Criteria: Subjects having (1) Age below 19 years and above 25 years, (2) Recent surgeries around hip & knee

joint, (3) Any neurological problems related to lower limb, (4) Recent fractures, (5) Any Skin sensitivity, (6) Subjects with hamstring injury in the past 3 years.

Treatment Protocol: The study begun after ethical approval on 22-08-2024 (IEC Code 1696) Fifty subjects who met the inclusion and exclusion criteria were enrolled in the study after informed consent. They were randomly assigned to two groups (A and B) via a lottery method. Each group contained 25 subjects, with the limb showing reduced muscle length and a higher popliteal angle chosen for treatment. Group A received myofascial pain release followed by hamstring stretching, while Group B received Kinesio taping followed by stretching. Treatments were given once daily, 3 days a week for 4 weeks, with self-stretching and home exercises on non-treatment days.

Outcome Measures: (1) Hamstring muscle length measured by using Inch tape. (2) Popliteal angle by using universal Goniometer.

- 1) Measurement of muscle- length using the Inch Tape technique. A tape was placed along the skin from the proximal to the distal marker. The distance between the two ends was measured using the tape (to the nearest mm) and it was considered as the whole Muscle tendon unit length (LMTU).
- 2) The popliteal angle was measured to assess hamstring flexibility using a universal goniometer. Angles greater than 15-20 degrees were considered. The lateral knee-joint line and lateral malleolus were marked by the examiner. The subject lay supine with the hip and knee flexed to 90°, holding the thigh against a barrier. The examiner then passively extended the knee to the point of firm resistance ⁽¹⁴⁾.



Figure 1: Shows measurement of popliteal angle with universal goniometer

4. Study Procedure

Group- A (Myofascial Pain Release)

Myofascial Release technique is given by using ulnar border of hand MFR was given from proximal to distal direction using a light amount of pressure over hamstring muscle. The pressure was being scaled following contact until the slack in the skin was taken up and that position was held until the tissues begins to soften the position of hand were crossed in order to work as energy efficiently as possible. The stretch

was maintained for 30 seconds. Treatment time will be 1 session per day, 3 days a week on alternate days for 4 weeks the intervention for each subject and score was noted. (15)



Figure 2: Shows performing MFR by using ulnar border of hand from proximal to distal direction

Group- B (Kinesio Taping)

In prone position, hamstring muscles were stretched passively and the length of the hamstring muscle and tendon region was measured with the tape. Kinesio tape (KT) will be cut as a Y-shape band for the tendon region and as a I-band for the muscle region. Then, tape will be applied without tension in prone lying position. Then, tape applied with no tension starting from tuberosities ischium going through out the hamstring muscle and tendon region. After taping five repetition of hamstring self-stretching were taught to the subjects in group B. The subjects were advised to keep the tape on for 24 hours after the stretching session (10)



Figure 3: Shows Kinesio tape technique for hamstring muscles

Stretching Procedure:

Subjects in both groups A and B were instructed to perform a self-stretching exercise with five repetitions of 30 seconds each. They were asked to face a table or chair, place the heel of the leg to be stretched on it, and ensure an anterior pelvic tilt. While keeping their hands on their hips and head neutral, they extended their leg, spine, and retracted their scapulae. They then leaned forward at the pelvis until they felt a hamstring stretch, holding for 30 seconds per stretch with 1-minute rest between sets. This routine was repeated for the other leg.



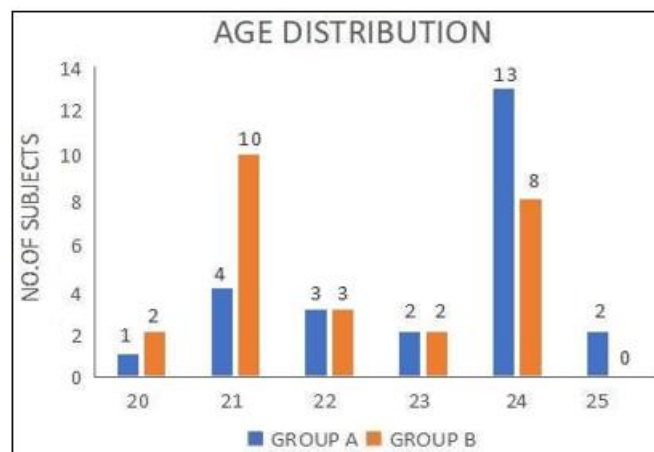
Figure 4: Shows self-stretching for hamstring muscle

5. Results

The data is entered into Microsoft Excel for tabulation and analysis. Statistical analysis is carried out by using SPSS 25.0 version software. The paired sample t-test is applied to compare the mean values of all the parameter in both the groups. A p-value of <0.01 is considered as statistically significant.

Table 1: Categorization of subjects according to age wise in both the groups.

