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INSTRUMENT ASSISTED SOFT TISSUE MOBILIZATION IN MANAGEMENT OF ATHLETIC AND MUSCULOSKELETAL CONDITIONS: A SYSTEMATIC REVIEW AND META-ANALYSIS

SYSTEMATIC REVIEW

ABSTRACT

Purpose: Instrument assisted soft tissue mobilization (IASTM) is a therapeutic intervention that involves the use of specialized tools to manipulate the muscles, tendons, myofascia and skin in a variety of soft tissue problems. Nonetheless, there is a divergence of opinions when it comes to the efficacy of IASTM in the treatment of athletic and musculoskeletal conditions. This systematic review was conducted to evaluate the effectiveness of IASTM in management of athletic and musculoskeletal conditions.

Methods: An investigation of the literature was carried out from inception to April 2023 using the databases PubMed, PEDro, and the Cochrane Library.

Results: Eighteen studies were included for qualitative synthesis, and six were selected for further quantitative synthesis. The effectiveness of IASTM in the management of athletic and musculoskeletal conditions was found to be either better or equal in comparison to other control interventions. The meta-analysis results showed that the reduction in pain was statistically significant in the experimental group (IASTM) compared to the control group (MD -1.33, 95% CI [-1.59, -1.06], p < 0.0001).

Conclusion: It can be stated that IASTM is an effective tool in the management of athletic and musculoskeletal conditions. Further studies should concentrate on investigating the efficiency of EASTM on particular participants with various specific athletic and musculoskeletal conditions.

Keywords: Athletic Performance, Musculoskeletal Manipulations, Musculoskeletal Pain, Myofascial Pain Syndrome

ATLETİK VE MUSKULOSKELETAL DURUMLARIN YÖNETİMİNDE ALET DESTEKLİ YUMUŞAK DOKU MOBİLİZASYONU: SİSTEMATİK DERLEME VE META-ANALİZ

SİSTEMATİK DERLEME

ÖZ

Amaç: Alet destekli yumuşak doku mobilizasyonu (IASTM), çeşitli yumuşak doku problemlerinde kasları, tendonları, miyofasyayı ve cildi manipüle etmek için özel aletlerin kullanılmasını içeren terapötik bir müdahaledir. Bununla birlikte, atletik ve kas-iskelet sistemi rahatsızlıklarının tedavisinde IASTM'nin etkinliği söz konusu olduğunda görüş ayrılığı vardır. Bu sistematik derleme, atletik ve kas-iskelet sistemi rahatsızlıklarının yönetiminde IASTM'nin etkinliğini değerlendirmek amacıyla yapılmıştır.

Yöntem: Bu çalışma, kuruluşlarından Nisan2023 tarihine kadar PubMed, PEDro ve Cochrane Library veritabanlarında yayımlanmış olan literatür incelenerek gerçekleştirildi.

Sonuçlar: Nitel senteze 18 çalışma dahil edildi ve bunların altısı daha ileri nicel sentez için seçildi. IASTM'nin atletik ve kas-iskelet sistemi durumlarının yönetimindeki etkinliği, diğer kontrol girişimlerininkine benzer veya daha iyi bulundu. Meta-analiz sonuçları, deney grubunda (IASTM) ağrının kontrol grubuna kıyasla istatistiksel olarak anlamlı şekilde daha fazla azaldığını gösterdi (MD -1.33,% 95 CI [-1.59, -1.06], p < 0.0001).

Tartışma: IASTM'nin atletik ve kas-iskelet sistemi rahatsızlıklarının yönetiminde etkili bir araç olduğu söylenebilir. İleriki çalışmalar, EASTM'nin çeşitli spesifik atletik ve kas-iskelet sistemi rahatsızlıkları olan belirli katılımcılar üzerindeki etkinliğini araştırmaya yoğunlaşmalıdır.

AnahtarKelimeler: Atletik Performans, Kas-İskelet Manipülasyonları, Kas-İskelet Ağrısı, Miyofasiyal Ağrı Sendromu

INTRODUCTION

Instrument assisted soft tissue mobilization (IASTM), coined by James Cyriax, is a popular treatment that involves the use of specialized tools to manipulate muscles, tendons, myofascia, and skin (1,2). IASTM helps therapists evaluate and mobilize soft tissue using tools applied in multiple directions and kept on the skin at various angles ranging from 30 to 60 degrees (3,4). IASTM tools are specifically crafted implements used for soft tissue mobilization, such as addressing myofascial adhesion and scar tissue, with the goal of easing discomfort and enhancing function and range of motion (4). The use of these tools is said to benefit physiotherapists mechanically by allowing more precise therapy and deeper penetration, thereby reducing stress on the hands (6,7). Both the therapist and the patient believe that employing instruments for soft tissue mobilization will improve vibration sensitivity, making it easier for the patient to detect modified sensations within the intervening tissues, which can assist the therapist in identifying changes in tissue qualities (8).

