International Journal of Yoga, Physiotherapy and Physical Education
ISSN: 2456-5067; Impact Factor: RJIF 5.24
Received: 27-01-2019; Accepted: 28-02-2019
www.sportsjournal.in
Volume 4; Issue 2; March 2019; Page No. 34-38

A comparative study between the efficacy of counterstrain technique and iliotibial band stretching with Hip Abductor Strengthening on Runners with Iliotibial Band Friction Syndrome

Tadepalli Bhavya[1], Lavanya Suvarna[2], Earnest Samuel[3]
[1] Assistant Professor, Banarsidas Chandiwala Institute of Physiotherapy, Kalkaji, Delhi, India
[2] Associate Professor, Rajiv Gandhi University of Health Sciences, Bangalore, India
[3] Senior Physical Therapist, Premier Healthcare, Young Adult Institute Network, New York, United State

Abstract
Background: Iliotibial Band Friction Syndrome (ITBFS) involves pain in the region of lateral femoral condyle or slightly inferior to it, that occurs after repetitive motion of the knee, typically in a runner, cyclist or other athlete.
Purpose: Aim of the study was to compare the efficacy of counter strain technique and Iliotibial Band stretching when given along with hip abductor strengthening in reducing pain and improving functional abilities in runners with ITBFS.
Method: 60 symptomatic patients of both the sexes fulfilling inclusion criteria were randomly taken, divided into 2 groups each of 30 subjects.
Group A: (n=30): Treated with counterstrain technique. Technique was given for 90 secsover the tender point in 3 repetitions.
Group B:-(n=30): Treated with Hip Abductor Strengthening with Iliotibial band Stretching. Side lying hip abduction exercise, a standing pelvic stabilisation exercise and forward-backward lunges with progression in resistance with theraband. Standing stretching and side lying stretching (pretezal stretch).Stretches were maintained for 30 seconds each and repeated 3-5times. Ultrasound was given to both the groups as control.
Results: The average improvement of VAS for Group A and Group B were 5 & 4 respectively using median. The U value was 10, which is statistically highly significant (p value=0.000)
The average improvement of Total of Cincinnati knee rating scale for Group A and Group B were 125 and 40 respectively using median. The U value was 36, which is statistically highly significant (p value=0.000).
The results indicated that both Counterstrain technique and Hip Abductor Strengthening along with Iliotibial Band Stretching produced highly significant improvement in VAS and Cincinnati knee rating scale (sub scores and total scores) scores at 4th week when compared to baseline values, Counterstrain technique (Group A) showed significant improvement when compared to Hip abductor strengthening along with It band stretching (Group B) in patients with ITBFS which was statistically highly significant (p value=0.000).

Keywords: iliotibial band friction syndrome, Counterstrain technique, hip abductor strengthening, iliotibial band stretching, VAS, Cincinnati knee rating scale.

Introduction
Iliotibial Band Friction Syndrome (ITBFS) is an inflammatory, repetitive strain injury to the knee they is particularly
common in long distance runners. out running shoes, and /or lower leg misalignment. aspect of the knee that can radiate into the outer thigh or calf 1,2,4. ITBFS may be caused by a multitude of factors including training errors, worn1,3,6. The main symptom of ITBFS is a sharp pain on the outer4
Knee pain usually occurs at a particular distance of each training run, probably due to muscle fatigue and is more pronounced shortly after the foot contacts the ground surface [5].

Prevelance
It is generally accepted that Itfbs is most common running injury of the lateral knee, with an incidence between 1.6 and 12%. It is also commonly diagnosed in cyclists, reported as comprising 15% of all overuse injuries of knee region [2].