Age (Years)	Group A		Group B		Total	
	No. of Subjects	%	No. of Subjects	%	No. of Subjects	%
20	1	4	2	8	3	6
21	4	16	10	40	14	28
22	3	12	3	12	6	12
23	2	8	2	8	4	8
24	13	52	8	32	21	42
25	2	8	0	0	2	4
Total	25	100	25	100	50	100
Mean Age	23.12±4.16		22.16±4.15		22.5±16.6	

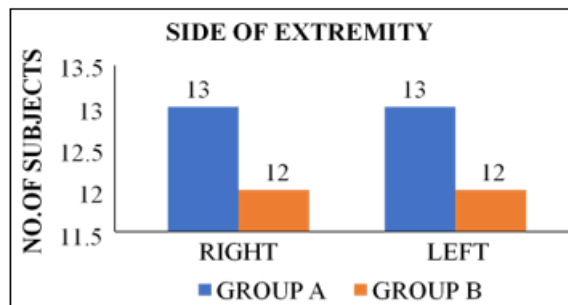


Graph 1: Categorization of subjects according to age wise in the both groups

Table and Graph 1 shows the mean age of subjects in Group A is 23.12 ± 4.16 years and the mean age of subjects in Group B is 22.16 ± 4.15 years. The mean age of all the subjects is 22.5 ± 16 .

Table 2: Categorization of subjects according to diagnosed side of the extremity in the both groups

Side	Group A		Group B		Total	
	No. of Subjects	%	No. of Subjects	%	No. of Subjects	%
Right	13	52	13	52	26	52
Left	2	48	12	48	25	48
Total	25	100	25	100	50	100
Mean Side	12.5	50	12.5	50	25	50



Graph 2: Categorization of subjects according to diagnosed side of the extremity in the both groups

Table and Graph 2 shows percentage value of subjects in Group A with hamstring tightness on Right side is 52 and left side 48. and total percentage is 50. In Group B with hamstring tightness right side is 52 and left side 48. and overall percentage of all subjects 50.

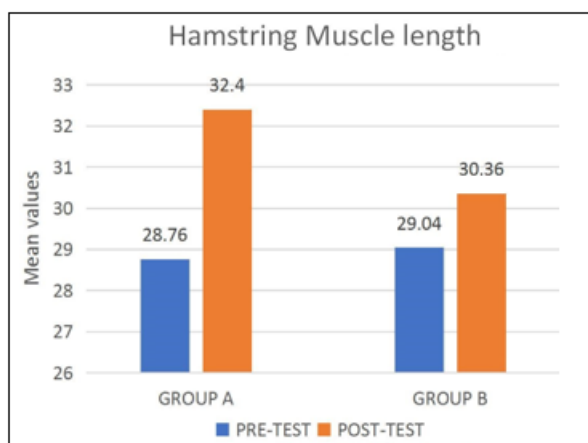
Table 3 (A): pre-test and post-test Mean \pm S. D values of hamstring muscle length before and after the treatment in the both groups

	Group	N	Pre-Test	Post-Test	Mean Difference	t-Value (P - Value)
			Mean \pm S.D	Mean \pm S.D		
Hamstring Muscle Length	Group A	25	28.76 ± 2.55	32.4 ± 2.43	-3.64	4.321 (0.000)
	Group B	25	29.04 ± 1.88	30.36 ± 2.25	1.42	2.252 (0.000)

Table 3 (B): comparison of post-test Mean values of muscle length between the groups

Group A&B Hamstring Muscle Length	Mean	SD	Mean Difference	T-value	P-value
Post A	32.4	2.43	2.04	0.01486	(0.000)
Post B	30.36	2.25			

** Significant at 0.00 level; $P < 0.01$



Graph 3: Pre-test and post-test MEAN \pm S. D values of hamstring Muscle length before and after the treatment in the both groups

Table and Graph 3 Shows represent the changes in muscle length before and after the treatment.

- The MEAN \pm S. D pre-test value of is 28.76 ± 2.55 altered to post-test MEAN \pm S. D value of 32.4 ± 2.43 with a mean difference of -3.64 in group A.
- The MEAN \pm S. D pre-test value of 29.04 ± 1.88 is altered to post-test mean value of 30.36 ± 2.25 with a mean difference of 1.42 in group B.
- The muscle length dimension showed a mean difference of -3.64 in group -A and 1.42 in group -B.
- Comparing the mean muscle length value before and after the treatment reveals statistically significance in both the groups, however group - A (32.4) shows more significance than group -B (30.36).
- At 99% confidence interval, the results reveal a t-values of 0.01486 with p-value of 0.00 between the groups which is considered as statically significant with p-value < 0.001 .

