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ORIGINAL ARTICLE

Effects of Instrumented Assisted Soft Tissue Mobilization (IASTM) Technique Versus Stretching on Ililotibal Band in Patients with Anterior Knee Pain

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ABSTRACT

Background: Anterior knee pain is caused by many factors iliotibial band tightness is one of cause of knee pain. The repeated hip abduction or postural imbalance usually results in contracture and tightness of the iliotibial band. Soft tissue mobilization is hypothesized as one of effective treatment. Instrumented assisted soft tissue (IASTM) technique is a soft tissue mobilizing technique and have remarked effects.

Objective: This study's objective was to assess how well IASTM improved hip adduction range of motion (ROM).

Methodology: This study was quasi experimental trial. And duration for this study was 6 month after the approval of synopsis. Sample of total 46 with knee pain was recruited in two groups. Non- probability convenience sampling technique was used. Total sample size was 30(15 each group). Subjects were allocated into 02 Groups. Inclusion criteria were Age 25 to 50 years and patients with Anterior Knee Pain, Patients of both genders. One group received IASTM and other group received self stretching for flexor group. Outcome was measured on NPRS, goiniomere and lower extremity function scale (LEFS) and values were be taken at baseline and after one week of treatment and then at third week of treatment. The data was analyses using SPSS v 25.

Results: The results shows no significant improvement in pain, LEFS and hip abduction range between both groups comparison but both treatments IASTM and stretching exercises shows significant results within each group.The individuals in the GT group showed better hip abduction strength after three treatment sessions. Furthermore, after the one-month follow up, the gain in strength persisted. HoweverThere was no significant difference statistically in hip adduction ROM or VAS scores for pain and function between both the control group and graston (GT) group.

Practical application :This study is going to help physical therapist and instrumented assisted soft tissue mobilization practitioners that how Graston technique and stretching effective in terms of decreasing pain, improving flexibility and lower extremity functions in patient with
illiotibal band tightness having anterior knee pain.

Conclusion: IASTM technique and stretching was equally effective in terms of decreasing pain, improving flexibility and lower extremity functions in patient with illiotibal band tightness having anterior knee pain.

Keywords: instrumented assisted soft tissue mobilization, iliotibial band, ant knee pain, soft tissue mobilization.

INTRODUCTION

The iliotibial band (ITB) is frequently tight in people who engage in physical activity, particularly runners and cyclists, which puts them at risk for ITB-related diseases such as patellofemoral pain syndrome (PFPS) and iliotibial band friction syndrome (ITBFS) (1). When fully extended the knee, the illiotibial band ITB is anterior to the lateral femoral condyle; however, with a 30 degree flexion, the gluteus maximus drags the ITB posteriorly so that it sits on top of the femoral condyle. When this procedure is repeated when pedaling(cycling) or running the illiotibial band ITB insertion rubs against the lateral femoral condyle, causing friction that causes inflammation. (4). Athletes' anterior knee discomfort has been linked to the illiotibial band syndrome and patellofemoral pain syndrome. illiotibial band syndrome is caused due to tissue adhesions(1, 5). Treatment option for these conditions is to focus on the sign and symptoms and reduce the inflammation (6,7). Among the methods utilised for the conservative treatment of the ITBS and PFPS include stretching, resistance training, altering one's routine, cryotherapy, and trigger point therapy, and other manual therapy procedures. Therapeutic exercise aims to improve ITB extensibility and hip abduction strength (8). Exercises that are both isotonic and isokinetic and that target strengthening the hip abduction have been demonstrated to reduce discomfort, promote tissue extensibility, and enhance function (6,8,9). Stretching alone might not be as efficient or effective as soft tissue mobilisation, which can relieve fascial restrictions and muscle stiffness, in functionally extending the ITB and surrounding musculature. (11).

