Original Article

EFFECT OF HIP ABDUCTOR STRENGTHENING AMONG NON-PROFESSIONAL CYCLISTS WITH ILIOTIBIAL BAND FRICTION SYNDROME

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ABSTRACT

Background and Objectives: The study was carried out to find out the effect of hip abductor strengthening among non-professional cyclists with iliotibial band friction syndrome.

Subjects: 40 non-professional cyclists with ipsilateral ITBFS subject including male and female age between 18 to 50 with positive ober's and nobble test were included in this study.

Methods: 40 subject were selected according to the inclusion criteria and they were assessed pre and post for ROM (hip adduction, IR), hip abductor strength and pain using goniometer,sphygmomanometer and VAS .Subject were assign experimental group(group A 20 subject) who received IT band stretching,US,and hip abductor strengthening exercise and control group (group B 20 subject) who received same treatment except hip abductor strengthening.

Data Analysis and Results: Based on statistical analysis using Wilcoxon test to compare the pre and post test pain in both group,Mann- whitney U- test to compare the post test pain scores of between groups ,Paired t - test to compare the pre and post ROM and strength in both groups, Unpaired t – test to compare post test ROM in between groups showed that pre post difference within group A there was significant difference for adduction ROM (p value <.0001),IR (p value <.0001),VAS(p value <.0001),and strength improve pre mean 40.80 to post mean 66.30 (p value <.0001).However in group B adduction ROM and VAS were found to be significant.

In comparision in difference between groups it was found that adduction ROM,IR ROM,VAS and strength all were significant. Baseline data for outcome variable were not statistically significant.

Conclusion: Based on outcome variable there was significant difference of hip abductor strengthening among non-professional cyclist with iliotibial band friction syndrome.

KEYWORDS: Iliotibial band, Iliotibial band friction syndrome, Repetitive stress injury,hip abduction strength,VAS, Cycling injury.

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INTRODUCTION

Iliotibial band friction syndrome (ITBFS) is a common overuse injury of knee that occurs as a result of repetitive soft-tissue trauma [1,2]. Iliotibial band friction syndrome involves pain in region of lateral femoral condyle or slightly inferior to it, that occurs after repetitive motion of knee.

ITBFS is associated with overuse in long distance runners, cyclists, and military personnel [3]. It is caused by friction of the iliotibial band (ITB) across the lateral femoral epicondyle during sporting activities [4,5]. Pain caused by ITBFS occurs when the knee is flexed between 0 and 30 degree, but especially at 30^0, where the posterior fibers of the ITB experience the great-

-est friction [5]. More common in age between 15 to 50 years [6].

A number of etiological factors have been related to ITBS include training errors, biomechanical factors like genu varum, foot hypersupination, foot overpronation, or cavus foot, and leg length discrepancies, footwear with poor shock absorption and most recently, hip abductor weakness [14].

Incidence & prevalence: It is generally accepted that ITBFS is the most common running injury of the lateral knee with an incidence between 1.6% and 12% [8,9]. ITBFS comprises 22% of lower extremity injuries [10]. Although it is most common in distance runners, there is a growing number of cyclists with ITBFS. ITBFS accounts for approximately 15% of all overuse injuries at the knee in cycling [5].

Pathomechanics: The pathogenesis of ITBFS involves inflammation and irritation of the lateral synovial recess (Renne et al.), as well as continued irritation of the posterior fibres of the ITB (Ekman et al.) and inflammation of the periosteum of the lateral femoral epicondyle (McNicol et al.), all of which describes the pathogenesis of ITBFS.

The iliotibial band is a thick strip of fascia that originates from tubercle of iliac crest, continues down the lateral side of thigh, and inserts into the lateral tibial condyle (Gerdy's tubercle) and into the lateral proximal fibular head [4,7]. When knee is flexed to an angle greater than 30^o, the ITB lies posterior to the lateral femoral epicondyle, when knee is extended however, the ITB moves anterior to this landmark.Therefore, friction occurs at or slightly less than 30^0 of knee flexion when the ITB crosses over the lateral femoral epicondyle [4].

The high number of revolutions of the bicycle cranks and tightness of the ITB resulting from muscular effort can result in inflammation of the ITB during cycling. Additionally, a snapping of the ITB may occur as it slides over the lateral femoral epicondyle of the femur, typically when the crank is approaching bottom center [5].

Takaishi et al. calculated peak pedal force for various cycling cadences in both competitive and noncompetitive cyclists and determined that non-competitive cyclists preferred a lower cadence (70 RPM) than competitive cyclists (80–90 RPM) for a moderate rate of work intensity (150 W) [11].