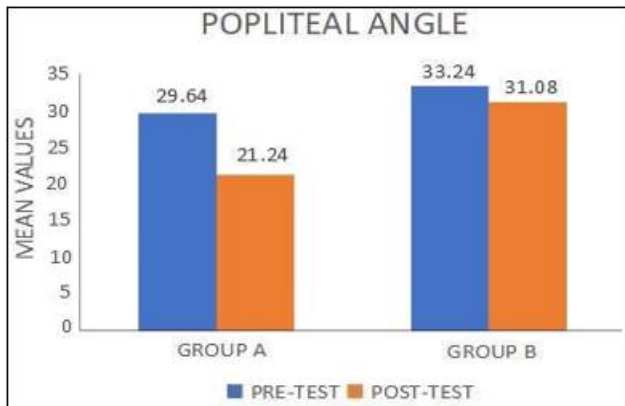
Table 4 (A): Pre-test and post-test Mean \pm S. D values of popliteal angle before and after the treatment in the both groups

	Group	N	Pre-Test	Post-Test	Mean Difference	t-Value (P - Value)
			Mean \pm S.D	Mean \pm S.D		
Popliteal Angle	Group A	25	29.6 ± 8.255	21.24 ± 5.48	8.4	0.000102130 (0.000)
	Group B	25	33.24 ± 7.04	31.08 ± 7.04	2.16	0.0296070 (0.000)

Table 4(B): Comparison of post-test Mean values of popliteal angle between the groups.

Group A&B Popliteal Angle	Mean	SD	Mean Difference	T- value	P- value
Post A	21.24	5.48	9.84	4.4066	0
Post B	31.08	7.04			

** Significant at 0.00 level; P<0.01.



Graph 4: pre-test and post-test MEAN \pm S. D values of popliteal angle before and after the treatment in the both groups

Table and Graph 4 shows represent the changes in popliteal angle before and after the treatment.

- The mean pre-test value of 29.6 ± 8.255 is altered to post-test mean value of 21.24 ± 5.48 with a mean difference of 8.4 in group A.
- The mean pre-test value of 33.24 ± 7.04 is altered to post-test mean value of 31.08 ± 7.04 with a mean difference of 2.16 in group B.
- The popliteal angle dimension showed a mean difference 8.4 of in group -A and 2.16 in group -B.
- Comparing the mean popliteal angle value before and after the treatment reveals statistically significance in both the groups, however group - A (21.24) shows more significance than group B (31.08).
- At 99% confidence interval, the results reveal a t-values 4.4066 with p- value of 0.00 between the groups which is considered as statistically significance with a p value <0.001.

6. Discussion

Hamstring tightness (HT) is a common issue affecting both symptomatic and asymptomatic individuals. Tight hamstrings, which cause posterior pelvic tilt, can reduce lumbar lordosis and lead to low back pain due to the hamstrings' attachment to the ischial tuberosity⁽⁹⁾.

A total of 55 subjects with hamstring tightness were screened over 6 months, and 5 were excluded based on the criteria, leaving 50 subjects (n=50) who met the inclusion criteria. These subjects were randomly assigned to two groups of 25 each: Group A received myofascial pain release with stretching, while Group B received Kinesio taping with stretching.

Behm DG et al 2019 they said the mechanism behind myofascial release (MFR) involves the central nervous system's modulation of muscle tone and sensory feedback

from the Golgi tendon organs (GTO). Pressure from MFR stimulates GTOs, inducing autogenic inhibition, reducing muscle resistance to stretch, and improving muscle length. Enhanced blood flow promotes muscle recovery, reducing tightness and supporting flexibility. Basti et al. (2015) reported that combining MFR with passive stretching led to a significant decrease in popliteal angle in 47 subjects⁽¹⁴⁾ MFR improves fascia elasticity, increasing joint range of motion and reducing tightness, thereby restoring knee extension and improving the popliteal angle⁽¹⁵⁾. Spinoso et al. (2014) found that myofascial release (MFR) effectively reduced popliteal angle and improved hamstring flexibility in 45 female students with hamstring tightness. Sakhalkar et al. (2016) concluded that MFR was more effective than passive stretching in improving hamstring flexibility in 30 subjects with hamstring tightness⁽¹⁶⁾.

Kase et al. explained that Kinesio taping (KT) helps reduce hamstring tightness and popliteal angle by improving muscle function, reducing pain, enhancing circulation, and providing proprioceptive feedback. KT boosts lymphatic drainage, blood flow, and activates muscle spindle cells, which reduce muscle resistance to stretch and increase hamstring length over time. This is crucial for improving knee extension and the popliteal angle when hamstrings are tight. Albeshri et al. (2016) found that Kinesio taping (KT) immediately improved hamstring muscle length in 96 female students with tightness⁽¹⁷⁾. Demi et al. (2017) reported that KT enhanced the effect of PNF stretching on hamstring length and knee range of motion in 30 subjects. German et al. (2018) observed that KT improved popliteal and SLR angles over time in 50 subjects, with greater improvement between days 8-12^(18,19).

7. Conclusion

The present study concluded that both the subjects who received myofascial pain release (Group -A) and the Kinesio taping (Group -B) had showed improvement in terms of muscle length and popliteal angle. However, Group- A had shown more significant improvement when compared to Group -B. therefore, The myofascial pain release can be used as an effective means of treatment in subjects with hamstring tightness.

8. Limitations of the Study

- Only female subjects were taken.
- The study sample size was relatively small.
- There was no follow up, so long term effects are not known.
- It was a short duration study.

9. Future Recommendations

- The study can be done including both the genders.
- The present study can be done in larger population for better outcomes.
- Long duration study with an effective follow up can be done
- The study can also be done in general population

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