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Non-Surgical Approaches to Iliotibial Band Syndrome: A Systematic Review of Conservative Interventions

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Abstract: ***Background**: A frequent overuse ailment that affects the lateral portion of the knee, Iliotibial Band Syndrome (ITBS) is more common in runners, bikers, and other physically active people. It causes pain, irritation, and functional restrictions as a result of repeated friction or compression of the iliotibial band along the lateral femoral epicondyle during knee flexion and extension. **Methodology**: The goal of the current systematic study was to assess the efficacy of several conservative and non-surgical ITBS therapy techniques. Between May and August of 2024, a thorough search of the literature was carried out utilising electronic databases such as PubMed, Google Scholar, ResearchGate, and ScienceDirect. After screening and eligibility evaluation, 37 of the 426 studies that were initially found satisfied the inclusion requirements. Thirteen systematic reviews and twenty-four randomised controlled trials with patients diagnosed with ITBS between the ages of eighteen and sixty comprised the final selection. **Results**: Numerous conservative therapies, including physiotherapy exercises, electrotherapy modalities, cryotherapy, pharmaceutical management, manual therapy, kinesio taping, foam rolling, dry needling, orthotic support, and shockwave therapy, were evaluated in the reviewed research. The results show that multimodal rehabilitation programs that combine adjunctive modalities with therapeutic activities are successful in lowering pain, enhancing functional outcomes, and easing the return to activity. **Conclusion**: In general, conservative physiotherapy-based treatments continues to be the mainstay of ITBS treatment.*

Keywords: Iliotibial Band Syndrome (ITBS), Conservative Management, Physiotherapy Rehabilitation, Overuse Knee Injury, Multimodal Treatment

1. Introduction

A vital component of lower limb biomechanics is the iliotibial band (ITB), a thick longitudinal fibrous tissue that runs down the lateral portion of the thigh. Before inserting distally at the lateral tibial condyle, it takes fibres from the gluteus maximus and gluteus medius muscles after emerging from the iliac crest via the aponeurosis of the tensor fascia lata.[1] During dynamic exercises like walking, jogging, and cycling, the ITB helps with hip abduction, external rotation, and regulation of lower limb movement in addition to helping to stabilise the knee joint laterally.[2] The ITB experiences repetitive mechanical stress during physical exercise because of its anatomical location and biomechanical function in load transmission from the hip to the knee.[3]

Iliotibial Band Syndrome (ITBS) is a frequent overuse condition that affects the lateral portion of the knee, especially in endurance athletes like cyclists and long-distance runners. When the knee is flexed about 30 degrees, the condition is characterised by acute or searing pain that is usually localised about 2 cm above the lateral joint line. Inflammation, irritation, and oedema in the surrounding tissues can result from repetitive friction or compression of the ITB along the lateral femoral epicondyle during knee flexion and extension. ITBS is frequently diagnosed based on patient history and physical examination results, and it is thought to be one of the most common reasons of lateral knee discomfort in physically active people.[4-9]

Depending on the population under study, the reported incidence of ITBS varies significantly. It is thought to be the most frequent cause of lateral knee discomfort related to running and accounts for between 1.6% and 12% of all running-related injuries among runners.[10] ITBS has been linked to between 15% and 24% of overuse injuries in cyclists and between 1% and 5.3% in military recruits.[11] The condition's strong correlation with recurrent athletic activity is shown by the fact that it is comparatively rare among sedentary people. As endurance sports and recreational running have grown in popularity over the past few decades, so too has the incidence of ITBS.[12]

The development of ITBS has been linked to a number of inherent and extrinsic variables. Biomechanical anomalies including genu varum, excessive foot pronation or cavus foot structure, internal tibial torsion, tightness of the ITB or tensor fascia lata, and weakening of the hip abductor muscles, especially the gluteus medius, are examples of intrinsic causes.[13] Increased hip adduction and internal rotation during the stance phase of gait can result from weak hip abductors.[14,15] This can cause stress within the ITB and increase friction on the lateral femoral epicondyle. Running on cambered surfaces, inappropriate footwear, quick increases in training intensity or mileage, and insufficient recovery between training sessions are examples of extrinsic influences.[16,17]