In cycling, the ITB is pulled anteriorly on the pedaling down stroke and posteriorly on the upstroke. The ITB is predisposed to friction, irritation, and microtrauma during this repetitive movement because its posterior fibers adhere closely to the lateral femoral epicondyle. Cyclists with an external tibia rotation greater than 20^0 stress is created on the ITB if the athlete's cycling shoe is placed in a straight-ahead position or the toe is in a cleat position. Cyclists with varus knee alignment or active pronation place a greater stretch on the distal ITB when they ride with internally rotated cleats. Poorly fitted bicycle saddle, a high-riding saddle causes the cyclist to extend the knee more than 150^0 . This exaggerated knee extension causes the distal ITB to abrade across the lateral femoral condyle. Bicycle saddles that are positioned too far back cause the cyclist to reach for the pedal, with a resultant stretch to the ITB [12].

The power exerted on the pedal is the most reliable parameter to determine the training load in cycling biomechanically and hence a crucial factor to optimize performance [13].Commercial power meters are meanwhile part of the standard equipment of professional cyclists, but also used by an increasing number of non professional cyclists [13].

Proximally, the ITB acts as a lateral hip stabilizer resisting hip adduction (Fredickson et al., 2000). It originates in the facial components of the gluteus maximus, gluteus medius, and tensor fasciae latae muscles (Muhle et al., 1999; Birnbaum et al., 2004; Terry et al., 1986). The ITB is attached distally to the supracondyle tubercle of the femur and the lateral intramuscular septum. In addition it has fibers that attach to the patella (Muhle et al., 1999; Birnbaum et al., 2004; Terry et al., 1986). Due to these attachments, increased hip adduction is likely to lead to increased tension on the ITB. Increased hip adduction may necessitate a greater eccentric demand from gluteal musculature, resulting in a higher hip abduction moment.

Schafer recommends treating ITBFS as an acute sprain with initial cryotherapy and adequate rest with ingestion of a nonsteroidal anti-inflammatory to help relieve the inflammatory process. Trigger points should be treated using cross fibre friction massage for several minutes as recommended by Simons. Treatments may be concluded by interferential current therapy to achieve analgesia, followed by functional muscle stimulation for muscle reeducation. Bilateral passive and active stretching exercises for the tensor fascia latae, hamstrings and quadriceps should be prescribed. Training should be modified to include non-percussive exercise such as cycling and swimming with ice massage of the affected areas following the activity. Surgical release of the ITB or removal of the lateral femoral epicondyle has been used when conservative treatment fails. However, return to full and normal lower limb mechanics may not be achieved.

Studies have shown that ITBFS responds well to conservative treatment (Anderson, 1991; Kirk et al., 2000; Levin, 2003) with success rates reported as high as 94% (McNicol et al., 1981). A number of different treatment options are reported in the literature, however, it should be questioned whether these treatments are delivered based on sound evidence.

Reid and Fredericson outline the following treatments: the reduction of inflammation (using ice and anti-inflammatory); reduction of tautness and myofascial trigger points in the band (employing stretch techniques and trigger point therapies); Corrective actions and the correction of biomechanical abnormalities with orthotics. Surgery is sometimes opted for in especially stubborn chronic cases.

Majority of the studies on ITBS thus far has focused mainly on the effectiveness of various treatment techniques to the ITB itself and its associated tensor fascia latae (TFL) muscle, with varying results reported which include conservative therapies like rest, ice, and stretching of the tight band; myofascial trigger point therapies like dry needling. Nonoperative measures specific to cyclists consist of bicycle adjustments and training modifications [15].

Other studies have been aimed at identifying and correcting primary etiological factors, such as biomechanical abnormalities (eg: genu varus, cavus foot type, leg length inequalities, sacroiliac joint fixations, and fibular head fixations) also with varying results.

Some of the latest studies have identified an association between weak hip abductors (especially the gluteus medius) and ITBS. These studies suggest that gluteus medius weakness, and myofascitis of the gluteus medius is another contributing factor to ITBS in long distance runners. Gluteus medius strengthening in the treatment of ITBS has been a recent focus of investigation in the literature. The literature reveals that the comparative effectiveness of this new approach to ITBS treatment based on gluteus medius strengthening, to any other form of conservative treatment, requires further investigation. Stretch therapy has traditionally been the basis of the conservative treatment for ITBS i.e., to stretch the tight band and thereby reduce the friction syndrome a proven effective component of conservative treatment for ITBS.