Soft tissue mobilisation, one manual therapy technique, makes the hands more mechanically worn out. Instrument assisted soft tissue mobilisation strategies have been created to get around this and provide the hands a stronger mechanical edge (8). The term "soft tissue mobilisation" refers to a variety of physical and applied manipulations of soft tissue structures. Manual mobilization soft tissues STM techniques include massage, Mayo facial release, muscular energy (MET), and active release technique (ART). Any soft tissue manipulation (STM) procedure utilising an instrument, such as the Graston technique, falls under the umbrella of the implemented soft tissue manipulation (ISTM or IASTM) technique. Since 1994, outpatient clinics have adopted the Graston Technique (GT), a technique for diagnosing and treating soft tissue issues (12). GT instruments – made of stainless steel, specifically designed and developed as an alternative to manual transverse friction massage (13). Soft tissue mobilisation (STM) utilising the Graston tool (GT) involves the use of a tool that causes mechanical micro-traumatic injury to the treated area. (14). In order to speed up the process of healing and rebuild flexible, normal tissue, it consequently causes an inflammatory reaction. This procedure appears to have the therapeutic effects of reducing tissue adhesion, raising fibroblast counts, and encouraging collagen synthesis.

In one study, the efficacy of two IASTM techniques was compared. Subjects with tight ITBs underwent the Garston Technique and Gua Sha. While there was an increase in hip adduction for the Garston group, the results did not significantly differ between the groups(5,16). A twenty-year-old male football player's case (27) illustrates the functional improvements brought on by Graston Technique treatment. His medical history included numerous ankle arthroscopic surgeries as a result of severe

sprains at ankle joint. After the physical therapy plan of five weeks yielded fewer than optimal outcomes, the GT was applied twice weekly for 7 weeks(12). Participant experienced no pain during movement at the end of the therapy session and had dramatically enhanced ankle range of motion(ROM). A reduction in the soft tissue surrounding the medial malleolus had been thwarted by scar formation, according to a magnetic resonance imaging done following therapy.

Anterior knee pain is caused by many factors .Iliotibial band tightness is one of cause of knee pain. There are different approaches to treat this condition. Soft tissue mobilization is hypothesized as one of effective treatment. IASTM technique is a soft tissue mobilizing technique and have remarked effects. Studies examining the effects of stretching on ITB extensibility concentrated on the abrupt effects on hip adduction range of motion as they were measured right after treatment.

The GT group did show an upward tendency, particularly at the one-month follow-up, despite the fact that there was no statistically significant difference in hip adduction ROM between the GT and control groups. Even after the therapy sessions, ROM grew, indicating that IASTM had long-lasting effects. .The continuous rise in ROM even without therapy suggests that the IASTM may have lowered soft tissue tension,adhesions and extended the entire ITB unit. The follow-up exam one month later showed continued improvement, which is consistent with the succession of the healing cascade.A controlled and localised inflammatory response is thought to be triggered by GT, enabling the repair of injured tissues (13). The completion of the proliferation phase of healing as well as the synthesis and proliferation of collagen may have been possible with a one-month follow-up.

The Research's Gap was First of all, the Graston technique was solely used to examine changes in pain and range of motion; muscle activity was not measured. Therefore, more research is needed to examine how the Graston treatment affects the activation of the lower limb muscles. Second, the intervention only lasted a brief time. Since the greatest significant progress may be made after at least 6 weeks , an intervention time of 6-8 weeks or longer has typically been adopted. The best time to exercise, however, is still unknown. Our findings demonstrated that the Graston treatment dramatically increased range of motion (ROM) and lowered discomfort after 4 weeks. The long-term effects of the Graston treatment on pain muscle activity and range of motion in patients with anterior knee pain require more study.

We investigated how the Graston approach affected patients with anterior knee pain in terms of discomfort and range of motion. Increased ROM was brought about by both the Graston treatment and regular exercise. Only the Graston group, nevertheless, demonstrated greater pain alleviation and higher ROM. These results indicate that those with anterior knee pain may benefit from the Graston treatment as a pain-relieving and ROM-improving programme.

The goal of this study was to ascertain whether IASTM increases hip adduction range of motion.