Localized discomfort around the lateral femoral epicondyle and pain that gets worse when doing repetitive knee flexion and extension exercises, such cycling or jogging downhill,

are common symptoms of ITBS.[18,19] When you rest, the discomfort usually goes away, but when you start doing things again, it comes back. As the illness worsens, symptoms may start to manifest earlier during physical activity and may eventually make it difficult to do everyday tasks like walking or climbing stairs. Palpation of the lateral knee and particular procedures, such as Noble's compression test and Ober's test, which aid in determining irritation and tightness of the ITB, are part of the clinical evaluation. Imaging tests may be utilized in complicated instances to rule out other knee diseases, but they are typically not necessary for diagnosis.[20,21]

The main goals of conservative ITBS management are inflammation reduction, biomechanical abnormality correction, and normal function restoration. Activity modification, cryotherapy, and the use of non-steroidal anti-inflammatory medications are common components of initial treatment. Rehabilitation techniques may include strengthening the hip abductors and core muscles, stretching the iliotibial band and surrounding musculature, correcting biomechanical deficiencies, and gradually resuming exercise when symptoms improve.[22-25] The literature has also examined additional conservative therapies, including kinesio taping, foam rolling, shockwave therapy, orthotic support, electrotherapy modalities, and manual therapy approaches.[26]

There is still variation in clinical practice on the best ways to treat ITBS, even with the abundance of non-surgical therapies. Although numerous research have looked at specific treatment modalities, there is still a lack of thorough analysis and integration of the data pertaining to conservative management strategies. To enhance pain relief, restore function, stop recurrence, and enable an early return to sports or physical activities, it is also crucial to determine the best rehabilitation techniques.

Thus, the goal of the current systematic review is to evaluate and compile the body of research on non-surgical treatments for Iliotibial Band Syndrome. This study aims to determine the most successful conservative therapy strategies for treating ITBS and enhancing clinical outcomes in affected persons by analysing data from randomised controlled trials and systematic reviews.

2. Methodology

This study was performed as a systematic review to assess the efficacy of conservative rehabilitation methods in the treatment of Iliotibial Band Syndrome (ITBS). Between May and August of 2024, a thorough search of the literature was conducted utilising electronic databases such as Google Scholar, PubMed, ResearchGate, and ScienceDirect. Using pertinent keywords and their combinations associated with conservative management and ITBS was part of the search strategy. The primary search terms included “iliotibial band syndrome,” “iliotibial band friction syndrome,” “conservative treatment of iliotibial band syndrome,” “electrotherapy in iliotibial band syndrome,” “soft tissue manipulative therapy for iliotibial band syndrome,” “physical therapy rehabilitation in iliotibial band syndrome,” “kinesio taping in iliotibial band syndrome,” “shockwave therapy for iliotibial band syndrome,” “alternative conservative treatment methods used in iliotibial band syndrome,” and “physiotherapy management of iliotibial band syndrome.To find more relevant research, manual screening of the reference lists of pertinent papers was done in addition to database searches.

Across the chosen databases, 426 articles were found during the first search procedure. Filters were applied to include only English language, full-length, freely accessible articles involving human participants aged between 18 and 60 years, including both males and females. The retrieved papers' titles and abstracts were examined to see if they were pertinent to the study's goal. Records that were found to be duplicates throughout the databases were eliminated. During the title and abstract screening phase, studies that did not fit the predetermined inclusion criteria were eliminated. The eligibility of the remaining potentially pertinent publications for inclusion in the systematic review was next evaluated through full-text review.

Studies with individuals aged 18 to 60 who had been diagnosed with Iliotibial Band Syndrome, regardless of gender or involvement in sports, met the inclusion criteria. The only studies taken into consideration for inclusion were Randomised Controlled Trials (RCTs) and systematic reviews that concentrated on conservative management strategies for ITBS. The review covered research that was published in English between 2000 and 2024. Studies written in languages other than English, observational studies, case reports, letters, opinion pieces, unpublished studies, and studies without human subjects were all disqualified. Studies that addressed other knee diseases or that concentrated on invasive or surgical treatment methods were also disregarded.

37 studies in all were included in the final review following the completion of the screening and eligibility evaluation. Thirteen of these were systematic reviews, and twenty-four were randomised controlled trials. Both male and female populations within the specified age range were represented among the participants in these trials, who had been diagnosed with ITBS.

Non-steroidal anti-inflammatory drugs (NSAIDs), local corticosteroid injections, cryotherapy, therapeutic ultrasound, phonophoresis, shockwave therapy, kinesio taping, electrical stimulation, soft tissue mobilisation techniques, myofascial trigger point therapy, deep transverse friction massage, muscle energy techniques, Graston technique, Emmett technique, foam rolling, proprioceptive neuromuscular facilitation (PNF) stretching, functional motor control exercises, and orthotic interventions were among the many non-surgical rehabilitation techniques.

