Comparison of Dry Needling Versus Myofascial Release In Iliotibial Band Tightness Among Non-Professional Cyclists

Rajkumar M,

SRM Institute of Science and Technology,SRM College of Physiotherapy

Vincent Jeyaraj

Madha Medical College & Research Institute, Madha College of Physiotherapy

INTRODUCTION:

The iliotibial band is the superficial fibres of the gluteus maximus and tensor fascia lata that thicken laterally and extend to the lateral part of the thigh. The iliotibial band extends inferiorly to the hip and knee and originates from the anterior superior iliac spine, which is also the common origin of the gluteus maximus and tensor fascia lata. Below the lateral part of the knee on the lateral tibial condyle, or Gerdy's tubercle, is where the iliotibial band inserts(1). In harmony with other thigh muscles, the iliotibial band is crucial in maintaining the stability of the knee joint during exercise like walking, running, cycling.

It has been discovered that cyclist and those with high activity levels frequently have iliotibial band tightness. The iliotibial band's roles include abduction of the hip and knee stabilization. Knee flexion at or slightly below 30 degrees pushes the iliotibial band over the lateral femoral condyle, causing tension; complete extension puts the ITB back in place. Repeated knee flexion and extension can lead to bursa inflammation and friction, which can reduce range of motion as a preventative measure and make the ITB more prone to tightness(2).

If a long-distance rider keeps cycling when their iliotibial band is tight, friction will build up, causing the band to enlarge and become inflamed, which could result in iliotibial band syndrome, Patellar compression, lateral tracking of the patella, and friction syndrome. In non- professional cycling, knee flexion of 30 degrees with 10 degrees of internal (or external) rotation increased compression force by 24% compared to 0 degrees of rotation, demonstrating the significant influence of knee rotation. In comparison to 40° flexion paired with a 10° abduction, hip joint angles are more strongly influenced by 40° hip flexion (the lowest flexion seen during a pedalling cycle), which raises compression force 100%(3).

There are other contributing factors for IT band tightness some of them are, Overuse or Repetitive Motion: Cycling involves prolonged pedalling, leading to ITB irritation and tightness. Improper Bike Fit: Incorrect bike adjustments can exert pressure on the ITB. Ensure optimal saddle height and handlebar position. Weak or Imbalanced Muscles: Weak gluteus muscles may cause lateral pelvic movement, affecting ITB loading. Strengthen quads and hamstrings. Poor Flexibility: Inflexible ITBs are prone to tightness. Regular stretching and warm-ups are crucial before cycling

A hyperirritable spot in a taut band of skeletal muscle that elicits pain on contraction, stretching, and can cause referred pain away from the point of origin is known as a myofascial trigger point. Contraction knots, also known as nodules, are defined as "palpable, thick, rounded, darkly stained muscle fibres with statistically increased fibre density" and are the source of these painful places, also known as trigger points(4). Stretched as a result of the contraction knot are taut bands on either side of the knot. As the name suggests, the pulling force of the contraction knot on these muscle fibres causes these taut bands to normally be taut or tight(5).

In order to alleviate musculoskeletal discomfort and movement impairment, a professional technique called dry needling entails inserting a small needle into the skin to activate underlying myofascial trigger points and muscular connective tissue. In addition to treating connective tissue, skeletal muscle, and fascia dysfunctions, it also lessens trigger point-induced chronic peripheral nociceptive input. It is a very cost-effective, highly-adaptable method that is portable and has a low risk-to-benefit ratio. (6) Dry needling causes a sudden increase in capillary permeability and vasodilation. Vascular endothelial growth factor production after needling will promote angiogenesis, vasodilation, and glucose metabolism in hypoxic tissue, which helps normalize it. (7)Trigger points Dry needling with an eliciting local twitch response had resulted in an immediate reduction of inflammatory chemicals like interleukins, bradykinin, and substance P. These are the chemicals that are believed to sensitize and activate the peripheral nociceptors, which result in increased peripheral sensitization.(8)

Applying low-load, long-duration stretches to the myofascial complex with the goal of restoring appropriate length, reducing discomfort, and enhancing function is known as myofascial release. Increasing pain sensitivity is mostly dependent on peripheral sensitization of myofascial nociceptors in peripheral pathways(9). This study aims to Recognise the benefits of dry needling and myofascial release in individuals with iliotibial band tightness in non-professional cyclist.