MATERIAL AND METHODS

Study Design & setting: This study was quasi experimental trial. And duration for this study was 6 month after the approval of synopsis. The participant to be sure treated with ethical rights. This study was conducted at AZIZ MEDICAL CENTER and ALI AHSAN hospital, Lahore. Every participant was informed about the study .the participation was voluntary and was allowed to withdraw the study anytime. All the data handled confidential and will be deleted after the completion of study .the participant have given the answers in privacy and privacy maintained.

Sampling selection &sample size: Non- probability convenience sampling technique were used. Total sample size was 30(15 each group). Subjects were allocated into 02 Groups. GROUP A was treated with IASTM technique and Group B was treated with Stretching Techniques. Inclusion criteria were Age 25 to 50 years and patients with Anterior Knee Pain, Patients of both genders. And they have symptom duration of 1 month and limitation in abduction and tight ITB with ITB flexibility less than 26 degrees. Exclusion criteria was Patient with back pain ,Patients with Knee osteoarthritis and medical red flag history (tumor, metabolic diseases, rheumatoid arthritis, osteoporosis or Infection) and patients with neurological disorder or symptomatic herniated disc or severe disorders of the lumber spine. Patients with any previous surgery of affected leg, history of severe trauma or any fracture and with cardiovascular diseases (e.g., chest pain during physical exercise, heart failure, myocardial infarction and stroke), Postoperative conditions in the leg and hip region and pregnancy were excluded.

Treatment Technique: GROUP A: Graston technique

Effects of graston technique versus stretching on illiotibal band in subjects with anterior knee pain.

There was flexed leg at the hip and knee joints at 45 degrees and 90 degrees, respectively, to provide stabilization on non treatment leg while the treatment leg was stretched. This study compared the effects of stretching vs. the graston technique on the illiotibal band in patients with anterior knee discomfort. The individuals were lying on their side with their untreated leg up. An emollient was applied to the leg from the lateral joint line along the tibial condyle to just below the iliac crest. The instrument GT-5 was used during treatment.. The tool was used to assess the soft tissue in three locations on the lateral leg: anterior to the ITB, over the ITB, and posterior to the ITB.

Brushing and strumming strokes were performed to the tissue in the same region utilising the instrument's convex surface to treat the ITB insertion at Gerdy's tubercle and the patellar retinaculum (6).

The GT-3 instrument was then used to perform brushing and strumming operations on the tensor fascia lata. Then, with a 30-second break in between each session, two low-intensity exercises were carried out for two sets of 20 repetitions each. The very first exercise entails externally twisting the leg while doing side-lying hip abduction with 15 degrees of flexion. The second exercise involved reclining on one side and extending the hip to a 30 degree abduction. After moving the leg internally and externally before returning to the resting position, the patient would then lower the leg back.

Group B: Stretching Techniques:

1 The control group's participants were made to lie in supine. When the patient was ready, the therapist added pressure at the end of the range while the patient was performing an adduction at the hip (34). TENS was used to administer a micro current therapy to participants in the control group. On the greater trochanter and the area just above the lateral knee joint line, adhesive electrodes were positioned. Electrodes were connected to the machine, but the intensity was not increased. They were told not to anticipate any feelings throughout the procedure by the subjects. (13)Control group also receive the IT stretch. patient asked to stand upright then

2 Cross the involved (hurting) leg BEHIND the opposite leg.

3 Lean to the uninvolved side (away from the sore side) until you feel a stretch across the Affected iliotibial band.

4 Hold for 30 seconds.

5 Uncross your legs and stand up straight again (7, 35) .

6 Repeat four more times.

Outcome measures: Numerical Pain Rating Scale (NPRS),

Goniometer for Hip Adduction ROM,

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Lower Extremity Function Scale (LEFS)

Rom testing: To check the range of motion we used goiniometre. The goniometer was initially set on a surface that was known to be level zero. The participants were supine, with their hips and knees in their normal positions. Then placed the goiniometre on the selected side to check the range the goiniometre axis was on ASIS on selected hip side and stationary arm on the opposite side was

directed to the opposite ASIS and moveable arm was parallel moveable arm was parallel to the femur directed toward the patella. And in this position we asked the patient to move the affected leg outwards and then where the movement stopped value on the goiniometre noted, normal value for abduction is 0-40.