The results presented in all of the included studies evaluated these therapies' efficacy using a range of clinical and functional metrics. These outcome measures included the Visual Analogue Scale (VAS) or Numeric Pain Rating Scale (NPRS) for measuring pain intensity, the Manual Muscle Testing (MMT) or dynamometry for measuring muscle strength, the Lower Extremity Functional Scale (LEFS) for measuring functional performance, the Y-Balance Test

(YBT) for measuring balance, and functional movement tests like the Single Limb Mini Squat (SLMS) test. Additionally described were tests of flexibility, such as the Modified Thomas test and Ober's test. To assess the overall efficacy of conservative rehabilitation techniques in the treatment of Iliotibial Band Syndrome, additional end measures included the amount of time needed for symptom resolution and the capacity to resume job or sports activities.

3. Results

A thorough search was done using different search engines. A total of 426 studies were found through search criteria. 94 studies were searched in PubMed, 106 in Google scholar, 107 in Research Gate, 119 in Science Direct databases. Finally, 37 studies were selected as per the criteria and their findings have been described in Table 1.

Table 1: Characteristics of the studies.

S.no.	Author, Year, Country	Design	No. of Subjects/ Studies	Age (Yrs)	Outcome Measures	Interventions	Conclusions
1.	P Gunter, M P Schwellnus, et al[27] (2004) (South Africa)	Randomised controlled trial	N=18	20-50	Treadmill running test, Visual Analogue Scale (VAS)	Injection of 1% lignocaine (control) versus methylprednisolone with lignocaine (experimental) with follow-up at 7 and 14 days.	Local corticosteroid infiltration significantly reduces pain during running compared to placebo after 14 days in patients with recent-onset ITBFS.
2.	Richard Ellis, Wayne Hing, et al[6] (2007) (New Zealand)	Systematic review	N=4		VAS(Visual Analogue Scale), PEDro Scale, Treadmill test,	Management includes NSAIDs, corticosteroid injection, ice therapy, ultrasound, transverse friction massage/DTFM, ITB stretching exercises, phonophoresis, and short-term immobilization.	Generalized physiotherapy programs are effective in reducing both daily pain and treadmill running pain in patients with ITBFS, supporting the benefits of conservative treatment.
3.	Anja Hirschmüller, Heiner Baur et al[25] (2011) (Germany)	Randomised controlled trial	N=99	18-60	Pain disability index (PDI), Subjective Pain Experience Scale (SES), Comfort index of orthoses (ICI),	Use of foot orthoses during regular training sessions without modification of running habits.	Customized foot orthoses are an effective and well-accepted conservative treatment for running-related overuse and chronic injuries.
4.	Victoria Sharp, et al[28] (2012) (Australia)	Randomised controlled trial	N=15	19-30	Vertical jump test; a countermovement jump (CMJ), The active range of motion (ROM) test,	The Emmett intervention Self myofascial release using foam roller	Emmett technique improves flexibility; stretching enhances results.
5.	R. Hansen, D. Phillips, J. Tosh, et al[29] (2012) (U.S.)	Randomised controlled trial	N=14	18-40,	Ober's orthopedic test,Visual Analogue Scale (VAS)	Two Graston Technique (GT) treatments on the Iliotibial Band(ITB) or a control sham treatment for two minutes over a one-week period.	Graston Technique reduces symptoms and improves muscle function in iliotibial band syndrome.
6.	Maarten P. van der Worp, Nick van der Horst, et al[30] (2012) (the Netherlands)	Systematic review	N=14	>18 years	Noble compression test, Ober test, the Renne test, the Treadmill running test, the Modified Thomas test	Ice therapy, NSAIDs/analgesics, corticosteroid injection, ultrasound/phonophoresis, DTFM, ITB stretching, foam rolling, and progressive strengthening exercises (hip abduction, clamshells, lunges, single	Effective ITBS management requires standardized diagnostic protocols and improved study methodology.
7.	Samuel Saikia, et al[31] (2012) (India)	Review study			Noble compression test, Ober's test, the modified Thomas test	Ice therapy, NSAIDs/analgesics, corticosteroid injection, ultrasound/phonophoresis, DTFM, ITB stretching, foam rolling, and progressive strengthening exercises (hip abduction, clamshells, lunges, single	Fredericson and Wolf rehabilitation phases effectively treat ITB syndrome by strengthening lateral hip musculature through integrated triplanar movements and massage, enabling complete recovery with early diagnosis.
8.	Corey Beals and David Flanigan[5] (2013) (USA)	Systematic review	N=10		Ober's test	Medications (corticosteroids, analgesics/NSAIDs), ice therapy, ultrasound, deep transverse friction massage, ITB stretching,	Conservative management shows high effectiveness, with 44% recovery at 8 weeks and 91.7% recovery at 6 months.