It is believed that IASTM therapy encourages collagen regrowth and repair by attracting fibroblasts and stimulates connective tissue remodeling by facilitating the absorption of excess fibrosis (9,10). Consequently, scar tissue, adhesions, and fascial limitations are released and broken down (11). In rat models of enzyme-induced tendinitis, the use of instruments resulted in increased fibroblast proliferation and collagen repair (12,13). This study contributes to the growing evidence that instrument massage significantly enhances ligament strength and stiffness over time (e.g., four weeks) when compared to the contralateral control limb. Many of these benefits were also observed in a laboratory study on ligament healing in rats (14). While these results offer early evidence that IASTM can induce connective tissue remodeling, further research is needed to confirm these physiological changes in human trials.. A latest systematic review with meta-analysis is necessary to overcome the limitations of previous research on IASTM. While Cheatham et al. identified short-term improvements in joint range of motion (ROM) with IASTM, overall evidence supporting its efficacy for treating common musculoskeletal pathologies remains limited (1). Seffrin et al. reported IASTM effective in enhancing ROM and improving pain and function, but highlighted the need for more extensive research involving diverse patient populations (38). Nazari et al. noted potential short-term benefits of IASTM but found inconclusive evidence for long-term pain relief and functional improvement (39). Therefore, a new comprehensive systematic review with meta-analysis with a larger number of studies could provide more robust evidence on effectiveness of IASTM, informing optimal treatment protocols and clinical practice guidelines for managing athletic and musculoskeletal conditions. To achieve this, a systematic review and meta-analysis were conducted.

METHODS

Eligibility Criteria

The present systematic review was designed and conducted in accordance with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-analysis) guidelines (Figure 1.)(15).This review was also registered in PROSPERO as CRD 42023410985 on 04 April 2023. All the randomized controlled trials published from Inception to April 2023 in English were taken in this study. Articles using IASTM as a treatment either alone or in combination with other interventions were taken.

Information Source

Electronic databases were used in the search such as Cochrane Library, PubMed and PEDro were searched in April, 2023 to locate the articles.

Search Strategy

The search term “IASTM” or “Instrument Assisted Soft Tissue Mobilization”, combined using advanced searched option along with Boolean Operators (‘AND’ and ‘OR’) with similar keywords and filters followed, utilize in orders like: title/abstract; Randomized Controlled Trials and duration (Inception to April 2023) to find the articles. The PICO strategy involved considering the population as participants who underwent IASTM, the intervention being the application of IASTM treatment. The outcome variables assessed included pain measured through VAS or NRS, as well as measures

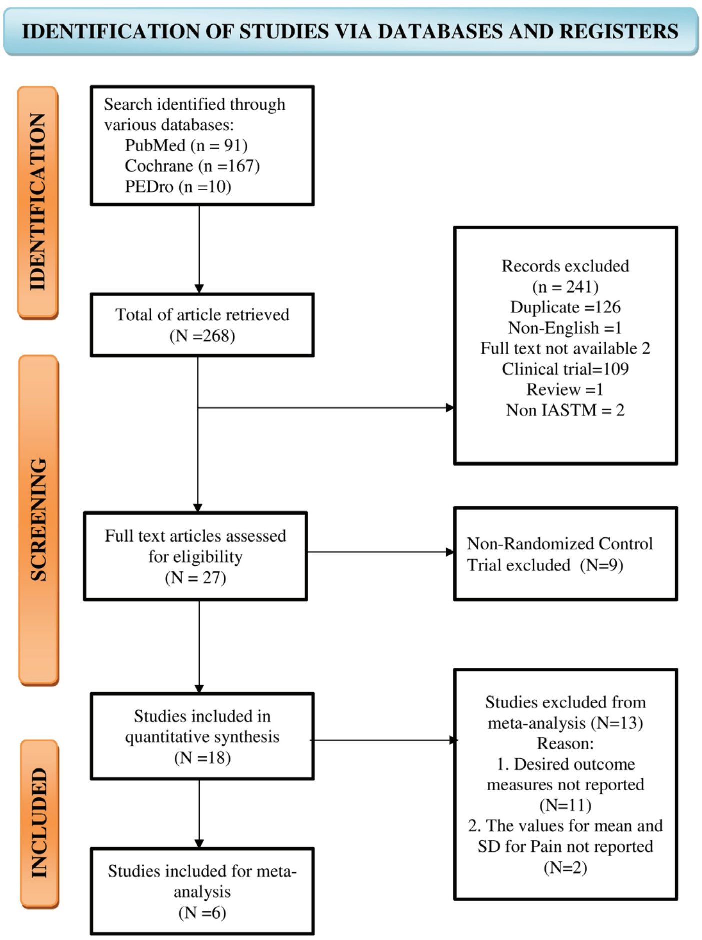

Figure 1. Prisma Flow Chart

of range of motion (ROM), strength, power, endurance, pressure pain threshold (PPT), and disability.