Numeric Pain Rating Scale (NPRS): Subjects also asked to complete a Numeric Pain Rating Scale (NPRS) for pain before and after the treatment . For both pain, two ten-centimeter vertical lines were employed. Subjects were asked to rate their level of pain on a scale from 0 to 10, with 10 representing the worst possible agony and 0 representing no discomfort at all. Additionally, participants were asked to rate their functional ability on a scale of 0 to 10. No physical restrictions will be represented as a 10 and any activity that is too unpleasant to undertake will be represented as a 0.(Figure 3). The level of felt discomfort and function was marked by the subjects. The examiner then used a metric ruler to measure the mark and determine a numerical value between 0 and 10. Results were quantified down to the millimetre. To remove any subject bias, On the page, the pain and function scales were printed from highest to lowest.

LEFS: A questionnaire about a person's capacity for performing commonplace tasks is called the Lower Extremity Functional Scale (LEFS), and it consists of 20 questions. Clinicians can use the LEFS to assess patients' initial functions ongoing progress, and results as well as to establish functional goals. A patient with the a disease associated with one or both lower limbs can use the LEFS to assess their functional disability. It has the capability to keep track of the subject over time and assess how well an intervention worked. The scale's columns are added together to determine the final score. 80 is the maximum score.

Interpretation of scores: The more disability, the lower the score. Nine scale points are the smallest difference that may be seen. Nine scale points are the smallest variation that is clinically significant. (LEFS score) / 80 * 100 = percentage of maximum function Performance: At any one time, there was a +/- 5.3 scale point margin of error. *ƒ* Reliability between tests was 0.94. By comparing the construct to the SF-36, construct reliability was assessed. The scale was discovered to be trustworthy and to be more sensitive to change than the SF-36.

Data collection procedure: All patients with anterior knee pain were recruited in this study.Pain and hip adduction was measured before the treatment.Treatment was continued according to allocating groups. Hip abduction was computed for the three trials over the course of four testing days after analysing pre- and post-treatment results (before to treatment, one week into treatment, immediately following treatment, and one month after treatment).All subjects received total six treatment sessions following one month follow up.

Data analysis: The data was analyzed using SPSS v 25. The normality of the data was assessed .Shapiro-Wilks test of normality and uniformity, based on which parametric or non-parametric test was applied to determine within the group and across the group difference in two groups. Independent sample T tests / Mann Whitney U test was applied to determine any significant difference across the two groups. Repeated Measure ANOVA / Friedman ANOVA were used to determine any significant difference with in each treatment group. A difference with p value less than 0.05 was considered as significant.

RESULTS

In this study 46 subjects were randomly divided into two groups. In Graston technique there were 24 subjects and in Stretching group there were 22 subjects.

In Graston technique group, mean Age was 35.83 ± 5.13 years, mean Weight (Kg) was 72.58 ± 13.07, mean Height (m) was 1.68 ± .096 and mean BMI (Kg/m2) was 25.68±4.90.

Independent sample T test was applied to determine any significant difference in NPRS across two treatment group at base level, w1, w2. No significant difference was reported at base level w1, w2 with value>0.05

Table 1:

		Graston technique	Stretching	p-value
Age		35.83 ± 5.13	36.18 ± 5.02	
Weight (Kg)		72.58 ± 13.07	77.18 ± 9.94	
Height (m)		1.68 ± .096	1.70 ± .060	
BMI (Kg/m^2)		25.68±4.90	26.58±3.25	
NPRS	Pre treatment	5.41±1.01	5.22±1.19	
	Week 1	4.37±1.13	4.40±1.18	
	Week 2	2.58±1.10	2.72±1.16	
LEFS	Pre treatment	40.16 ± 4.06	42.18 ± 3.47	
	Week 1	50.37 ± 3.90	51.04 ± 4.02	
	Week 2	55.95 ± 3.18	55.09 ± 2.94	
Hip Abduction	Pre treatment	23.16 ± 2.94	22.86 ± 3.84	
	Week 1	31.66 ± 4.19	31.22 ± 3.35	
	Week 2	32.33 ± 2.82	31.31 ± 2.55	