Pathomechanics
the point of Friction is caused by the flexion and extension movements of the knee, which brings the thickest portion of the band, which is adjacent to the lateral femoral condyle, anterior to the axis of knee motion and the condylar prominence during flexion movements past this 30 degree point. The internal and external rotation of the Hip during running produce a Friction point at the greater trochanter, producing the potential for the trochanteric bursitis [7].
Studies have suggested two factors that lead to excessive abduction of the stance leg in the frontal plane, causing increased tension of the IIT: weakness of the muscles that abduct and support the pelvis, and running on cambered (arched) surfaces [5].
Long distance runners with ITBFS have weaker hip abduction strength in the affected leg compared with their unaffected leg [9].
The degree of pain on movement can be categorised on a 1 to 5 severity scale [8].
Grade 1: Pain comes on after running but does not restrict distance or speed.
Grade 2: Pain comes on during a run but does not restrict distance or speed.
Grade 3: Pain comes on during a run and restricts distance

or speed.
Grade 4: Pain is so severe it prevents running.
Grade 5: Pain is continuous during activities of daily living.

Investigations
ITBFS can be detected through the list of special tests
Ober's test, Modified ober' stest, Noble's test, Renne Creak's test, Thomas test.
MRI findings suggests poorly defined signal intensity abnormalities or a circumscribed fluid collection located in a compartment like space medial to the IIT with obliteration of the fatty layer distal to the vastuslateralis muscle [10, 11].

Treatment
Manual adjustments to the ankle, foot and patella, deep tissue procedures. Ultrasound and electric stimulation combination therapy, iontophoresis, non steroidal anti inflammatory drugs, ice pack. Surgery should be considered if all other means of therapy fails [7, 11, 12, 13].

Counterstrain technique
It is also known as positional release. It is a gentle, manual medicine technique that places the patients body in a comfortable position for approximately 90 secs; this allows patient's body to reset its muscles to normal, hence setting stage for muscles to heal. It moves joints and their muscles away from restrictions to a comfortable position instead of moving non-functional joints directly into motion restrictions.it deals particularly with the relief of pain.it can be used in almost any condition and on any age [14, 15].

Stretching
It is a form of physical exercise in which a specific skeletal muscle (or muscle group) is deliberately elongated, often by abduction from the torso, in order to improve the muscle's felt elasticity and reaffirm comfortable muscle tone [71].The result is a feeling of increased muscle control, flexibility and range of motion. Stretching is also used therapeutically to alleviate cramps.

Strengthening
Muscle strength is what happens when the nervous system communicates a message to the muscle fibres to contract so as to produce force. Often the force produced by a muscle contraction is against resistance. Dumbbells, Thera band or tubing, or something heavy to lift or carry all qualifies as resistance to muscle contraction.

Objectives of the study
1. Cincinnati Knee Rating System.
2. To find the efficacy of hip abductor strengthening with Iliotibial band stretching in reducing pain and disability in runners with ITBFS by measuring pain on VAS and functional abilities on Cincinnati Knee Rating System.
3. To compare the efficacy of counter strain technique and iliotibial band stretching when given along with hip abductor strengthening in reducing pain and improving functional abilities in runners with ITBFS by measuring pain on VAS and functional abilities on Cincinnati Knee Rating To determine the effectiveness of Counterstrain technique in reducing pain and disability in runners with ITBFS by measuring pain on VAS and functional abilities on System.

Methodology
Study design: Experimental (Comparative Study) design.

Sample design: Purposive sampling

Source of data: Runners aged between 20 to 50 yrs with ITBFS diagnosed and referred from Govt Wenlock Hospital, Dr. M.V.S.T surgical nursing home and from stadium in and around Mangalore.

Inclusion criteria: Age between 20-50 yrs Both males and female are included Long distance runners having unilateral literal knee pain Positive Modified Ober's and Nobel's test. Runners with a minimum score of 120 in Knee Rating System.

Exclusion Criteria: Meniscal tears Degenerative Joint diasorders Patella femoral Pain Ligament injury History of knee trauma or history of knee surgery Runners who ha e already taken any treatment for ITBFS.

Sample Size: 60 subjects fulfilling the inclusion and exclusion criteria.