Study Selection

The studies were initially examined by title and abstract, then by the presence of full-text articles. 18 studies were chosen and included in this systematic review after the duplicates were eliminated and the inclusion criteria were followed. The criteria for inclusion were: Studies that were randomized controlled trials, studies in which use of IASTM as intervention either alone or in combination with other intervention, on human participant and in English language were selected. For meta-analysis, studies with the available values of mean and standard deviation for the variable pain were included.

Data Collection Process

Three reviewers (AM, SJ and RC) separately searched using the MeSH term and associated keywords selected, retrieved the data and evaluated the quality of the included studies using PEDro (The Physiotherapy evidence database). Any disagreements were settled by conversation with the author (SJ), and SJ's judgment was taken as final.

Data Extraction

Three reviewers (AM, SJ and RC) extracted the data from the potential articles. The mean and standard deviation for the variable pain (measured by VAS or NPRS) as well as details from each trial, such as the study ID (first author and year), study location, duration, sample size, intervention, outcome measures, and results, were extracted from the studies. Table 1. shows the characteristics of the studies included.

Risk Bias in Studies

By using the Physiotherapy Evidence Database (PEDro), the studies' methodological quality was

Table 1. Showing the Characteristics and Findings of Included Studies.

Study	Design	Sample	Intervention	Outcome Variables	Results
Mylonas et al. (2021)	Randomized control trial	20 female patients with mechanical neck pain lasting over 3 months.	**Group A** (N=10) IASTM for 10 min, 8 session. **Group B** (N=10) Massage for 10 min, 8 session.	• Cranio-vertebral angle • Cervical ROM • Strength • VAS • NDI Assessed at baseline, throughout the treatment period, week 2 and 4 post treatment.	Both groups showed improvement in CROM, strength and pain. Greater improvement in CVA and NDI in Group A than in group B.
Gulick (2017)	Randomized control trial	36 healthy participants having knots in neck region.	**Group A** (N=16) Six IASTM session for 5 min, over 3 weeks of interval using 3 IASTM techniques. **Group B** (N=20) Control group, no treatment.	• Pain pressure threshold Initial day and three weeks later.	Improvement in in PPT on myofascial trigger points in IASTM group when compared to control group.
Stanek et al. (2018)	Randomized control trial	44 physically active people with less than 30-degree dorsiflexion.	**Group A** (N=18) Compressive myofascial release applied for 1 min. **Group B** (N=17) Garston technique applied for 1 min. **Group C** (N=18) Control group lying for 5 min.	• Ankle-dorsiflexion Before and immediately after treatment.	Improvement in dorsiflexion in CMR group as compared to GT and control group.
Stroiney et al. (2020)	Randomized controlled trial	49 collegiate recreational athletes	**Group A** (N=25) IASTM for a maximum of 90 sec. **Group B** (N=24) Self-myofascial release for a maximum of 90 sec.	• Pain • Vertical and horizontal power • Sprinting performance	No significant difference in pain, both groups did not improved sprinting performance. Self-myofascial release prior to exercise improve jump height.
Kim et al. (2018)	Randomized controlled trial	40 young soccer players	**Group A** (N=20) IASTM for 60 min, 5 session, per week for 12 weeks. **Group B** (N=20) Control groups No intervention.	• Isokinetic power • Fatigue • Physical fitness After 1 week post treatment.	Increase in performance and fitness and decrease in fatigue in IASTM group as compared to control group.
Ikeda et al. (2019)	Randomized controlled crossover study	14 healthy volunteers	**Group A** IASTM 5 min. **Group B** Control group No intervention.	• Ankle-dorsiflexion ROM • Peak passive torque • Ankle joint stiffness • Muscle stiffness Assessed before and immediately after the intervention.	IASTM group showed improvement in dorsiflexion ROM and decrease in ankle joint stiffness and no change in peak passive torque and muscle stiffness when compared to control group.
Gunn et al. (2019)	Randomized clinical trial	40 non-disabled adults	**Group A** (N=17) IASTM with static stretching. **Group B** (N=23) PNF with static stretching. Stretch for 30 sec, Repeated for 4 repetitions.	• Hip flexion ROM •Active straight leg Raise Assessed at pre and post interventions.	Both interventions resulted in greater increase in hip flexion range.
Garcia et al. (2021)	Randomized controlled trial	21 regulars cross-fitters	**Group A** (N=11) Stretching, isometric contraction and IASTM. **Group B** (N=10) IASTM only 2 days a week for 4 weeks.	• Shoulder range of motion Assessed prior to intervention, following intervention, and after a 4-week follow-up period.	Both groups yields the similar results.
Mahmood et al. (2021)	Randomized controlled trial	60 Male patients, 18-40years upper crossed syndrome	**Group A** (N=30) Routine physical therapy. **Group B** (N=30) IASTM along with Routine physical therapy. Thrice a week for 4 weeks.	• Pain •ROM Baseline, after 2 weeks & 4 weeks	IASTM along with RPT group was found to be more effective when compared to routine physical therapy group.