Fredericson explain that the gluteus medius and tensor fascia latae are both hip abductors, but the gluteus medius (mainly its posterior fibres) also externally rotates the hip, whereas the tensor fascia latae also internally rotates the hip. They have consequently postulated that fatigued runners or those who have a weak gluteus medius are therefore prone to increased thigh adduction and internal rotation at midstance, leading to an increased valgus vector at the knee, and that this increases tension on the ITB, making it more prone to impingement on the lateral epicondyle of the femur, especially during the early stance phase of gait (foot contact).

ITBFS sufferers had hip abductor weakness or increased hip adduction during the stance phase of gait, a finding which could be interpreted as being due to hip abductor weakness [1,16,17]. Several studies have investigated forces during cycling while others have studied causes of ITBFS in cyclists. In fact, Fredickson et al. (2000) reported that runners who currently have ITBS exhibited weak hip abductors. Since their subjects were already injured at the time of the measurement, it is unclear whether the weakness was the cause or result of the ITBS.

There is conflicting evidence in the literature as to whether ITBS is a true friction syndrome or more the result of tissue compression. From a clinical perspective, training error combined with hip muscle weakness tends to be the most consistent finding with variable contributions from other factors. In triathletes it is not uncommon for errors in bike setup to cause muscle imbalances that cause ITBS to manifest in the run (even if cycling is pain free).

It is hypothesized that ITBFS is a common symptom among cyclist and athletes. Various studies so far have done proved the efficacy of various treatments like stretching, deep friction massage and modified ober test. As hip abductor weakness is common finding in ITBFS and often neglected during physiotherapy management. The study is aimed to find out the effect of hip abductor strengthening in non professional cyclists with iliotibial band friction syndrome.

OBJECTIVES: To examine the effect of Hip abductor strengthening among non-professional cyclists with ITBFS and to compare the effect of Hip abductor strengthening over conventional physiotherapy among non-professional cyclists with ITBFS.

MATERIALS AND METHODS

Source of data: 1. Padmashree Physiotherapy &Rehabilitation Centre, Nagarbhavi, Bangalore. 2. ESI hospital, Rajaji Nagar, Bangalore. 3. K.C.G. hospital, Malleshwaram, Bangalore 4. Padmashree diagnostics,Bangalore.

Collection of data: Population**:** Non-professional cyclists with ITBFS**.** Sample design**:** Convenient sampling. Sample size **:** 40. Type of Study**:** pre and post test experimental design. Duration of study**:** 6 weeks.

Inclusion criteria: Non-professional cyclists with unilateral iliotibial band friction syndrome, diagnosed by orthopaedic surgeon. Age between 18 to 50 years, Both genders with Positive ober's and nobble test.

Exclusion criteria: Presence of anatomical limb length discrepancies of more than 1cm, Subjects with other associated pathologies of the lower limbs like ankle sprains, anterior cruciate ligament injuries, meniscal injuries, degenerative joint disease, lateral injury of knee, popliteal or biceps femoris tendinitis, common peroneal nerve injury, reffered pain from lumbar spine, Sign symptoms of other knee pathology (meniscal-tear, degenerative joint disease, patellofemoral pain syndrome), history of any previous knee surgeries and any ongoing spine, hip or lower extremity injury.

Materials used: Universal Goniometer, Examination table, Ultrasound machine, Theraband, Sphygmomanometer

Procedure: Subjects who fulfill the inclusion and exclusion criteria were included in the study. A written consent form was taken from each of the subjects. General screening procedure was done by the examining physical therapist.Demographic data were collected from the subject. Subjects were divided into two groups. Each group consist of 20 subjects.

GROUP A (experimental group)-physiotherapy including ITB stretching,Ultrasound therapy with hip abductor strengthening exercise were given.

GROUP B (control group)- physiotherapy including ITB stretching, ultrasound therapy without hip abductor strengthening exercise.

Duration of the study was six weeks. Pre test evaluation was done before starting treatment which includes pain assessment using VAS, hip abductor strength using modified sphygmomanometer and ROM using Goniometer. Patient received one session of treatment per day up to six weeks.At the end of six weeks post test evaluation was conducted for groups. The differences between pre and post test values were compared within groups.

Intervention to be conducted on participants:

Rehabilitation programme used in this study focused on improving hip abductor strength.The side-lying hip abduction exercise was gluteus medius isometric contraction held at approximately 30 degree of hip abduction with slight hip external rotation and neutral hip extension. This exercise was done with the back against a wall. In the fourth week, a 1-metre-long green theraband was added around the ankle.