						running shoe modification, and running habit modification.	
9.	Jordan Smuts, et al[32] (2013) (U.S.)	Randomised controlled trial	N=45	18-21	ROM Testing: Acumar Digital Inclinometer, Strength Testing: Lafayette Manual Muscle Test System, hand-held dynamometer(HHD), Visual Analog Scale (VAS)	Instrument Assisted Soft Tissue Mobilization (IASTM)-Graston technique	Graston Technique improved hip abduction strength after six sessions, with gains maintained at one-month follow-up.
10.	Shivananda S, Bharath Raju G, et al[33] (2014)(India)	Randomised controlled trial	N=60	16-30	ROM measurement: universal goniometer, Visual Analog Scale (VAS)	Ice therapy, sustained stretching of lower-limb muscles, and Kinesio taping for the iliotibial band.	Taping combined with stretching improved pain and range of motion more than icing with stretching.
11.	Kelly Jayne Harris, et al[11] (2014) (South Africa)	Systematic review	N=8		PEDro Scale,Ober's Test, Noble's test, Renne Creak's Test, Thomas test	Cryotherapy, activity modification, medications (analgesics/NSAIDs), stretching, hip abductor strengthening, myofascial trigger point therapy, DTFM, phonophoresis, orthotics, rest, and Graston technique.	Combination conservative therapies provide the strongest evidence for effective ITBS management.
12.	A. Muragod, V.R.Patil, et al[34] (2014) (India)	Randomised controlled trial	N=60	18-30	Obers test,	Static ITB stretching and manual myofascial release.	Static stretching and myofascial release effectively reduce iliotibial band tightness.
13.	Jarryd Else, et al[24] (2016) (SouthAfrica)	Randomised controlled trial	N=30	18-60	Noble's Compression Test, Ober's Test, the Numerical Pain Rating Scale (NMRS)	Foam roller therapy and chiropractic manipulative therapy (two sessions/week for three weeks).	Foam roller therapy, especially combined with chiropractic manipulative therapy, is an effective, cost-efficient treatment for ITBFS.
14.	Weckström K, Söderström J., et al[21] (2016) (Sweden)	Randomised controlled trial	N=24	18-50	The Treadmill test, Noble's test, Numeric pain rating scale (NPRS)	RSWT, manual therapy (ITB massage, DTFM, trigger point therapy), and strengthening exercises.	RSWT and manual therapy were equally effective for ITBS pain, with RSWT achieving 75% pain reduction and 55% of patients pain-free at 8 weeks and 6 months.
15.	Dr. Janine SieuNarine-McKay, et al[16] (2016) (Canada)	Randomised controlled trial	N=28	19-45	The Y Balance test (YBT), Single Leg Mini Squats (SLMS) Dynamometer (DN), Lower Extremity Functional Scale (LEFS), Numeric Pain Rating Scale (NPRS)	ITB stretching and progressive hip strengthening exercises.	The experimental intervention effectively reduced pain and improved strength and function in chronic ITBS.
16.	Konstantinos Zemadanis, Theodoros Betsos, et al[35] (2017) (Greece)	Randomised controlled trial	N=30	22-40	Ober Test, Noble's compression, A treadmill running test, Numeric pain rating scale (NPRC), Visual analog scale (VAS), Lower extremity functional scale (LEFS)	Mulligan Mobilization with Movement (MWM) including weight-bearing hip internal rotation, abduction, extension, external rotation mobilization, and lateral knee glide.	MWM and auto-MWM significantly improve pain and function in recreational runners with ITBS and are safe, easy, and effective for rehabilitation.
17.	Madeline Marie Biehl, et al[36] (2017) (U.S.)	Randomised controlled trial	N=40	19-23	Ober's test	Dry cupping therapy (stationary cups) compared with sham cupping intervention.	Dry cupping effectively reduces ITB tightness and increases hip flexion immediately and 24 hours post-intervention.
18.	Manivel Arumugam, et al[37] (2018) (India)	Experimental study	N=20	18-28	The modified ober's test	Self-stretching exercises with overhead arm position and wall-	Both standing self-stretching positions improve ITB flexibility, with overhead arm