Kim et al. (2021)	Randomized controlled trial	32 participants with chronic low back pain	**Group A** (N=16) TENS and IASTM for 6 min twice a week for 3 weeks. **Group B** (N=16) Control group no treatment.	•Pain •Disability •Passive straight leg raise •Supine bridge test Baseline After 3 weeks intervention.	TENS and IASTM group showed significant improvement in pain and motor function when compared to control group.
Schaefer et al. (2012)	Randomized controlled trial	36 healthy physically active individuals with chronic ankle instability	**Group A** (N=11) DBT **Group B** (N=13) DBT and GISTM-Sham **Group C** (N=13) DBT and GISTM Twice a week, 8 min for 4-week period.	• Foot and ankle ability measure • Activities of daily living • Visual analog scale • Ankle ROM • Star excursion balanced test After four weeks of intervention.	Improvement in all groups in outcome variable except in VAS. Largest effect was found in most outcome variables in the DBT/GISTM group.
Jones et al. (2019)	Randomized controlled study	11 participants with chronic plantar heel pain	**Group A** (N=5) IASTM and Exercise twice weekly for the 4 weeks for a total of 8 treatment sessions. **Group B** (N=6) Exercise for 20 min.	• Pain • Function Assessed at baseline, after final treatment, and 90 days later.	Both groups demonstrate improvement in pain but IASTM and Exercise group shows better results as compared to only exercise group.
Laudner et al. (2014)	Randomized controlled trial	35 Asymptomatic collegiate baseball players	**Group A** (N=17) IASTM for 40 secs. **Group B** (N=18) Control group- no treatment.	• Passive glenohumeral horizontal adduction and internal rotation ROM Assessed at pre and post test	IASTM group having greater improvements compared to the control group (p<0.001).
MacDonald et al. (2016)	Randomized controlled trial	48 physically active adults	**Group A** (N=16) IASTM for 3min. **Group B** (N=16) Control group no treatment.	• Vertical jump height • Peak power • Peak velocity Assessed at Pre and post test	No statistically significant differences found between treatment groups.
Kumar et al. (2020)	Randomized control study	34 subjects were with cervicogenic headache	**Group A** (N=17) Suboccipital release, MFR with IASTM **Group B** (N=17) Suboccipital release, MFR Both group exercises for 40 secs Twelve sessions, 3 sessions a week to both groups 15 repetitions each (twice a day).	• Visual analog scale • Headache intensity • Cervical rotation test • Cervical ROM	Between group comparison showed no significant improvement in any outcome variables but showed clinical significant in pain, ROM headache intensity and CFR in both the group.
Osalian et al. (2021)	Randomized controlled trial	23 young non-athletic college students with unilateral hamstring tightness	**Group A** (N=12) IASTM for 2 minutes. **Group B** (N=11) Manual stretching for 3 minutes.	• Hip flexion • Torque • Power Before After intervention	IASTM was as good as manual stretching in the improving the outcome variables.
Kim et al. (2019)	Randomized clinical trial	16 healthy male college students	**Group A** (N=8) IASTM was applied for 8 min. **Group B** (N=8) Control- no intervention	• Maximal isometric strength • Muscle soreness • Creatine kinase activity immediately and 48 hr. after exercise.	Recovery of maximal isometric strength was faster in IASTM group than control group.
Mostafa et al. (2022)	Randomly controlled trial	30 patients with mechanical neck pain	**Group A** (N=15) IASTM and conventional treatment **Group B** (N=15) Conventional treatment 3 times a week for 4 weeks.	• Visual analogue scale • Neck disability index • ROM Baseline at the end of study	IASTM that was more effective than conventional treatment group in relieving pain, functional disability and ROM.