MATERIALS AND METHODS:

This quasi- experimental study with the sample size of 30 (n=30) was conducted at SRM institute of science and technology. Subjects who met the inclusion criteria were recruited for the study following permission from the Institutional Review Board's Ethics Committee. The study population includes non-professional cyclist between Age of 18-28 years with Minimum of cycling 2 Km per day, and testing positive in Ober’s test. Needle phobia, Skin hypersensitivity, Skin allergy, Open wound and recent history of lower limb injury were excluded from the study. Convenient sampling method was performed. Dry needling is given to group A (n=15) and myofascial release were given to group B (n=15).

PROCEDURE

The procedure of the study was explained clearly, and informed consent was obtained from all the subjects, who were selected based on the inclusion and exclusion criteria. The subjects were divided into two groups- Group A (n = 15): Dry Needling & Group B (n = 15): myofascial release. The subjects were assessed using the Numerical Pain Rating

Scale to quantify the pain experienced. It consists of numbers ranging from 0 to 10 so higher the score higher the pain. The Universal Goniometer is used to measure the available range of motion (hip abduction). It has three parts namely axis, stationary arm and moving arm. The axis is placed at Anterior superior illac spine (ASIS), The stationary arm is directed towards the opposite ASIS and the moving arm is placed at the parallel to the femur. The subjects of Group A and Group B were treated for six sessions, three days per week, for a period of two weeks by dry needling and myofascial release techniques, respectively. The subject was positioned on one side, lying on the unaffected side, with a pillow between the knees. Palpation of the IT band was done by the flat palpation technique using the pulp of the fingers. Positioning of the subject and trigger point palpation were the same for both techniques. Before the dry needling technique, the treatment area was cleaned with sterile and cotton. Needling was done at different trigger points during each session located on the IT Band, and the needles used for treatment were 30 mm in length. The needle was inserted perpendicular to the orientation of the IT band, where the needle is manipulated using the pulp of the thumb and index finger (in and out manner). The duration of needling was based on the twitch response; a minimum of 2–3 twitch was elicited before the withdrawal of the needle. The area of needling has been compressed for 5–10 seconds immediately following the needle withdrawal. Duration of needling was 50 to 60 secs and three times per session for totally 6 session were done Needles were used for only one time and discarded as a precaution(10). In the myofascial release technique, the therapist's forearm was placed on the trigger points, and constant pressure was applied to the trigger until there was a decrease in tension in that area, when the trigger was no longer tender, or when one minute had elapsed, which ever occurred first. The total time of successive pressures was five minutes or more. Self-stretch was taught to the subject, which was performed after the completion of the intervention during each session(11). After the completion of the two-week intervention, a post-test was conducted using the Numerical Pain Rating Scale and the Universal Goniometer.

STATISTICAL ANALYSIS

Both descriptive and inferential statistics were used in the tabulation and analysis of the data. Version 24 of the statistical package for social science (SPSS) was used to evaluate the parameters. The independent t-test, also known as the student's t-test, was used to determine the statistical difference between the groups, and the paired t-test was used to determine the statistical difference within the groups.

RESULTS

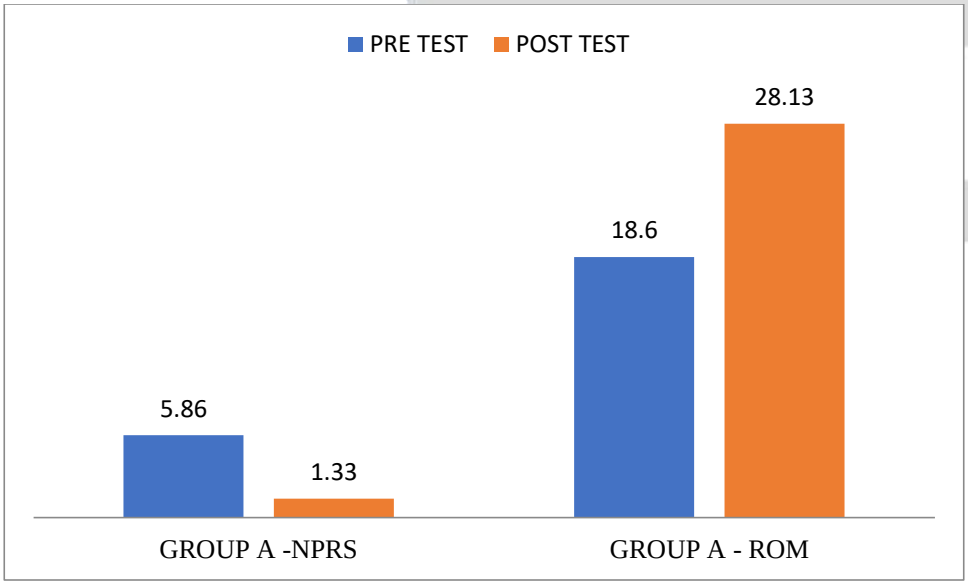
There is decrease in Numerical pain rating scale value from 5.86 to 1.33 and increase in Hip adduction range of motion value from 18.06 to 28.13 between pre and post-test within Group-A. The table infers significant at $P<0.05$ level. (Table 1) (Fig 1)