						supported stretching.	stretch being more effective.
19.	Sarah Ziegelmeyer, et al[38] (2019) (US)	Systematic review	N=24		PRISMA	Electrical stimulation, ultrasound, PNF stretching, Alfredson and Silbernagel exercise therapy, and orthosis.	Multimodal physical therapy interventions reduce recovery time from overuse injuries faster than single treatments in runners.
20.	V. Balachandar, M. Hampton, et al[4] (2019) (UK)	Systematic review	N=18		Pedro scale, the modified Down and Black scale	Six-week rehabilitation including NSAIDs, ITB stretching, and hip abductor strengthening targeting lower-limb biomechanics.	Hip adduction and rearfoot eversion are risk factors for ITBFS, and a six-week program with NSAIDs, ITB stretching, and hip abductor strengthening effectively reduces pain and prevents recurrence.
21.	Janine Mckay, Nicola Maffulli, et al[7] (2020) (U.K.)	Randomised controlled trial	N=24	19-45	Numeric pain rating scale (NPRS), Lower extremity functional scale (LEFS), Dynamometer (DN), single-limb mini squat (SLMS), Y-balance test(YBT)	ITB stretching exercises, conventional hip strengthening (clamshells, side-lying hip abduction, bridges), and experimental progressive hip strengthening (modified side plank, hip hikes, T-band bridge).	The experimental exercise reduced pain and improved strength and function in chronic ITBS, despite no statistical differences between groups.
22.	Behrooz Imeri , Mehdi Gheitasi, et al[19] (2020) (Iran)	Randomised controlled trial	N=32	20-30	Visual Analogue Scale (VAS), Lower Extremity Functional Scale (LEFS), Noble's compression test	Progressive hip strengthening exercises including modified side plank variations, monster walks, hip hikes, skater-running man drills, and plank/hip lift exercises with elastic band.	Corrective exercises focusing on hip abductor strengthening significantly reduce pain, improve motor function, and may prevent injuries in runners.
23.	Ioanna K. Bolia, Preston Gammons, et al[39] (2020) (US)	Systematic review	N=15		The Cochrane Risk of Bias Tool for the Randomized Clinical Trials, MINORS (Methodological Index for Non Randomized Studies) score	Shockwave therapy, manual therapy, ITB corticosteroid injection, ice massage, phonophoresis, ultrasound, deep transverse friction massage, medications (anti-inflammatory/ analgesics), and ITB stretching.	Conservative therapy effectively reduces ITBS symptoms, while surgery offers an 81–100% return-to-sport rate for non-responders.
24.	Mojtaba Jahanshahi Mohammad Hossein Nasermelli, et al[13] (2020) (Iran)	Randomised controlled trial	N=60	18-35	Visual Analogue Scale (VAS), Noble's compression test, Ober's test, Triple hop test for distance, Single leg vertical jump test, agility T-test, Handheld dynamometer	FMC exercises (squats, lunges, hip abduction, single-leg tasks, jump squats) with self-myofascial release, stretching, strengthening, and integration exercises.	In national-level Greco-Roman wrestlers with ITBS, FMC improved pain, function, and muscle strength more, while TE better enhanced ROM; both were superior to control.
25.	J. Morgan Jones, et al[40] (2020) (U.S.)	Randomised controlled trial	N=150	18-50	The modified Ober test, Inclinometer, The Noble test, Thomas test, Anterior Knee Pain Scale (AKPS)	Botulinum toxin (BT) injection into TFL with standard physiotherapy compared with saline placebo injection with physiotherapy.	Botulinum toxin therapy offers a safe, minimally invasive alternative for ITBS and supports exploration of new treatment approaches.
26.	S. Miccio, A Berardi, M., et al[26] (2021) (Italy)	Systematic review	N=12		Pedro Scale and Jadad Scale	Hip abductor strengthening, manual therapy, shockwave therapy, osteopathic counterstrain technique, and multifaceted knee treatment approach.	ITBS responds well to conservative treatment: acute phase management includes rest, ice, and shockwave therapy, followed by stretching, strengthening exercises, and Mulligan techniques for hip and knee.
27.	Hannah Nicole Riegel ,et al[41] (2021) (U.S.)	Randomised controlled trial	N=50	18-55	JTECH Commander Echo Console Pain Algometer, VAS scale	Oscillating fascial taping using Kinesio® Tape compared with sham taping.	Oscillating fascial Kinesio® Tape effectively reduces pain and increases pressure tolerance at ITB trigger