ROM : Range of motion, VAS : Visual analog scale, NDI : Neck disability index, CROM : Cervical range of motion, CVA : Craniovertebral angle, CMR : Compressive myofascial release, GT : Graston technique, RPT : Routine physical therapy, TENS : Transcutaneous electrical nerve stimulation, DBT : Dynamic balance training, GISTM : Graston instrument soft tissue mobilization, MFR : Myofascial release, CFR : Cervical flexion rotation.

evaluated. When studies met the standards for intention to treat analysis, assessor blinding, and randomization and allocation concealment, they were deemed to be of high quality. The risk assessment for determining the risk of bias in the included research was conducted using the Robvis (visualization tool). The quality assessment was done by two authors independently (AM, SJ).

Statistical Analysis

The statistical analysis for this study was conducted using Review Manager 5.4 (RevMan 5.4), a software tool developed by the Cochrane group specifically designed for systematic reviews and meta-analyses. This software allows researchers to effectively synthesize and analyze data from various studies by inputting key statistical parameters

	Bias arising from the randomization process	Bias due to deviations from intended intervention	Bias due to missing outcome data	Bias in measurement of the outcome	Bias in selection of the reported result	Others
Mylonas et al 2021	+	+	+	+	+	+
Gulick 2017	+	+	+	+	+	+
Stanek et at 2018	+	+	+	+	+	+
Stroiney et al 2020	+	+	-	+	+	+
Kim et al 2018	+	+	+	+	+	+
Ikeda et at 2019	+	+	?	+	+	X
Gunn et al 2019	+	+	X	+	X	X
Garcia et al 2021	+	+	+	+	+	+
Mahmood et al 2021	+	+	X	X	+	X
Kim et al 2021	+	+	-	+	+	+
Schaef et al 2012	+	+	+	+	+	+
Jones et al 2019	+	+	?	X	+	X
Laudner et al 2014	+	+	+	+	+	+
MacDonald et al 2016	+	+	-	+	X	+
Kumar et al 2021	+	+	-	+	X	+
Osalian et al 2019	+	+	X	+	X	+
Kim et al 2019	+	+	+	X	+	+
Mostafa et al 2022	+	+	+	X	X	X

Figure 2. Shows the Summary of Risk of Bias

such as standard deviation, mean, and total participant numbers for each variable of interest, in this case, the pain variable. By computing the mean difference (MD) and 95% confidence interval (95% CI), researchers can assess the significance of the observed effects between intervention and control groups. The results are then visualized using a forest plot, which provides a graphical representation of the data, aiding in the interpretation of the findings. It's worth noting that the statistical significance level was set at $p<0.05$, ensuring that only results with a high degree of certainty are considered significant. Moreover, to enhance the reliability of the analysis, the meta-analysis process was conducted independently by two authors (RC, AM), minimizing the risk of bias and errors. This study utilized Review Manager 5.4 (RevMan 5.4), version 5.4.1, released on November 18, 2020, which is developed and maintained by the Cochrane Editorial and Methods Department, affiliated with Cochrane, and headquartered in Copenhagen, Denmark.

RESULTS

Study Selection

A total of 268 articles were identified from the search engines PubMed (N= 91), Cochrane (N=167) and Pedro (N= 10) by utilizing the above keywords. The title and then the abstract of every study were read before selection. 18 studies were chosen for the systematic review after screening, according to the inclusion criteria, and eliminating duplicates. A total of 250 articles were excluded due to duplication or not meeting the inclusion criteria. The search strategy's summary and the explanations for manuscript exclusion are provided Figure 1. PRISMA flow chart.

Study Characteristics

Out of 18 studies,8 studies were from USA (16-23),3 studies were from Korea (24-26),1 study was from Egypt (27),1 from Spain (28),1 from Japan (29),1 from India [30],1 from Saudi Arabia (31),1 from Greece (32), 1 from Pakistan (33).