Hip abduction exercise: Side-lying hip abduction exercises and pelvic drops to strengthen the gluteus medius was started at 1 set of 10 repetitions and over a course of several weeks increased to the goal of 3 sets of 30 repetitions. The patients were instructed to increase by five repetitions per day provided there will no significant post work-out soreness the following day. For the side-lying hip abduction, specific instructions were given to keep the lower leg flexed for balance, the abdominals braced, and the upper leg in slight hip extension and external rotation. Instructions ensured that the leg should be slowly brought into an arc of abduction of 20–30° with each repetition, held for 1 second at extremes of motion and then slowly returned to adduction.

The pelvic drop exercise involved standing on a step with the involved leg, while holding onto a wall or stick if necessary for support with both knees locked, the opposite, non involved pelvis will be lowered towards the floor, shifting one's body weight to the inside part of the foot and involved leg, creating a swivel action at the hip. Then, by contracting the gluteus medius on the involved side, the pelvis will be brought back to a level position.

All subjects instructed to discontinue running, cycling and any other activities that continued to cause pain. Subjects needed to be pain free with all daily activities and have progressed to 3 sets of 30 repetitions of the 2 strength exercises before being allowed to start a return to running program at the end of the 6-week rehabilitation program.

Treatment parameters for Ultrasound therapy:

Duration: 6 Minutes

Mode :continuous

Intensity : 1 watt/cm^2

Frequency: *6* treatment session every alternate day

Iliotibial band stretching: Standing IT band stretch: Stretches were maintained for 60 seconds each and conducted twice daily for the entirety of the programme. Standing lateral fascia stretch with trunk lateral flexion/rotation contralateral to involved leg.The involved leg is crossed behind the uninvolved.

Outcome Measure: Pain (Visual analogue scale), Strength (Modified sphygmomanometer).

Range of motion (adduction & internal rotation of hip).

Data analysis: Wilcoxon test used to compare the pre and post test pain in both group.

Mann- whitney U- test used to compare the post test pain scores of between groups, Paired t - test used to compare the pre and post ROM and strength in both groups, Unpaired t – test used to compare post test ROM in between groups, The statistical analysis was done using SPSS software.

Ethical clearance: As this study involve human subjects; the ethical clearance has been obtained from the ethical committee of Padmashree institute of physiotherapy, Nagarbhavi, Bangalore, as per ethical guidelines research from biomedical research on human subjects, 2000, ICMR, New Delhi.

RESULTS

Study design: A pre and post test experimental design study was done consisting of 40 subjects.In which there were 30 male 10 females in age group of 18-50 years. All subject were able to complete their intervention, there was no drop out.

Table 1 show that for baseline variables, mean age of Group A was 33.60 with SD (9.97) and Group B was 35.45 with SD (9.23) which was not statistically significant (p>0.546).

Progression of Hip Abduction exercise.

Week	Sets	Repetetion	Hold time (sec)	Rest Time (sec)	Resistance
1	1	10	10	10	-
2	2	10	10	10	-
3	2	10	15	10	-
4	2	10	10	10	Green Theraband
5	2	10	15	10	Green Theraband
6	2	12	15	10	Green Theraband

Number of male and female in Group A was 15 and 5 respectively and Group B was 15 and 5 respectively which was not statistically significant (p=1)

Table 1: Baseline data for demographic variables.

Sl .No:	Variables	Group A	Group B	Þ-value
1	Age	33.60±9.97	35.45±9.23	>.546
2	Gender (M/F)	15/15	15/15	1

*Data are mean±S.D.

Table 2: Baseline data for outcome variables.

Sl .No:	Variables	Group A	Group B	Þ-value
1	Adduction ROM	16.15±4.18	14.75±4.44	>.311
2	Internal Rotation ROM	36.35±3.25	37.00±2.96	>.512
3	VAS	6.70±1.30	6.95±1.11	>.529
4	Strength	40.80±12.02	40.75±14.17	>.952

*Data are mean±S.D.

Table 2 show that Adduction ROM mean of Group A was 16.15 with SD (4.18) and Group B was14.75 with SD (4.44) which was not statistically significant (p>0.311).

Internal Rotation ROM mean of Group A was 36.35 with SD(3.25) and Group B was 37.00 with SD (2.96) which was not statistically significant (p>0.512).

VAS mean of Group A was 6.70 with SD (1.30) and Group B was6.95 with SD (1.11) which was not statistically significant (p>0.529).

Strength mean of Group A was 40.80 with SD (12.02) and Group B was 40.75 with SD (14.17) which was not statistically significant (p>0.952).

Table 3: Pre-post difference within the group A.