Duration: The study was conducted over duration of 12 months. Method-

60 runners with ITBFS fulfilling the inclusion and exclusion criteria were selected and randomly divided into two groups i.e Group A and Group B, each group containing 30 subjects. Informed consent was obtained for them. Pre test was conducted on Group A and Group B by VAS for assessing pain and Cincinnati Knee Rating System for assessing functional abilities.
After a brief demonstration counter strain technique was given to Group A subjects twice a week for a period of 4weeks. Similarly after a brief demonstration Group B received Hip Abductor strengthening, Iliotibial band stretching twice a week for 4 weeks(8 treatment sessions).
Ultrasound was given over the area of discomfort to both the groups after treatment.
Post test was conducted on Group A and Group By VAS for assessing pain and Cincinnati Knee Rating System for assessing functional abilities.
The results were recorded and analysed statistically.

Group A: Counterstrain technique
The patient was made to lie in supine position. The tender point on the flexed (30 degrees) Knee was identified. This point was approximately 2cm (range 0-3) proximal to the lateral femoral epicondyle. The patient was asked to rate the severity of pain on VAS. While monitoring the tender point with thumb, patient's knees was positioned into extension. As the tissue is relaxed, the patient's leg was positioned into slight abduction and external rotation. This step involves fine tuning until the patient feels maximal relief. While monitoring the tender point in the position for 90 seconds. After these 90 seconds, the leg was positioned back to the natural position. The tender point was monitored again in flexion. The patient was not allowed to initiate movement of the leg, as this could trigger the tender point again by reinitiating inappropriate proprioceptive firing. This treatment was twice for a period of 4 weeks.

Group B: Hip abductor strengthening and Iliotibial band stretching

Hip Abductor Strengthening: Three strength exercise were included for strengthening hip abduction: side lying hip abduction exercise, a standing pelvic stabilisation exercise and forward-backward lunges.

Table 1: Progression of Strength Exercises

0	Week	# Sets	# Reps	Hold	Rest	Resistance
Side-lying hip abduction exercise	Week 1	1	10	10 sec	10 sec	~
	Week 2	2	10	10 sec	10 sec	~
	Week 3	2	10	10 sec	10 sec	green theraband
	Week 4	2	10	15 sec	10 sec	green theraband
Standing pelvic stabilization exercise	Week 1	1	5	5 sec	5 sec	green theraband
	Week 2	1	10	5 sec	5 sec	green theraband
	Week 3	2	10	8 sec	5 sec	green theraband
	Week 4	2	10	10 sec	5 sec	green theraband
Forward-backward lunges	Week 3	1	5/side	~	~	~
	Week 4	1	8/side	~	~	~

Iliotibial band stretching: Two iliotibial band stretches:
Standing Stretch -In standing stretch the patient stands erect, crosses his affected leg behind the unaffected leg.
Side lying (pretezal) Stretch-In side lying pretezal stretch the subjects pulls the foot upto the back of buttocks, crosses the unaffected leg over the affected leg and push down. Stretches were maintained for 30 seconds each and repeated 3-5 times.

Ultrasound Therapy: will be given over the area of discomfort at 0.5W/cm Ultrasound therapy was given as control to both the groups. Continuous Ultrasound 22 x 3mHz x 5min will be given for the first week and then will be increased to 1 W/cm x 3mHz x 5 min to the area of discomfort.

Data Analysis

Parameters used for comparison and statistical analysis used- Wilcoxon Sign Rank test and Mann Whitney U test.

Result

Table 2: Age wise distribution in Group A and Group B.

Age	Group-A	Group-B
20-29	11	10
30-39	9	11
40-49	10	9
total	30	30

Table 3: Pre and post values of vas, walking, stair climbing, squatting and Kneeling, straight running, jumping and landing, twists and pivots and total ofcincinnati knee rating scale in group a and Group: B

Groups	Group A pre	Group B pre	Group A post	Group B post
Visual Analogue Scale	7	8	2	4
Walking Score	30	20	40	30
Stair Climbing Score	20	20	40	30
Squatting and kneeling Score	20	20	30	30
Straight Running Score	60	60	100	60
Jumping and Landing Score	60	40	80	60
Twists and Pivots Score	60	60	90	60
Total	245	230	370	270

Table 4: Comparison Of Average Improvement In Scores Of Vas, Walking, Stair Climbing, Squatting And Kneeling,Straight Running, Jumping And Landing, Twists And Pivots,Total Of Cincinnati Knee Rating Scale.