Table 2. Showing the Assessment of Quality of Studies by Pedro Scoring

Study	1	2	3	4	5	6	7	8	9	10	11	Total
Mylonas et al. (2021)	0	1	0	1	0	0	1	1	0	1	1	6/10
Gulick et al. (2017)	1	1	0	0	0	0	0	0	0	1	1	4/10
Stanek et al. (2018)	0	1	0	0	0	0	1	1	0	1	1	5/10
Stroiney et al. (2020)	1	1	0	1	0	0	0	0	0	1	1	5/10
Kim et al. (2018)	1	1	0	1	0	0	1	0	1	1	1	7/10
Ikeda et al. (2019)	1	1	0	0	0	0	0	1	1	1	1	6/10
Gunn et al. (2019)	1	1	1	0	0	0	1	0	0	1	1	6/10
Garcia et al. (2021)	1	1	1	1	0	0	1	1	1	1	1	9/10
Mahmood et al. (2021)	1	1	0	1	0	0	1	1	0	1	1	7/10
Kim et al. (2021)	0	1	0	1	0	0	0	0	0	1	1	4/10
Schaefer et al. (2012)	1	1	1	1	0	0	0	0	0	1	1	6/10
Jones et al. (2019)	1	1	1	0	0	0	1	0	0	1	1	5/10
Launder et al. (2014)	1	1	0	1	1	0	0	1	0	1	1	7/10
MacDonald et al. (2016)	1	1	0	1	1	0	0	1	0	1	1	7/10
Kumar et al. (2020)	1	1	0	1	0	0	0	1	0	1	1	6/10
Osailan et al. (2021)	1	1	0	1	1	0	0	0	0	1	1	6/10
Kim et al. (2019)	0	1	0	1	0	0	0	0	0	1	1	4/10
Mostafa et al. (2022)	1	1	0	0	0	0	0	1	0	1	1	5/10

PEDro scale: 1, eligibility criteria; 2, random allocation; 3, concealed allocation; 4, similarity at baseline; 5, blinding of participants; 6, blinding of therapists; 7, blinding of assessors; 8, measures of at least one key outcome from at least 85% of participants initially allocated to groups; 9, intention to treat analysis; 10, between-group comparison; 11, point measures and measures of variability. 1: Yes (1 point), 0: No (0 point), maximum score: 10.

The qualities of the studies mentioned are in Table 2. In 18 studies, one study (28) had Pedro score of 9 out of 11, three studies (16,25,26) had Pedro score of 4 out of 11, four studies (17,18,21,27) had Pedro of 5 out of 11, four studies (22-24,33) had Pedro of 7 out of 11, and six studies(19,20,29-32) had Pedro of 6 out of 11.

Risk of Bias

Figure 2. provides a summary of the risk of bias. 18 studies in all were included, out of those 18 studies showed low risk due to randomization, 18 studies showed low risk due to deviation from intended intervention. 4 studies had high risk of bias in measurement of outcome,3 studies had high risk of bias due to missing outcome data, 5 studies had high risk of bias in selection of reported result, 4 studies had some concern of bias due to missing of outcome data, 2 studies had no information regarding outcome data, 14 studies showed low risk of bias in overall. All of the included studies had a low overall risk of bias. Figure 2 showing Risk of Bias Summary of the Included Studies.

Effect of IASTM on Pain

The data on pain was extracted from six randomized controlled trials including a total of 88 participants. The meta-analysis results displayed that the reduction in pain was statistically significant for the experimental group (IASTM) as compared to the control group (MD-1.33, 95% CI[-1.59,-1.06], p<0.0001.Figure 3 shows the forest plot for the variable pain between the intervention and control group.

In the present review eight studies have explored the role of IASTM on pain in various musculoskeletal conditions. Out of the studies included six studies showed reduction in pain intensity with the application of IASTM (20,21,25,27,32,33) Whereas, one study has shown no significant difference in perceived pain and performance in recreational collegiate athletes (18). Another study also showed no significant improvement in pain with the application of IASTM in combination with suboccipital release and myofascial release in patients with cervicogenic headache, but the improvements were clinically significant (33).

Effect of IASTM on Range of Motion

In the present review, eleven studies have explained the effect of IASTM on range of motion at various joints (17,19,20,22,27-33) Out of these, three studies have explored the role of IASTM on cervical range of motion (CROM) and out of these two studies has shown significant improvement in CROM (27,32) whereas, one study has shown no

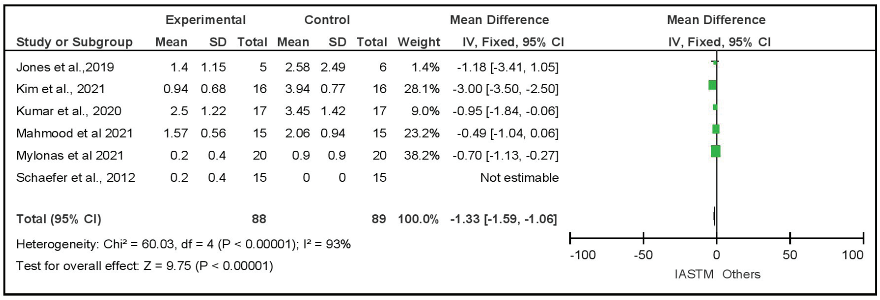

Figure 3. Shows the Gorest Plot for Pain between the Intervention and Control Group

statistically significant improvement in cervical ROM but the improvement were found to be clinically significant (30). Three studies have explored the effect of IASTM and showed improvement in range of motion at the ankle joint (17,20,29).Three studies on shoulder joint and out of these, two studies showed significant improvement in internal rotation and horizontal adduction at shoulder joint with the application of IASTM (22,33) and one study showed similar improvement in ROM with the application of IASTM alone or with the combination of stretching and isometric contraction and IASTM at the shoulder joint internal rotation and horizontal adduction (28). Two studies showed significant improvement in ROM at the hip joint ROM with the application of IASTM (19,31).