Sl .No:	Variables	Pre	Post	Þ-value
1	Adduction ROM	16.15±4.18	23.90±3.63	<.0001
2	Internal Rotation ROM	36.35±3.25	39.70±2.90	<.0001
3	VAS	6.70±1.30	0.95±0.89	<.0001
4	Strength	40.80±12.02	66.30±14.66	<.0001

Table 3 shows that in group A, for Adduction ROM pre test score mean was16.15 and SD (4.18), post test score mean was 23.90 and SD (3.63) with p value <0.0001 which was statistically significant.

For Internal Rotation pre test score mean was 36.35 and SD (3.25), post test score mean was 39.70 and SD (2.90) with p value <0.0001 which was statistically significant.

For VAS pre test score mean was 6.70 and SD (1.30), post test score mean was 0.95 and SD (0.89) with p value <0.0001 which was statistically significant.

For Strength pre test score mean was 40.80 and SD (12.02), post test score mean was 66.30 and SD (14.66) with p value <0.0001 which was statistically significant.

Table 4: Pre-post difference within the group B.

Sl .No:	Variables	Pre	Post	Þ-value
1	Adduction ROM	14.75±4.44	19.80±4.40	<.0001
2	Internal Rotation ROM	37.00±2.96	37.65±2.68	>.091
3	VAS	6.95±1.10	3.90±1.29	<.0001
4	Strength	40.75±14.17	41.50±13.68	>.083

Table 4 shows that in group B, for Adduction ROM pre test score mean was14.75 and SD (4.44), post test score mean was 19.80 and SD (4.40) with p value <0.0001 which was statistically significant.

For Internal Rotation pre test score mean was 37.00 and SD (2.96), post test score mean was 37.65 and SD (2.68) with p value >.091 which was statistically not significant.

For VAS pre test score mean was 6.95 and SD (1.10), post test score mean was 3.90 and SD (1.29) with p value <0.0001 which was statistically significant.

For Strength pre test score mean was 40.75 and SD (14.17), post test score mean was 41.50 and SD (13.68) with p value >.083 which was statistically not significant.

Table 5: Difference between group.

Sl .No:	Variables	Group A	Group B	Þ-value
1	Adduction ROM	23.90±3.63	19.80±4.40	<.003
2	Internal Rotation ROM	39.70±2.90	37.65±2.68	<.026
3	VAS	0.95±0.89	3.90±1.29	<.0001
4	Strength	66.30±14.66	41.50±13.68	<.0001

Table5 shows that Adduction ROM mean of Group A was 23.90 with SD (3.63) and Group B was19.80 with SD (4.40) which was statistically significant (p value <.003).

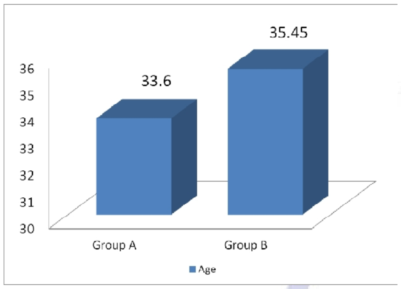
Internal Rotation ROM mean of Group A was 39.70 with SD(2.90) and Group B was 37.65 with SD (2.68) which was statistically significant (p value <.026).

VAS mean of Group A was 0.95 with SD (0.89) and Group B was 3.90 with SD (1.29) which was statistically significant (p value <.0001).

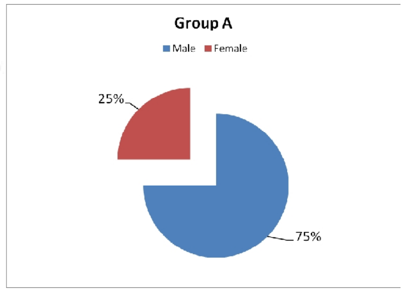
Strength mean of Group A was 66.30 with SD

(14.66) and Group B was 41.50 with SD (13.68) which was statistically significant (p value <.0001).

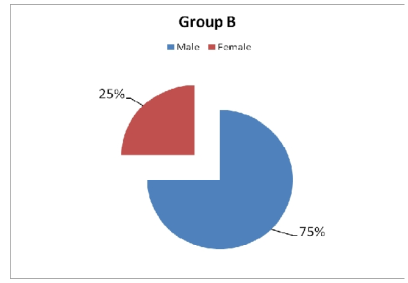
Graph 1: No of subject in age distribution.



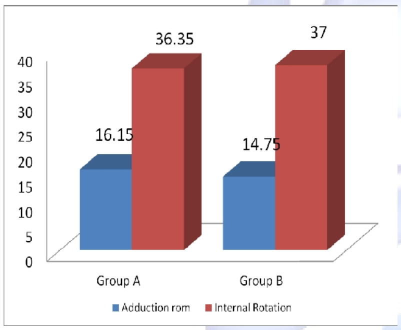
Graph 2: No of subject in gender distribution in group A.