Table 2:

	Group (1) (N=24) IASTM (Graston Technique)	Group (2) (N=22) Stretching	p-value
Age	35.83 ± 5.13	36.18 ± 5.02	
Gender	F: 50% (n=12) M: 50% (n=12)	F: 50% (n=11) M: 50% (n=11)	
Duration of Symptoms			
BMI (Kg/m^2)	25.68±4.90	26.58±3.25	

Independent sample T test was applied to determine any significant difference in FEES across two treatment group at base level, w1, w2. No significant diff was reported at base level w1, w2 with value>0.05

Table 3:

Outcome measures	Group (1) (N=24) IASTM (Graston Technique)	Group (2) (N=22) Stretching	p-value
NPRS Baseline value	5.41±1.01	5.22±1.19	.564
NPRS W1	4.37±1.13	4.40±1.18	.921
NPRS W2	2.58±1.10	2.72±1.16	.668
Mean Difference	.189	.034	.143
P value	.564	.921	.668
Hip Abduction	23.16 ± 2.94	22.86 ± 3.84	.764
Hip Abduction W1	31.66 ± 4.19	31.22 ± 3.35	698
Hip Abduction W2	32.33 ± 2.82	31.31 ± 2.55	.209
LEFS Baseline	40.16 ± 4.06	42.18 ± 3.47	.079
LEFS W1	50.37 ± 3.90	51.04 ± 4.02	.570
LEFS W2	55.95 ± 3.18	55.09 ± 2.94	.344

Independent sample T test was applied to determine any significant difference in hip abduction across two treatment group at base level, w1, w2. No significant diff was reported at base level w1, w2 with value>0.05

Table 4:

	Treatment Groups			
Hip abduction	Graston (Mean ± SD)	Stretching (Mean ± SD)	Mean Difference Mean	P value
Pre treatment	23.16 ± 2.94	22.86 ± 3.84	.303	.764
Week 1	31.66 ± 4.19	31.22 ± 3.35	.439	698
Week 2	32.33 ± 2.82	31.31 ± 2.55	1.01	.209

In Graston group there is significant mean difference of NPRS score in pre-treatment to week 1, week 1 to week 2 and pre-treatment to week 2 is 1.042, 1.792 and 2.833 with p value < 0.05. In stretching group there is significant difference of NPRS score in pre-treatment to week 1, week1 to week 2 and pre-treatment to week 2 is 0.81,1.68and 2.50 with p value < 0.05.

Table 5:

	Study Groups			
Within Group Change for NPRS	Garston technique (Mean difference)	P value	Stretching (Mean difference)	P value
Baseline – 1 Weeks	1.042	.001	.818	.000
1 weeks – 2 weeks	1.792	.001	1.68	.001
Baseline –2 Weeks	2.833	.000	2.50	.000

Table 6:

	Study Groups			
Within Group Change for LEFS	Garston technique (Mean difference)	P value	Stretching (Mean difference)	P value
Baseline – 1 Weeks	10.20	.000	8.86	.000
1 weeks – 2 weeks	5.58	.000	4.04	.001
Baseline – 2 Weeks	15.79	.000	12.90	.000

In Graston group there is significant mean difference of LEFS score in pre-treatment to week 1, week1 to week 2 and pre-treatment to week 2 is 10. 20, 5.583 and15.79 with p value < 0.05.

Table 1 Between the groups comparison for Hip Abduction.

	Study Groups			
Hip abduction Within Group Change	Garston technique (Mean difference)	P value	Stretching (Mean difference)	P value
Baseline – 1 Weeks	8.50	.000	8.36	.000
1 weeks – 2 weeks	.667	1.00	.091	1.00
Baseline – 2 Weeks	9.16	.000	8.45	.000

In stretching group there is significant difference of LEFS score in pre-treatment to week 1, week1 to week 2 and pre-treatment to week 2 is 8.86, 5.58 and15.79 with p value < 0.05.