Effect of IASTM on Strength

The studies that were examined in this review also looked at how IASTM affected strength. Two studies have explored the effect of IASTM on strength. One study suggests that the recovery of maximal isometric strength was faster in IASTM group as compared to the control group (26) and another study showed that and showed improvement in the muscle strength as compared to control group (32).

Effect of IASTM on Power and Endurance

The effect of IASTM on power was explored in four studies in the present review. Two out of the four studies included showed no improvement in power (18,23) whereas, two studies (24,31) reported improvement in power in the group treated with IASTM. One study has explored the effect of IASTM on muscle endurance that showed significant improvement when IASTM is applied in combination with TENS in patients with chronic low back pain (25).

Effect of IASTM on PPT

One study in the present review explored the effect of IASTM on pain pressure threshold (PPT) that showed improvement in the PPT in healthy participants (16).

Effect of IASTM on Disability

The review includes five studies, explored the IASTM's effect on disability. Out of which, four studies have shown significant improvement in disability (20,25,27,32) whereas, one study showed no statistically significant improvement in disability but the improvements were clinically significant (30).

The result of the study revealed that the use of IASTM used in isolation or with other interventions was effective tool in improving the various outcome measures such as pain, range of motion, strength, pain pressure threshold, power and endurance.

DISCUSSION

The purpose of this review is to provide an overview on the effectiveness of IASTM on various outcome measures. The result of the systematic review suggests that the use of IASTM was effective on various outcome measures. The results of the meta-analysis on the variable pain revealed a statistically significant reduction in the pain in the interventional group treated with IASTM as compared to the control group (MD= -1.33, $p<0.0001$).

In the present review out of eight studies, six studies showed reduction in pain intensity with the application of IASTM (20,21,25,27,32,33).Whereas, one study showed no significant difference in perceived pain (18) and another reported no significant improvement in pain with the use of IASTM in combination with suboccipital release and myofascial release in patients with cervicogenic headache (33). The possible mechanism for reduction in pain could be increased blood flow with the application of IASTM. Increase in blood flow removes pain producing substances and can reduce swelling that is developed around any injured structure (34). Another author has suggested increase in perfusion with the application of IASTM (35). Pain is mainly caused by inflammation of the injured tissues and application of IASTM may control the inflammation by break down the fascial restrictions and scar tissue Local inflammation is stimulated by the application of controlled microtrauma to the afflicted soft tissue structure. Microtrauma starts the process of reabsorbing unneeded fibrosis or excessive scar tissue, facilitates a series of healing processes that lead to the remodeling of the soft tissue structures that are impacted, and can even control the inflammatory processes. But this theory warrants further investigations as various previous studies could not appropriately suggest the effect of IASTM on inflammatory responses. Thus, possibly the increase in circulation and mobility of soft tissue can be taken as prospective mechanism for pain reduction with the use of IASTM.