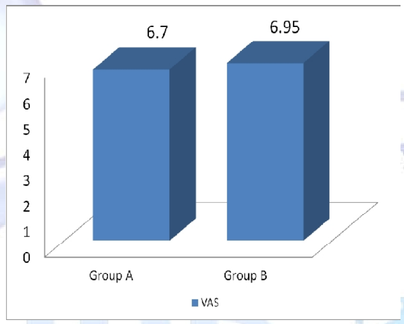
Graph 3: No of subject in gender distribution in group B.



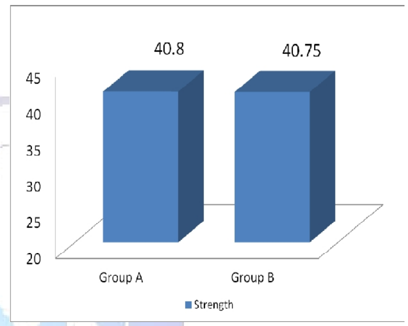
Graph 4: Adduction, Internal rotation variable in group A & B.



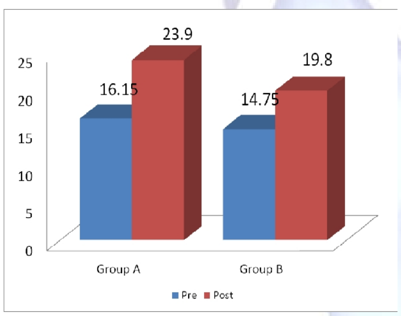
Graph 5: VAS outcome variable in group A & B.



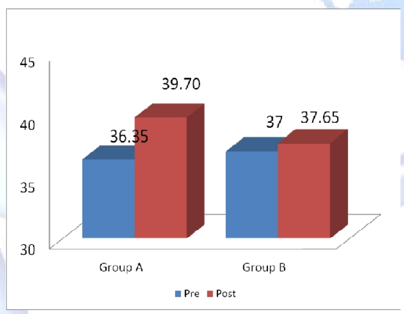
Graph 6: Strength outcome variable in Group A & B.



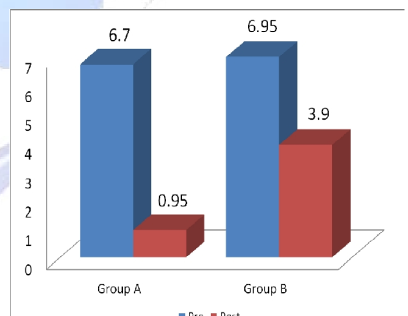
Graph 7: Pre post difference within group A & B showing Adduction ROM.



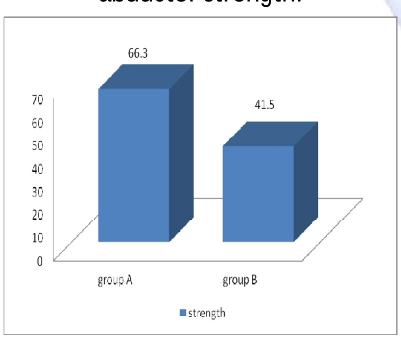
Graph 8: Pre post difference within group A & B showing Internal rotation ROM.



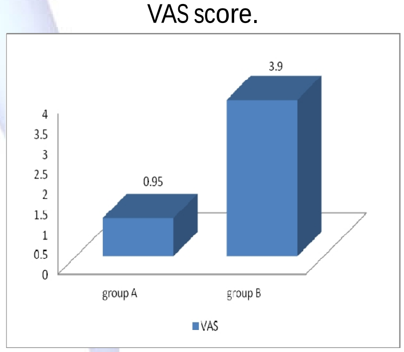
Graph 9: Pre post difference within group A & B showing VAS.



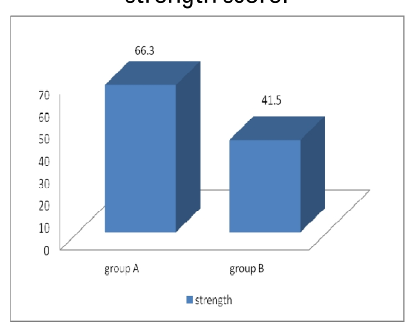
Graph 10: Pre post difference within group A & B showing Hip abductor strength.