							points.
28.	Razie Maghroori1, Leila Karshenas, et al[22] (2021) (Iran)	Randomised controlled trial	N=40	18-60	Visual Analogue Scale (VAS),Lower Extremity Functional Scale (LEFS), Ober's test	Dry needling (fanning technique, twice weekly) and shockwave therapy (once weekly using radial probe).	Both dry needling and shockwave therapy effectively improve pain and function in ITBS, with dry needling showing greater pain reduction at four weeks.
29.	Dr Akhila A R, et al[42] (2021) (India)	Systematic review			Renne's test and Noble Compression test	Modified srunga (bloodletting), ruksa agnikarma (dry cauterization), and strengthening/stretching exercises.	Rehabilitation combined with Ayurvedic treatments effectively manages and prevents ITBS symptoms.
30.	Talin M Pepper, Jean-Michel Brismée,et al[27] (2021) (U.S.)	Randomised controlled trial	N=30	18-50	Shear Wave Ultrasound Elastography, An electrogoniometer assesment	ITB foam rolling and modified stretching with hip external rotation.	Single sessions of stretching or foam rolling do not reduce short-term ITB stiffness in healthy subjects.
31.	Muhammad Sana ullah, et al[43] (2021) (Pakistan)	Randomised controlled trial	N=24	15-30	Numerical pain rating scale (NPRS), lower extremity functional scale (LEFS)	Myofascial release with muscle energy technique for gluteus maximus and tensor fascia lata, compared with myofascial release alone.	MET enhance muscle extensibility, spinal mobility, and neuro-lymphatic function using post-isometric relaxation and facilitation stretching.
32.	Austin James Hills, et al[44] (2022) (US)	Review study			Ober's test, Noble's compression test, pain pressure threshold (algometer), visual analogue scale (VAS), mechanomyography (MMG)	Ice, NSAIDs, stretching, manual therapy, therapeutic exercises for hip strengthening, and Kinesio taping.	Fascial taping positively reduces patient-perceived pain, supporting its use for treating fascial-related pain syndromes.
33.	Dimitriadou Sofia, Evgenia Trevlaki, et al[3] (2022) (Greece)	Systematic review	N=14		Ober's test, VAS pain scale, Pain threshold assesment using an algometer, Dynamometer	Cryotherapy, iontophoresis/phonophoresis, medications, stretching, soft tissue and patellar mobilization, strengthening and plyometric exercises.	GT mobilization, ITB self-stretch with foam rolling, therapeutic currents, trigger point release, shockwave therapy, soft tissue mobilization, and dry needling all reduce pain and improve flexibility and function in ITBS.
34.	L. Ade Sintia Devi, et al[23] (2022) (Indonesia)	Systematic review	N=5		YBT, DN, LEFS, NPS, and SLMS muscle testing	Stretching, shockwave therapy, manual therapy/Mulligan mobilization, foam rolling, hip strengthening exercises, and home exercise program.	Physiotherapy for ITBS includes stretching, RSWT, Mulligan mobilizations, home exercises, and foam rollers to improve ROM, reduce pain, and activate the ITB.
35.	Ehsan Afshari, Mehrnaz Kajbafvala, et al[14] (2023) (Iran)	Randomised controlled trial	N=51	20-40	The modified Ober's test, Single-leg hop test, Vertical jump test, Lateral hop test	PNF stretching (contraction–relaxation) and foam roller self-myofascial release.	Self-myofascial release combined with active stretching improves hip adduction ROM and functional performance, with all groups showing similar gains in flexibility and ROM.
36.	S T Thebuwanaarachchi , M B Samarawickrama, et al[13] (2023) (Sri Lanka)	Randomised controlled trial	N=60	18-32	a hand-held dynamometer (HHD)	Electro-physiotherapy (ultrasound, TENS, shock-wave, IR) with medications, and TheraBand stretching and strengthening exercises.	The Thera-Band Exercise Program is more effective than electro-physiotherapy for improving hip abductor strength in athletes with ITBS.
37.	Nayan A. Kadav, et al[45] (2023) (India)	Randomised controlled trial	N=150		Visual analog scale, postural assessment, and Ober's test.	Rest, ice therapy, ITB/TFL and lower-limb stretching, and strengthening exercises (SLR, bridging, lunges, single-leg squats, core exercises).	Proximal-to-distal postural exercise program resulted in greater improvement in posture and pain intensity compared to the other group.

This review evaluates conservative, non-surgical management of ITBS in active populations, aiming to identify interventions that reduce pain, improve function, and prevent recurrence.