5.5 Within group comparison for NPRS, LEFS, AND Hip abduction ROM

Table 2 Shows Within group comparison for NPRS

Table 3 Shows Within group comparison for LEFS

Table 4 Shows Within group comparison for Hip Abduction

In Graston group there is significant mean difference of Hip abduction score in pre-treatment to week 1, week1 to week 2 and pre-treatment to week 2 is 8.50, 0.66 and 9.16 with p value < 0.05.

In stretching group there is significant difference of Hip Abduction score in pre-treatment to week 1, week1 to week 2 and pre-treatment to week 2 is 8.36, 0.09 and 8.45 with p value < 0.05.

DISCUSSION

The individuals in the GT group showed better hip abduction strength after three treatment sessions. Furthermore, after the one-month follow up, the gain in strength persisted. The hip adduction range or scores for pain and function on VAS, however, did not statistically differ between the control group and GT group.

While there was no considerable arithmetical difference in hip adduction ROM among both the GT and control groups, the GT group did show an upward trend, particularly at the one-month follow-up. It's probable that IASTM had long-lasting effects because ROM grew even after the course of treatment. The fact that ROM has continued to improve after therapy raises the possibility that IASTM extended the entire ITB unit and lessened soft tissue adhesions and tension. Additionally, during the one-month follow-up, the improvement's progression matched the healing cascade's progression. According to one theory, GT causes a regulated and localised inflammatory response that promotes tissue repair. One month of follow-up may have been sufficient to allow for the completion of the proliferation phase of healing and the synthesis and proliferation of collagen.

Though, because of ITB's dense, layered structure and firmly attached attachments along the length of the femur, the degree of the impact that an instrument (IASTM) treatment might produce might be constrained. According to cadaveric dissection, the Illiotibial band is linked to the femur's linea aspera by fibrous sheath or bands that have an approximately of 0.3 mm thickness from the greater trochanter to the lateral epicondyle(28). There have been no research examining the efficiency of instrumented assisted soft tissue mobilization (IASTM) on illiotibial ITB extensibility and lengthening, however, a study assessing the efficacy of Graston Technique for carpal tunnel syndrome found that wrist ROM increased. The individuals' wrist extension and wrist flexion ranges of motion increased by 7.3° and 7.2°, respectively, after ten GT treatments However, the wrist muscles that had GT therapy have better potential for ROM increases because they do not have as many layers or are as fibrous as the ITB. (29)

The immediate benefits of hip adduction range of motion as they were examined just after treatment were the main focus of studies investigating an increase in ITB extensibility through stretching. Stretching caused an average increase in ITB length of 9.84% to 11.15% compared to resting length. (30) Stretching produced short-lived alterations that might have been caused by the TFL and gluteus maximus lengthening and releasing tension rather than by increasing the ITB's actual length. Stretching has very little chance of affecting the ITB because it is not a contractile tissue. Therefore, the lengthening seen through an increase in hip adduction ROM is better explained by lengthening of the TFL and gluteus maximus than elongation of the ITB.

Since the study's primary goal was prevention and we were particularly interested in how GT affects ITB extensibility, many individuals initially reported being pain-free and having no functional restrictions. The baseline makes it many participants originally reported being pain-free and having no functional restriction because the main focus of the study was preventive and we were primarily interested in how GT affects ITB extensibility.

A significant improvement was not required because the baseline values for both pain and function varied from.10 to.18. With values for both pain and function in the range of.10 to.18, no significant improvement was required.

CONLCUSION

Graston technique and stretching was equally effective in terms of decreasing pain, improving flexibility and lower extremity functions in patient with illiotibal band tightness having anterior knee pain.

Recommendations & Limitations

1. Because there is no absolute best position for ROM and strength tests, researchers used their best judgement..
2. Exercises were carried out isotonically, although strength measurements were taken isometrically.

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