	Average improvement(A)	Average improvement(B)	U-value	p-value	result
Visual Analogue Scale	5	4	10	0.000	P<0.05 sig
Walking	10	10	310	0.026	P<0.05 sig
Stair Climbing	20	10	253	0.001	P<0.05 sig
Squatting and kneeling	10	10	241	0.007	P<0.05 sig
Straight Running	40	0	108	0.000	P<0.05 sig
Jumping and Landing	20	20	135	0.000	P<0.05 sig
Twists and Pivots	30	0	82	0.000	P<0.05 sig
Total	125	40	36	0.000	P<

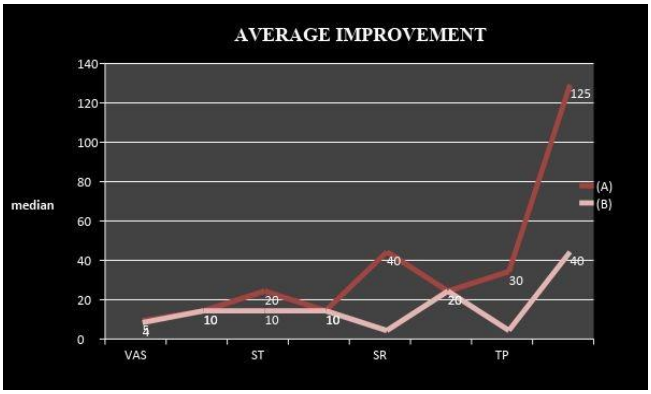

Fig 1: Comparison of average improvement in scores of vas, walking, stair climbing, squatting and kneeling, straight running, jumping and landing, twists and pivots, total of Cincinnati knee rating scale.

The above graph depicts average improvement in VAS, walking, stair climbing, squatting and kneeling, straight running, jumping and landing, twists and pivots and total of Cincinnati knee rating scale

VAS: The sample size for group A and group B was taken as 30 each (N =30). The comparison of change for VAS between group A and group B were given as: The average improvement for group A and group B were 5 and 4 respectively. The U value was 10, which is statistically highly significant (p value.

Total of Cincinnati knee rating scale: The sample size for group A and group B was taken as 30 each (N =30). The comparison of change for total of Cincinnati knee rating scale between group A and group B were given as: The average improvement for group A and group B were 125 and 40 respectively. The U value was 36, which is statistically highly significant (p value = 0.000).

Discussion

The aim of the study was to determine the effectiveness of counter strain technique in reducing pain and disability in runners with iliotibial band friction syndrome, also to find the efficacy of hip abductor strengthening given with iliotibial band stretching in reducing pain and disability in runners with iliotibial band friction syndrome and To compare the efficacy of counter strain technique and iliotibial stretching when given along with hip abductor strengthening in reducing pain and functional abilities in runners with iliotibial band friction syndrome.

Total number of subjects were 60, they were randomly divided into 30 in each group (i.e group A and group B).

Group A received Counter Strain Technique twice weekly followed by Ultrasound for 4 weeks. Group b received Hip Abductor Strengthening along with Iliotibial Band Stretching twice weekly followed by Ultrasound for 4 weeks.

In present study Vas and Cincinnati Knee Rating system was used to asses pain and functional abilities as its validity and reliability is already established. Cincinnati Knee Rating Scale includes all those activities where the joint mechanics of knee joint along with the mechanics of iliotibial band are relatively understood and therefore determines which treatment protocol is beneficial [19, 20].

The pain relief was assessed using Visual Analogue Scale (VAS). The subjects showed significant pain relief within Group A and Group B respectively. It was also noted that Group A showed better pain relief as compared to Group B.

Cincinnati Knee Rating Scale was used to assess improvement in functional abilities. The subjects showed improvement within Group A and Group B. It was also noted that Group A showed better improvement as compared to Group B.

In Cincinnati Knee Rating Scale functional activities noted by this scale such as walking, stair climbing, squatting and kneeling, straight running, jumping and landing and twists and pivots all showed improvement within Group A and Group B.