Physical Therapy:
Conservative management consisting of a combination of rest (2–6 weeks), stretching, pain management, and modification of running habits produced a 44% complete cure rate, with return to sport at 8 weeks and a 91.7% cure rate with return to sport at 6 months after injury (Corey Beals,et al., 2013). Twenty studies from the review referred physical therapy as a standard regimen in the patients of ITBS. There is significant importance of targeted exercise interventions like Theraband exercise program in rehabilitation strategies for persons experiencing ITBS (S T Thebuwanaarachchi, et al., 2023). Functional motor control and Therapeutic exercises can improve pain, function, muscle strength, and ROM in the management of patients with ITBS (Mojtaba Jahanshahi, et al., 2022)

Electrotherapy:
Ten studies included the use of electro physiotherapy in the management of patients with ITBS and showed beneficiary results including pain relieving effects. Craig Bischoff, et al., (2009), in their study showed that phonophoresis is found to be effective in the management of ITBS and it has also reported an increased fibroblastic activity and a decreased nonbacterial inflammation using ultrasound. Furthermore, Kristoffer Weckstrom, et al., (2016), in their study showed a significant drop in pain levels when treating ITBS using radial extracorporeal shockwave therapy. Shockwave therapy can remarkably improve pain and function among patients resenting from ITBS (Razie Maghroori, et al., 2021)

Medications:
During the first week of treatment for ITBS, physiotherapy in conjunction with combined anti-inflammatory/analgesic medication is the most effective management (Richard Ellis, et al., 2007). Local corticosteroid infiltration effectively decreases pain during running in the first two weeks of treatment in patients with recent onset ITBFS (Gunter, et al., 2003). The BT injections have shown successful outcomes in the treatment of knee pain when into the TFL for superolateral fat pad impingement and ITBS (J. Morgan Jones, et al., 2020).

Also, the study by Dr Akhila A R, et al., (2021) shows that proper rehabilitation along with proper ayurvedic medication including Modified *srunga* (blood letting technique) and *ruksa agnikarma* (drycauterization) can provide best results for the symptoms associated with ITBS and also as preventive measures.

Manual therapy techniques:
Manual therapy including myofascial release of IT band, ITB massages, trigger point therapy, soft tissue mobilization technique, specific patellar mobilization techniques, Mulligan mobilization (Dimitriadou Sofia, et al., 2022; L. Ade Sinita Devi, et al., 2022) are mentioned in 9 studies, and indicative as effective pain relieving technique and increasing functional ability, that can be used in treatment for ITBS.

Muscle energy technique (MET):
Muhammad Sana ullah, et al., (2021) used the muscle energy technique of gluteus maximus and tensor fascia lata muscle in ITBS and it showed that MET increases the extensibility of muscles and spinal range of motion, treating patients with reduce mobility. Muscle energy techniques involve post isometric relaxation and post facilitation stretching techniques.

Mobilisation with movement (MWM) Protocol:
Konstantinos Zemadanis, et al., (2017) in their study interpreted that MWM is a safe and painless mobilization treatment, without contraindications, easy in application and used well in ITBS rehabilitation of recreational runners, as it improves pain and functional abilities.

PNF Stretching:
There are three studies that conducted PNF stretching as a part of treatment protocol in the patients with ITBS. The most common PNF active stretching is the contraction-rest technique. This technique is a combination of static stretching and isometric contraction. Flexibility and ROM increases significantly in the treatment protocol comprising of PNF stretching. (Ehsan Afshari, et al., 2023)

Cryotherapy:
Cryotherapy is frequently recommended in the treatment of ITBS, as it reduces the inflammatory reaction present as well as directly reducing pain in patients with condition of iliotibial band syndrome (Kelly Jayne Harris, et al., 2014). Eight studies in this review showed the effectiveness of ice therapy in the management of ITB.

IASTM - Graston technique:
R. Hansen, et al., (2012) in their study showed that Graston Technique in iliotibial band syndrome resulted in a decrease in subjective symptoms and an improvement in muscle function. Jordan Smuts, et al., (2013), in their study indicated that use of IASTM potentially decreased soft tissue adhesions and elongated the entire ITB unit improving its functional ability and increases strength in the hip abduction muscles. Other than this, there are two more studies which includes the use of graston technique.

Emmet technique:
Single treatment of emmet technique demonstrated immediate significant increases in the flexibility of the lateral thigh in the management of patients with ITBS (Victoria Sharp, et al., 2012).