A systematic review on Instrument Assisted Soft Tissue Mobilization (IASTM) efficacy for musculoskeletal conditions and joint range of motion (ROM) using seven randomized controlled trials. While some short-term improvements in joint ROM were observed, overall, evidence supporting its efficacy for treating common musculoskeletal pathologies remains limited (1). Another systematic review on Instrument-Assisted Soft Tissue Mobilization (IASTM) indicating its effectiveness in enhancing range of motion for uninjured individuals and improving pain and patient-reported function in injured patients. While supportive, the study emphasizes the need for more extensive research involving diverse patient populations and products to generalize these findings (38). Another systematic review with meta-analyses assessing the effectiveness of IASTM for upper body, lower body, and spinal conditions. The study suggests potential benefits of IASTM, particularly in short-term improvement of joint range of motion. However, evidence for long-term pain relief, range of motion enhancement, or functional improvement remains inconclusive (39).The present review also suggests of increase in range of motion with the application of IASTM. Out of the eleven studies that have explored the effect of IASTM on range of motion at various joints (17,19,20,22,27-33).Nine studies reported IASTM as an effective intervention for improving ROM at various joints (17,19,20,22,27,29,31-33).One study has shown no statistically significant improvement in cervical ROM but the improvement was clinically significant (30). Another study displayed similar improvement in ROM with the application of IASTM alone or used with the combination of stretching and isometric contraction at the shoulder joint (28). Studies have explained the improvement in range of motion can be because of the two mechanisms. First one is that the application of IASTM produces heat by the frictional forces to the connective tissues. This heat decreases the viscosity of the tissues and thereby increases the extensibility and reduces the restrictions in the tissues and the decrease in the viscosity of tissues increases the ROM (36). Similar recommendations were proposed by another study that also suggests that the application of mechanical stress, heat, massage or pressure is to the fascia makes it more pliable thereby allowing a greater ROM (25). Another mechanism is that the application of mechanical stress on the muscle fascia stimulates the intra fascial mechanoreceptors which modulates the proprioceptive inputs to the CNS which in turn alters the tension in the motor units of the tissues producing increase in the ROM (37). A study indicates that IASTM may result in side effects such as bruising, inflammation, and muscle soreness. Post-treatment, certain patients reported sensations of warmth or tingling, while less frequent risks included skin redness and increased pain (37).In addition to this the present study also advocates the use of IASTM in improving the strength, endurance and improving the disability. Two studies included in the review have explored the effect of IASTM on muscle strength and both the studies suggested an increase in the muscle strength as compared to control group (26,32).One study has explored the effect of IASTM on muscle endurance that showed significant improvement when IASTM is applied in combination with TENS in patients with chronic low back pain (25). The possible reasons for results may be attributable to strong muscle contractions that are made possible by releasing restrictions in the soft tissues, which may have boosted muscle strength and endurance (24). Out of the four studies on estimating the effect of IASTM on power, two suggests improvement in the power as the use of IASTM can aid in tissue fluid exchange, boost oxygen delivery to soft tissues to lessen localized vasculopathy, and speed up the recovery from muscular exhaustion and muscle function by boosting metabolic secretion and waste disposal.

The review includes five studies, explored the IASTM's effect on disability. Out of which, four studies have shown significant improvement in disability (32,25,20,27) whereas, one study showed no statistically significant improvement in disability but the improvements were clinically significant (30). The improvement in disability can be attributed to improvement in the variables such as pain, function, range of motion and other outcome variables in the studies that have improved the disability in the included studies.

Out of 18 studies in the current review, 16 studies favored IASTM as an efficient treatment for impairments, either by itself or in combination with other treatments. Only 2 trials (18,23) did not support IASTM as an effective intervention since they did not yield meaningful outcomes. IASTM offers advantages in physical therapy by enhancing tissue mobility and flexibility, benefiting athletes and injury recovery. It targets soft tissue restrictions effectively, improving athletic performance and movement efficiency. Sessions are quick and minimally invasive, but disadvantages include potential side effects like bruising and discomfort, requiring proper training and certification. Limited scientific evidence compared to alternative treatments and potential contraindications necessitate careful assessment. Additionally, the cost of sessions may be a concern (40-42). However, the majority of studies supported IASTM, indicating it as a helpful tool that can be coupled with other interventions or used alone to treat a variety of athletic and musculoskeletal conditions. Hence, it can be interpreted that IASTM is an effective tool in management of athletic and musculoskeletal conditions.

Limitations

The scarcity and diversity of evidence around IASTM is the primary constraint of this systematic review. Comparing the outcomes of trials using IASTM therapy alone vs those using IASTM implement as adjunct of a treatment plan with other adjunct therapies. It is challenging to differentiate the results when the IASTM treatment is used with patient who may retort to IASTM therapy alone but who are more likely to benefit from adjunct therapy specially when given the flexible methodology (e.g., varying treatment times, applying static versus dynamic IASTM treatment, etc.), employed throughout research, it is therefore difficult to evaluate the effectiveness of IASTM treatment, especially when used in combination. It is difficult to apply the findings to clinical practice because of the variety of the present IASTM research. Finding the best treatment protocol is challenging because study procedures vary so much, including the study population, IASTM intervention type, dosing regimen, and outcome measurements. No hand-searching was conducted. Only databases such as PubMed, PEDro, and the Cochrane Library were used for the search strategy

Clinical Recommendations for Future Research

To further understand the hypothesized physiological principles underlying the various athletic and musculoskeletal conditions, clinicians may also find it helpful to read related research on athletic and musculoskeletal conditions.

Conclusion: The analysis and synthesis of existing evidence concluded that IASTM is a valuable tool for managing athletic and musculoskeletal conditions. Its adaptability allows integration into multidisciplinary treatments, enhancing patient outcomes and quality of life in rehabilitation.

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