When Group A and Group B were compared, Group A showed better results than Group B. VAS Scores and Cincinnati Knee Rating Scale Scores across baseline and post intervention showed a highly significant improvement statistically in their median values within Group A and Group B (p value =0.000).

In this study Counter Strain technique has proved beneficial in reducing pain and improving functional activities in iliotibial band friction syndrome. A similar study was done by Robert N. Pedowitz (2005) which included a case study on use of Counter Strain Technique for iliotibial band friction syndrome and the results show that counter strain, as a treatment modality proves to be beneficial for an athlete to reduce pain and make him capable of returning to full activity in less than 3 weeks from the initiation of the treatment. Like wise Dardzinski J.A, Ostrov B.E et al reported pain reduction with counter strain technique. A case study and retrospective review of 20 patients who had had chronic pain for an average of 2.7 years were included in study and were treated with SCS for pain relief. A reduction in pain and an increase in function of 50%-100% occurred in 19 of 20 patients immediately after SCS therapy. Partial improvement was maintained for 6 months in 11 of 20 patients, and 4 were still pain free. Study concluded that counter strain technique are helpful adjunctive therapy for patients previously unresponsive to standard treatment for myofascial pain syndrome [18].

In the present study hip abductor strengthening when given along with iliotibial band stretching has proved useful in reducing pain and improving functional activities in runners with iliotibial band friction syndrome. this is in accordance with a similar study done to examine whether a multi modal physiotherapy approach, including hip abductor strengthening, iliotibial band stretching in patients with iliotibial band friction syndrome, might play a role in recovery.16 subjects (5 men, 11woman) aged 20-53 yrs participated in the study. The duration of treatment was 6 weeks. The result of the study shows that hip abductor strengthening appeared beneficial in treatment of iliotibial band friction syndrome [16]. Likewise Fredericson M, Wolf C. (2005) conducted a study to find out the effects of hip abductor strengthening in runners with iliotibial band friction syndrome and concluded that it very beneficial in recovery [17].

Iliotibial band stretching plays a vital role in reducing pain and increasing functional abilities has been proved in the present study. A similar study was conducted by Carrie Ann Lucas to examine the effects of various stretches in treating patients with iliotibial band friction syndrome. 6 patients were included. Several static stretching techniques were adopted including Ober technique, crossover stretch, standing wall lean, standing lateral fascial stretch with tunk rotation, standing wall lean and crossover stretch, and

modified Ober technique. An increase in the flexibility of iliotibial band was greatly noticed along with reduction in pain and discomfort in majority of patients. The study concluded the static stretching of iliotibial band is helpful in patients with iliotibial band friction syndrome.

Between Group comparison of VAS and Cincinnati Knee Rating Scale it showed that subjects receiving Counter Strain Technique (i.e Group A) had highly significant improvement in VAS and functional ability, when compared to the subjects receiving Hip Abductor Strengthening along with Iliotibial Band Stretching (i.e Group B).

The study results examined the effectiveness of Counter strain technique to Hip abductor strengthening with iliotibial band stretching, both within groups and between groups. From the results obtained it suggests that Hip abductor strengthening and iliotibial band stretching is effective in reducing pain and improving functional abilities in runners with iliotibial band friction syndrome but Counter strain technique showed better results when compared to Hip abductor strengthening and iliotibial band stretching.

Conclusion

1. Counter Strain Technique (Group A) produced highly significant improvement in reducing VAS and increasing functional abilities (Cincinnati Knee rating Scale – Sub and Total scores) at 4th week (post intervention) when compared to pre intervention values in runners with iliotibial band friction syndrome.
2. Hip Abductor Strengthening with Iliotibial Band Stretching (Group B) had a significant improvement in reducing VAS and increasing functional abilities (Cincinnati Knee rating Scale – Sub and Total scores) at 4th week (post intervention) when compared to pre intervention values in runners with iliotibial band friction syndrome.
3. However, Counter Strain Technique was found to be more beneficial when compared to Hip abductor Strengthening with Iliotibial Band Stretching in reducing VAS and increasing functional abilities (Cincinnati Knee rating Scale – Sub and Total scores) at 4th week (post intervention) when compared to pre intervention values in runners with iliotibial band