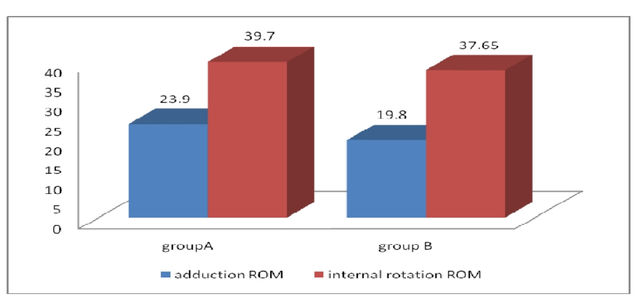
Graph 11: difference between group VAS score.



Graph 12: difference between group strength score.



Graph 13: Difference between group Adduction and Internal rotation ROM score.



DISCUSSION

Objective of the study was to examine the effect of hip abductor strengthening among non-professional cyclists with ITBFS and to compare the effect of hip abductor strengthening over conventional physiotherapy among non-professional cyclists with ITBFS. The parameters selected were ROM, VAS score and strength.

In this study the baseline data of the demographic and outcome variables did not show any statistically significant difference between the patient population in Group A and Group B.

Baseline data for outcome variable strength (hip abductor) was not statistically significant this was similar to the study done by Amir M Arab, Mohammad R Nourbakhsh (The relationship between hip abductor muscle strength and iliotibial band tightness in individuals with low back pain) concluded that the relationship between ITB tightness and hip abductor weakness in patients with LBP was not supported as assumed in theory which was ITB tightness in individuals with LBP was a compensatory mechanism following hip abductor muscle weakness.They hypothesized that more clinical studies needed to assess the theory of muscle imbalance of hip abductor weakness and ITB tightness in LBP. All patients in group A and group B were able to complete the study.

The result in group A showed that for Adduction ROM pre test score mean was16.15 and SD (4.18), post test score mean was 23.90 and SD (3.63) with p value <0.0001 which was statistically significant, for Internal Rotation pre test score mean was 36.35 and SD (3.25), post test score mean was 39.70 and SD (2.90) with p value <0.0001 which was statistically significant,for VAS pre test score mean was 6.70 and SD (1.30), post test score mean was 0.95 and SD (0.89) with p value <0.0001 which was statistically significant,for Strength pre test score mean was 40.80 and SD (12.02), post test score mean was 66.30 and SD (14.66) with p value <0.0001 which was statistically significant this was in accordance with study done by Brian Noehren, Irene Davis and Joseph Hamill (Prospective Study of the Biomechanical Factors Associated with Iliotibial Band Syndrome) found from their results that individuals who go onto to develop ITBS exhibit greater hip adduction and knee internal rotation. These results suggest that interventions should be directed at controlling these motions.

Ferber et al. (2003) found that runners who went on to develop ITBS had greater peak eversion, greater peak eversion velocity and excursion. A hip mechanism for developing ITBS has been proposed as well. Weakness of the hip abductors has been associated with ITBS (Fredrikson 2000). Weakness of the hip abductors has been shown to be related to increased hip adduction in runners with patellofemoral pain syndrome (Dierks 2005). However, there were no studies of the role of increased hip adduction in ITBS. It is possible that increased hip adduction combined with knee internal rotation, increases ITB tension. This could increase contact of the ITB with the lateral femoral condyle and lead to irritation with repeated exposure. Another study done by Michael Fredericson et al. *(*Quantitative Analysis of the Relative Effectiveness of 3 Iliotibial Band Stretches**)** shows that adding an overhead arm extension to the most common lateral ITB stretch increases average ITB length change and average external adduction moments in male elite-level distance runners, and that these differences are statistically significant.

Improvement in hip abductor strength and VAS pre post difference within group A may be because of effect of hip abductor strengthening and ultrasound treatment this was similar to the study done by Reed Ferber, Karen D. et al A 3-week hip-abductor muscle-strengthening protocol was effective in increasing muscle strength and decreasing pain and stride-to-stride knee-joint variability in individuals with PFPS. Another study done by Michael Fredericson, Curtis et al where injured runners were enrolled in a 6-week standardized rehabilitation protocol with special attention directed to strengthening the gluteus medius. After rehabilitation, the females demonstrated an average increase in hip abductor torque of 34.9% in the injured limb, and the males an average increase of 51.4%. After 6 weeks of rehabilitation, 22 of 24 athletes were pain free with all exercises and able to return to running and at 6- month's follow-up there were no reports of reoccurance. They concluded that long distance runners with ITBS have weaker hip abduction strength in the affected leg compared with their unaffected leg and unaffected long-distance runners. Additionally, symptom improvement with a successful return to preinjury training program parallels improvement in hip abductor strength.

Another mechanism that accounts for pain relief (improvement of VAS) for both groups may be because of mild heating effect of ultrasound in reducing pain and promoting the healing process. Accelerated protein synthesis stimulates the rate of damaged tissues.