TABLE – 1: PRE&POST TEST WITH IN GROUP –A (DRY NEEDLING)

		PRE TEST			POST TEST		t-test	sig
		n	MEAN	S.D	MEAN	S.D		
GROUP A	NPRS	15	5.86	1.83	1.33	1.48	21.05	.000
	HIP ABDUCTION ROM	15	18.06	2.55	28.13	2.85	14.26	.000

(P > 0.05), (P ≤ 0.001) Mean, Standard deviation (S.D.)

Fig 1: PRE&POST TEST WITH IN GROUP –A (DRY NEEDLING)



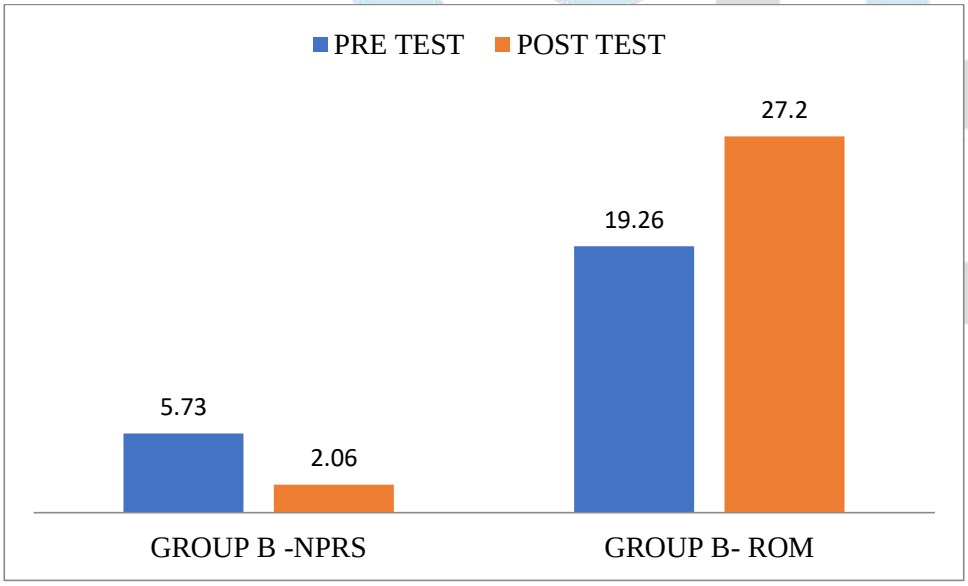
There is decrease in Numerical pain rating scale value from 5.73 to 2.06 and increase in Hip adduction range of motion value from 19.26 to 27.20 between pre and post-test within Group-B. The table infers significant at P<0.05 level. (Table 2) (Fig 2).

TABLE -2: PRE&POST TEST WITH IN GROUP –B (MYOFASCIAL RELEASE)

		PRE-TEST			POST TEST			
		n	MEAN	S. D	MEAN	S. D	t-test	Sig
GROUP B	NPRS	15	5.73	1.79	2.06	1.88	17.39	.000
	HIP ADDUCTION ROM	15	19.26	1.83	27.20	2.00	12.19	.000

(P > 0.05), (P ≤ 0.001) Mean, Standard deviation (S.D.)

Fig -2: PRE&POST TEST WITH IN GROUP –B (MYOFASCIAL RELEASE)