References

1. Anderson GS. Iliotibial Band Friction Syndrome. The Australian Journal of Science and Medicine in Sport. 1991; 81-83.
2. Barber FA, Sutker AN. Iliotibial Band Syndrome. Sports Medicine. 1992; 14(2):144-148.
3. Kirk KL, Kuklo T, Klemme W. Iliotibial Band Friction Syndrome. Orthopaedics, ortho bluejournal.com. 2000; 23(11)1209-1215.
4. Birnbaum K, Siebert CH, Pandorf T, Schopphoff E, Prescher A, Niethard FU. Anatomical and biomechanical investigations of the iliotibial tract. Surg Radiol Anat. 2004; 26(21):433-446.
5. McNicol K. Iliotibial Tract Friction Syndrome in Athletes. Canadian Journal of Applied Sport Sciences. 1981; 6(2):76-80.
6. Gunter P, Schwellnus MP. Local corticosteroid injection in iliotibial band friction syndrome in runners: a randomized controlled trial. British Journal of Sports Medicine. 2004; 38:269-272.
7. Reid DC. Sports Injury Assessment and Rehabilitation. New York: Churchill Livingston Inc, 1992, 424-427.
8. Reid DC. Assesment and Treatment of the Injured Athelete. University of Alberta, Edmonton, 1984.
9. Messier SP, Edwards DG, Martin DF, Lowery RB, Cannon DW, James MK, *et al*. Etiology of iliotibial band friction syndrome in distance runners. Med Sci Sports Exerc. 1995; 27:951-960.
10. Ekman EF, Pope T, Martin DF, Curl WW. Magnetic resonance imaging of iliotibial band syndrome. Am J Sports Med. 1994; 22:851-854.
11. Murphy BJ, Hechtman KS, Uribe JW, Selesnick H, Smith RL, Zlatkin MB. Iliotibial band friction syndrome: MR imaging findings. Radiology. 1992; 185:569-571.
12. Kvist M, Jarvinen M. Clinical Histochemical and Biomechanical Features in Repair of Muscle and Tendon Injuries. International Journal of Sports Medicine. 1982; (3):12-14.
13. Walker JM. Deep Transverse Frictions in Ligament Healing. The Journal of Orthopaedic and Sports Physical Therapy. 1984; 6(2):89-94.
14. Di Giovanna EL, Schiowitz S. eds. An Osteopathic Approach to Diagnosis and Treatment. Philadelphia, Pa: Lippincott Williams & Wilkins, 1991, 2-13.
15. Glossary of osteopathic medical terminology. In: American Osteopathic Association 2000/01 Yearbook and Directory of Osteopathic Physicians. 91st ed. Chicago, Ill: American Osteopathic Association. 2000; 855-872.
16. Amanda Beers, Michael Ryan, Zenya Kasubuchi. Scott Fraser, Jack, Taunton E. Effects of multi-modal physiotherapy including hip abductor strengthening, in patients with iliotibial band friction syndrome. J Physiother Can. Spring. 2008; 60 (2):180-188.
17. Fredericson M, Wolf C. Iliotibial band syndrome in runners: Innovation in treatment. Sports Med. 005; 35(5):451-9.
18. Dardzinski JA, Ostrov BE, Hamann LS. Myofascial Pain Unresponsive to Standard Treatment: Successful Use of a Strain and Counterstrain Technique with Physical Therapy. Journal of Clinical Rheumatology, August. 2000; (6)4.
19. Sue D, Barber-Westin, Frank Noyes R, et al. Rigorous Statistical Reliability, Validity and Responsiveness testing of the Cincinnati knee rating system in 350 subjects with uninjured, injured or anterior cruciate ligament-reconstruction knees. The American Journal of Sports Medicine.
20. Robert Marx G, Edward Jones, C, Answorth A, Allen David Altchek W, Stephen J. O'Brien Scott A, et al. Wickiewicz. Reliabilty, Validity and Responsiveness of four Knee Outcome Scales for Athletic patients. Journal of Bone and Joint Surgery (American). 83:1459-1469.