However in group B mean VAS score improved from pre score of 6.95 to post score of 3.90 and adduction ROM from 14.75 to 19.80 which was statistically significant this may be due to effect of IT band stretching and ultrasound treatment.

However IR and strength pre post difference within group B was not significant this was in accordance to study done by Grau et al. found no significant difference for isometric, concentric, or eccentric peak torque of the hip abductors in controls versus those with ITBS.

For IR study done by Willson and Davis suggest that subjects with PFPS exhibited greater hip adduction, but also greater hip external rotation, than controls. The researchers did not assess hip strength, thus precluding the ability to note an association between hip weakness and altered kinematics. In a follow-up study, Willson and Davis examined trunk, hip, and knee strength, as well as hip and knee kinematics and kinetics during repeated single leg jumps. Although subjects with PFPS demonstrated greater hip-adduction excursion, they did not demonstrate differences in hip-internal-rotation excursion. When only analyzing subjects with PFPS, they found a fair correlation (r = –.40) between hip-abductor strength and hip adduction excursion. There was a poor correlation (r = –.07), however, between hip external- rotator strength and hip-internal-rotation excursion. Dierks et al examined hip strength and hip and knee kinematics in runners with and without PFPS before and after prolonged running. Like in the study by Willson and Davis, there was a fair correlation (r = -.34) between hip-abductor strength and peak hip adduction at the beginning of the run. After prolonged running, subjects with PFPS demonstrated a higher correlation (r = –.74) between hip-abductor strength and peak hip adduction. No association was found between hip external-rotator weakness and peak hip internal rotation. In summary, these findings suggest that subjects with PFPS might not exhibit altered hip kinematics until their muscle strength falls below a certain threshold. More important, it remains elusive whether hip weakness was the cause or the result of PFPS. Additional research is needed to better understand the association between hip weakness, hip kinematics, and PFPS etiology.

Pre post difference between groups there was significant difference in adduction, IR ROM,VAS and hip abductor strength this was in accordance to study done by Amanda Beers et al showed that increases in hip abductor strength were observed over the course of the 6 weeks during which the participants were taking part in the standardized rehabilitation programme, and these strength changes seemed to parallel decreases in the symptoms of ITBFS.

LIMITATION OF THE STUDY:

1. Sample size was small
2. Duration of study was less.
3. No follow up was done.
4. Functional activity was not monitored.

FURTHER RECOMMENDATION

1. Isolated hip abductor strengthening in experimental group and control group without any treatment can be conducted.
2. Outcome using lower extremity functional scale for quality of life
3. Isokinetic dynamometer can be used as a tool for measurement of strength as well as hand held dynamometer.
4. Long term follow up needed.

CONCLUSION

The primary objective of the study was to find out the effect of hip abductor strengthening among non-professional cyclist with ITBFS.

The results of the study shows that there is significant difference of hip abductor strengthening among nonprofessional cyclists with ITBFS.

SUMMARY

ITBFS is a common problem of lateral knee and comes under the repetitive stress injury cause due to repetitive flexion and extension associated with other biomechanical abnormalities.Most common in runners and cyclists.A high incidence has been found among cyclist.

Majority of the studies on ITBS has focused mainly on the effectiveness of various treatment techniques to the ITB itself and/or its associated tensor fascia lata (TFL) muscle, with varying results reported which include conservative therapies like rest, ice, and stretching of the tight band; myofascial trigger point therapies like dry needling. Nonoperative measures specific to cyclists consist of bicycle adjustments and training modifications [15].

It has been proved that there is hip abductor weakness in patients with ITBFS and patellofemoral pain syndrome.So the purpose of the study was to find out the effect of hip abductor strengthening among non-professional cyclist with ITBFS.40 Subject consisting of 30 male and 10 female assigned into control group B (20 subject) which was given ultrasound treatment,stretching of IT band and experimental group A(20 subject) received hip abductor strengthening in addition to Ultrasound and IT band stretching.

The duration of study was 6 weeks and it was pre post experimental study where subject were assessed pre and post for ROM (hip IR, adduction) using Goniometer, pain using VAS and strength using modified sphygmomanometer.

The results of the study indicated that there was significant difference of hip abductor strengthening exercise among non-professional cyclists with ITBFS.

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Abbreviations

ITBS- Iliotibial band friction syndrome
IR-Intrnal Rotation
US- Ultrasound
ITB- Iliotibial Band
TFL-Tensor Fascia Latae
PFPS- Petello Femoral Pain Syndorome

Conflicts of interest: None

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