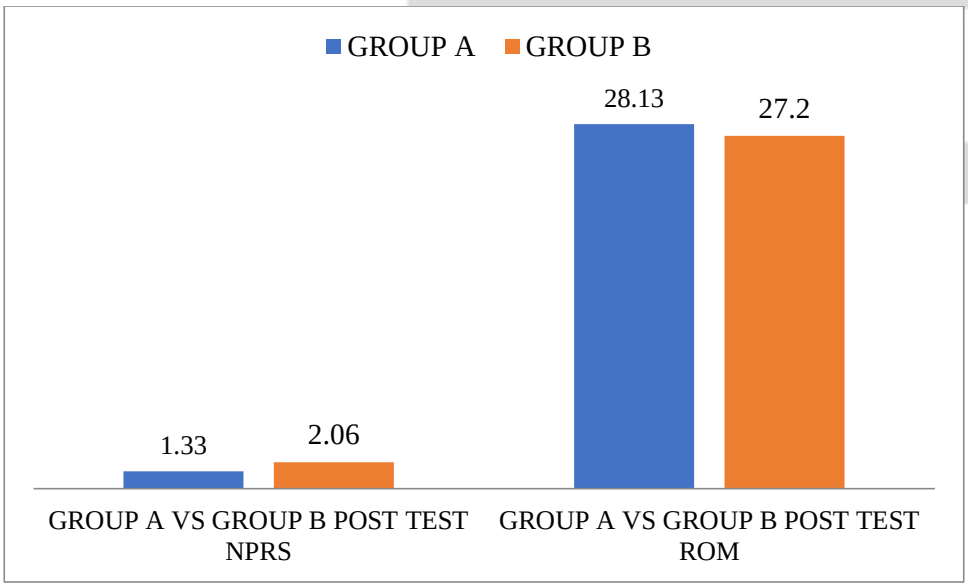
There is decrease in Numerical pain rating scale and Hip adduction range of motion mean value in both Group –A and Group – B. The table infers no significant decrease in Numerical pain rating scale and Hip adduction range of motion between Group –A and Group - B at P>0.05 level. (Table 3) (Fig 3).

TABLE – 3: COMPARISON OF POST TEST DIFFERENCE BETWEEN GROUP - A AND GROUP – B

		POST TEST			t-test	Sig
		n	MEAN	S.D		
COMPARISON OF GROUP-A AND GROUP-B	GROUP A NPRS	15	1.33	1.48	2.81	.009
	GROUP B NPRS	15	2.06	1.88		
	GROUP A HIP ABDUCTION ROM	15	28.1	2.85	1.03	.039
	GROUP B HIP ABDUCTION ROM	15	27.2	2.00		

(P > 0.05), (P ≤ 0.001) Mean, Standard deviation (S.D.)

Fig -3: COMPARISON OF POST TEST DIFFERENCE BETWEEN GROUP - A AND GROUP – B



According to Table 1 and fig-1 Group-A shows decrease in Numerical pain rating scale value from 5.86 to 1.33 and increase in Hip abduction range of motion value from 18.06 to 28.13 between pre and post-test within Group-A. The table infers significant at P<0.05 level. By Table 2 and fig-2 Group-B shows decrease in Numerical pain rating scale value from 5.73 to 2.06 and increase in Hip abduction range of motion value from 19.26 to 27.20 between pre and post-test within Group-B. The table infers significant at P<0.05 level. By Table 3 and fig-3 shows there is no significant decrease in Numerical pain rating scale and increase Hip abduction range of motion between Group –A and Group - B at P>0.05 level.

DISCUSSION

This study findings states that the dry needling Group-A shows the significant effect compared to myofascial release among cyclist with IT band tightness.IT band plays a major role in knee stability and studies states that the ITB's resistance to external adduction moments or the knee compression force the ITB tensions on the femur can both contribute to the stability of the knee joint. Movement at the knee joint is an intricate mechanical process with displacements occurring across various planes of motion. The intrinsic stability of the knee is ensured by a fusion of main and secondary stabilizers, with each functioning as a relative impediment to movement along a particular plane of motion. Based on the research a detailed account of knee kinematics necessitates the consideration and documentation of a total of six distinct degrees of freedom, comprising three translational movements and three rotational movements. states that knee flexion/extension, external/internal rotation, adduction/ abduction, anterior /posterior translation, compression/distraction, and medial/lateral shift. states that an underlying factor that may contribute to limited range of motion associated with localized muscle dysfunction is the myofascial trigger point (TP). Trigger points (TPs) are characterized as localized hyperirritable regions linked to hypersensitive perceptible taut bands situated in muscle tissue, and are proposed to lead to limitations in joint range of motion as well as negatively impact muscle activation. Dry needling is one such treatment procedure which helps to treat the muscular pain and dysfunction. This study supports this notion in the table-1, which shows there is a significant improvement in the adduction range of rom (AROM) and reduction in pain (NPRS) and it also showed statistically significant results. One of the other techniques to treat helps to treat this pain is Myofascial release. MFR is frequently employed to elongate muscles prior to competition and throughout the process of recuperation. Myofascial procedures have the capacity to reinstate the range of motion and alleviate discomfort, so facilitating the prompt resumption of normal bodily function. The objectives of myofascial therapy encompass the alleviation of tense muscles, augmentation of blood flow to ischemic regions (sometimes coinciding with muscular spasms), enhancement of venous and lymphatic drainage, and activation of stretch reflexes in muscles that are hypotonic. In this study table -2 shows that there are statistically significant results in pain reduction and improvement in joint range of motion. Both group A and group B showed clinically and statistically significant results in pain and range of ROM. Hence it can be used as one of the treatment regimens to improve pain and range of ROM among cyclist with IT band tightness. Additional researches can be conducted by evaluating the effects of myofascial release and dry needling on strength and flexibility training to avoid IT band syndrome and lower the risk of injury in elite cyclists.