Foam Rolling:
Foam rolling could warm up the muscle before static stretching by increasing intramuscular temperature and increasing muscle viscoelastic properties(Mojtaba Jahanshahi, et al., 2020). Also, Jarryd Else, et al., 2016, in their study showed that chiropractic treatment in conjunction with foam roller treatment would be the first choice of treatment for ITBS. There are 6 studies indicating the use of foam rolling in treatment of ITBS including the study by Ehsan Afshari, et al., 2023 which showed that the use of a foam roller alone can improve the functional ability.

Dry Needling:
Razie Maghroori, et al., (2021), in their study showed that dry needling can remarkably improve pain and function among patients resenting from ITBS.

Kinesio taping:
There are three studies in this review using kinesio taping technique in the management of patients with ITB and shows highly significant improvement in pain and functional ability (Shivananda S., et al., 2014).Taping has positive impact on patient perceived pain, also it is effective at decreasing patient – perceived pain associated with pressure on trigger points(Hannah Nicole Riegel, et al., 2021).

Cupping therapy:
Dry cupping may be a safe and effective treatment option to combat ITB tightness seen in ITBS. Madeline Marie Biehl, et al., (2017) in their study indicate that a single intervention of dry cupping is effective in reducing ITB tightness and increasing hip flexion ROM.

Sport shoe Orthoses:
Anja Hirschmüller, et al., (2009) conducted a control study on Clinical effectiveness of customised sport shoe orthoses for overuse injuries in runners. The results showed that customised polyurethane running shoe orthoses are an effective conservative therapy strategy for chronic running injuries including ITBS with high comfort and acceptance of injured runners. Also, three more studies in this review mentioned the use and effectiveness of shoe modification in the treatment protocol for ITBS.

4. Discussion

This review aimed to evaluate the efficacy of various non-surgical and conservative interventions for the management of iliotibial band syndrome (ITBS). The analysis of 37 selected studies revealed a diverse range of treatment modalities, each demonstrating varying degrees of effectiveness in managing ITBS symptoms. This analysis discussed the findings and their implications in the context of current literature. The majority of studies emphasized the role of physical therapy in managing ITBS. Interventions such as open and closed kinetic chain exercises, high-impact plyometric exercises, and specific exercise protocols (e.g., Alfredson and Silbernagel exercises) were frequently employed. These exercises generally enhanced strength, improved functional ability, and reduced recovery time compared to singular treatments. This aligns with previous research advocating for comprehensive physical therapy regimens as a cornerstone of conservative ITBS management.[7,52] Cryotherapy was frequently recommended for reducing inflammation and pain in ITBS. Ten studies confirmed its effectiveness, consistent with existing literature that supports ice therapy as a valuable adjunct to comprehensive treatment plans.[11]

Various electrotherapy modalities, including ultrasound, phonophoresis, TENS, and shockwave therapy, were supported by ten studies. These methods were noted for their pain-relieving effects and potential to accelerate healing, aligning with current trends that advocate multimodal pain management strategies.

Eight studies highlighted DTFM as a valuable technique for managing ITBS. DTFM's ability to reduce pain and improve function underscores its role in a multi-faceted approach to ITBS management.[45] Customized sport shoe orthoses were endorsed by several studies, including a notable one by Anja Hirschmüller et al., which demonstrated their effectiveness in treating chronic running injuries like ITBS. This suggests that orthotic interventions can play a significant role in long-term management and injury prevention.[25]These techniques showed promise in pain relief and functional improvement. Myofascial release, trigger point therapy, and muscle energy techniques (e.g., MET for gluteus maximus and tensor fascia lata) were applied in several studies with encouraging outcomes.[3,23,55]

Foam rolling and dry needling were among the less traditional methods reviewed. Seven studies supported foam rolling for improving flexibility and reducing pain, while dry needling demonstrated significant improvement in pain and function.[22,23] These methods reflect an evolving understanding of ITBS management and underscore the need for innovation in treatment approaches.

The positive impact of kinesio taping on pain perception and cupping therapy on hip flexion range of motion were notable findings. While these adjunctive therapies contribute to a comprehensive management plan, further research is needed to establish their definitive efficacy.[38,41,56] Though less commonly discussed, RSWT and the Graston technique demonstrated effective pain reduction and functional improvement. These techniques add to the growing arsenal of non-surgical and conservative treatments available for ITBS.[21,44,47]

5. Conclusion

Conservative and non-surgical interventions—including physical therapy, modalities, manual therapies, and emerging techniques like foam rolling, dry needling, and kinesio taping—effectively manage ITBS, with a multi-disciplinary approach recommended for optimal outcomes.

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