CONCLUSION

A clinically significant distinction was observed between Group B (myofascial release) and Group A (dry needling technique), as indicated by the study's results. However, no statistically significant differences were observed between the two groups with regard to reduction in pain or range of motion of the hip abducted.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

FUNDING: No funding for this study

ACKNOWLEDGEMENT

The authors would like to thank the authorities of SRM college of science and technology, SRM college of physiotherapy, Dean, Faculty of Physiotherapy for providing the facilities required to conduct the study.

REFERENCES

1. Flato R, Passanante GJ, Skalski MR, Patel DB, White EA, Matcuk GR. The iliotibial tract: imaging, anatomy, injuries, and other pathology. Skeletal radiology. 2017 May; 46:605-22.
2. Holmes JC, Pruitt AL, Whalen NJ. Iliotibial band syndrome in cyclists. The American journal of sports medicine. 1993 May;21(3):419-24.
3. Christopher H, Jean-Allain C, Erika M, John GKennedy "Cycling injuries of the lower extremity. Cycling injuries of the lower extremity 2007.
4. Gose JC, Schweizer P. Iliotibial band tightness. Journal of Orthopaedic & Sports Physical Therapy. 1989 Apr;10(10):399-407.
5. Baker RL, Souza RB, Fredericson M. Iliotibial band syndrome: soft tissue and biomechanical factors in evaluation and treatment. PM&R. 2011 Jun 1;3(6):550-61.
6. Kirk KL, Kuklo T, Klemme W. Iliotibial band friction syndrome. Orthopedics. 2000 Nov 1;23(11):1209-15.
7. Robidoux CG. A Practical Approach to the Evaluation of a Cyclist with Overuse Injury. Cycling, An Issue of Physical Medicine and Rehabilitation Clinics of North America, E-Book: Cycling, An Issue of Physical Medicine and Rehabilitation Clinics of North America, E-Book. 2021 Oct 25;33(1):15-29.
8. Nath J. Effect of hip abductor strengthening among non-professional cyclists with iliotibial band friction syndrome. Int J Physiother Res. 2015;3(1):894-904.
9. Anne S, Ross H, Carolyn W, William Black "Assessment of strength, running mechanics in men with iliotibial band syndrome. Assessment of strength, flexibility, and running mechanics in men with iliotibial band syndrome 2014.
10. Noehren B, Schmitz A, Hempel R, Westlake C, Black W. Assessment of strength, flexibility, and running mechanics in men with iliotibial band syndrome. journal of orthopaedic & sports physical therapy. 2014 Mar;44(3):217-22.
11. Waryasz GR, McDermott AY. Patellofemoral pain syndrome (PFPS): a systematic review of anatomy and potential risk factors. Dynamic medicine. 2008 Dec; 7:1-4.

12. Hodgson L. The effect of manual pressure release on myofascial trigger points in the upper trapezius muscle (Doctoral dissertation, Victoria University).
13. Mukhtar Z, Jan MB, Khan DA, Rahman MU. Effectiveness of manual therapy and myofascial trigger point therapy in management of uppertrapezius myofascial trigger points. Annals of allied health sciences. 2015 jan 1;1(1):10-5.
14. Cagnie B, Dewitte V, Barbe T, Timmermans F, Delrue N, Meeus M. Physiologic effects of dry needling. Current pain and headache reports. 2013 Aug; 17:1-8.
15. Dommerholt J. Dry needling—peripheral and central considerations. Journal of Manual & Manipulative Therapy. 2011 Nov 1;19(4):223-7.
16. Huguenin LK. Myofascial trigger points: the current evidence. Physical therapy in sport. 2004 Feb 1;5(1):2-12.
17. Xiaoqiang Z, Shusheng T, Qiangmin H. Understanding of myofascial trigger points. Chinese Medical Journal. 2014 Dec 20;127(24):24.