

Instrument assisted soft tissue mobilization- an emerging trend for soft tissue dysfunction

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Abstract

Musculoskeletal disorders are common conditions involving joints, muscles, nerves, ligaments and tendons. These disorders affect normal activities and cause discomfort. These discomforts are managed by different types of interventions, including exercise, acupuncture, soft tissue release and manual therapy, as conservative modes of management. Soft tissue release, including active release technique, fascial abrasion, and myo-fascial release are considered effective for musculoskeletal function improvement. Advanced technology-improved and instrument-assisted techniques are being used nowadays. These instruments are sensitive in the localisation, specification and facilitation of the target area with the help of mechanical pressure applied on tissue with movement of specific muscle. Prognosis varies with good outcomes using fewer sessions than the others. But it needs proper localisation of the muscle involved and special training. The advantage considered is that musculoskeletal disorders can also be prevented in practitioners as well.

Keywords: IASTM, Musculoskeletal dysfunction, Pain, Range of motion, Soft tissue mobilization.

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Introduction

Most musculoskeletal disorders are overuse injuries, including strains and sprains, overuse-related biomechanical issues as well as ergonomic imbalance. Overuse can lead to compromised muscle/tendon activity leading to decreased length tension relation for daily use normal activities. Poor ergonomics, posture, improper sitting and postoperative rehabilitation as well as overuse syndrome's reoccurrence cannot be neglected.¹

The role of manual therapy is very important in the management of such musculoskeletal disorders. These include Cyriax, Mulligan, Maitland and Kaltenborn

techniques which are very effective. Soft tissue mobilisation (STM), strain-counter-strain (SCS), muscle energy technique (MET), fascial release technique (FRT), and active release technique (ART) have proven effectiveness.² With technological advancement, instrument-assisted soft tissue mobilisation (IASTM) has evolved as a new concept in decreasing rehabilitation time. It is based on Cyriax digital cross-friction.³ Initially it was used in sports rehabilitation as there is a need of shortening the rehabilitation time, but now it has been extended to the general population in last few years.⁴

Types of IASTM

The current review comprised studies comparing IASTM with other techniques of conservative management of musculoskeletal dysfunction. Modern types of interventions using combined approach of exercise with the use of STM with instruments like GuaSha, Graston, Ergon, Hawk Grips and Rock Tapes. These instruments have different sizes, shapes and specific treatment and gripping sides.^{5,6} The instruments are used on skin after friction-free gel which lubricates the area to be treated and facilitation of the tissue can easily be performed. The protocol includes the standard intervention plan using different strategies sequence including: warm-up exercise to increase blood circulation in specific area; IASTM using lubricant gel; stretching while facilitation is prompted by use of pressure; strengthening exercises along with treatment sessions; and cryotherapy, or icing, if there is mild discomfort and reddening of skin which is considered an indicator that the response of body tissues has initiated which is beneficial for healing.⁷

IASTM Mechanism

These instruments break down scar and fascial restrictions. The clinician localises the area and then mobilise it with the required amount of force and stroke on the specific site. The force applied is targeted over specific restrictions.⁸

Gua Sha is effective in diabetic neuropathy and improves the pain threshold; Ankle Brachial Index (ABI) score and sensory performance on follow-up of 12 weeks.⁹ Hawk grips are based on blood flow restriction using graded tools. Ergon tools glide on the superficial skin with slight use of pressure on the basis of engineered precise shape

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and size. Their benefits have been documented at cellular level, with fibroblast proliferation directly proportional to the applied pressure increasing vascular response remodelling of the matrix of collagen. These also promote healing as well as re-absorption of scar.¹⁰ Manual working practitioners have to apply force by hands during STM repetitions. That is why work-related disorder risk is higher in such manual therapies.¹¹

Shape and ergonomics make them more precise and specific to the soft tissue involved. Their efficacy for musculoskeletal restriction and soft tissue adhesions management increases circulation and minimises the pain. These micro-traumas lead the local response of body.¹²

IASTM Effects on musculoskeletal disorders

A study on hamstring extensibility with non-specific low back pain had 24 subjects; 8 males and 4 females in each group. The comparison was made between stretching exercise and Graston-assisted STM. Results showed lower pain in the Graston group compared to the exercise-alone group.¹³

Graston is effective in low back pain. A study included 30 subjects with chronic low back pain; 13 males and 17 females. The study compared exercise and IASTM for 4 weeks. The outcome measured was pain and range of motion (ROM). The Graston group was better compared to the other group.¹⁴

A quasi-experimental study used mechano-sensitive stimulation of neurons with 23 subjects; 14 males and 9 females. It concluded that IASTM-treated group was better even though the difference was not significant.¹⁵ In one study, patients with Achilles tendinopathy were treated over 2 sessions for 8 weeks, and showed an improvement in lower extremity functioning.¹⁶

IASTM can be effectively used for medial epicondylitis, plantar fasciitis, patellar tendinitis, rotator cuff tendinitis, adhesive capsulitis post-surgical and traumatic scars, muscle strain, back pain, or lumbago, non-acute bursitis, trigger points, iliotibial band syndrome (ITBS) and myofascial pain, restrictions and many such disorders.¹⁷ A study on muscle soreness due to exercise and its fibrotic factors comprising 16 male college students with 8 in each group compared two sets of eccentric contraction of elbow flexors. IASTM was applied for 8 minutes after exercise and then after 2 days. Muscle isometric strength and soreness, and transforming growth factor beta-1 (TGF-B1) as fibrotic damage, was assessed. The IASTM group was faster in reducing soreness and strength and TGF-B1 was improved compared to the exercise group.¹⁸ When IASTM was applied on 3-week protocol in athletes having

glenohumeral internal rotation deficit (GIRD) and exercise, including static stretching, warm-ups and muscle energy techniques (METs), goniometry results showed significant improvement in IASTM the group regarding ROM in horizontal adduction and internal rotation. But results of external rotation was not significant. Pre-and post-test Apley's scratch also showed significant improvement ($p=0.001$).¹⁸

A study on hamstring shortness, quads strength pain threshold and knee stiffness had 45 subjects; 24 females and 21 males. The subjects were allocated to 3 groups of intervention; strain-counter-strain, hold-relax and instrument. The results were significant for quads strength ($p=0.00$), pain ($p=0.00$) and strength ratio ($p=0.004$).¹⁹

When effects of IASTM were compared with dynamic strength training in subjects with ankle instability, it increased ankle-foot-ankle measures, decreased pain and increased ROM in all four directions.²⁰ This study had 36 subjects; 31 males and 5 females. It stated that chronic heel pain and chronic ankle instability could be improved with IASTM.²¹

A comparative study on manual and IASTM on vertical and horizontal power among recreational athletes used 40-yd sprint timing and vertical jump as the outcome. The 49 subjects from a college were divided in two groups, and the results, measured in the context of pain, found both techniques to be equally effective. But the effects on sprinting were not improved in both groups.²¹

A study compared Mulligan Bent Leg Raise (BLR) with IASTM in patients with hamstring tightness for short effects. There were 212 asymptomatic subjects in two groups, each group receiving intervention with passive static stretching. Only one-time treatment was given with IASTM. The results were significant in hamstring tightness except lumbar Lordosis having significant effect of BLR ($p=0.05$).²² This was also supported by a study comparing Proprioceptive Neuromuscular Facilitation (PNF) and IASTM. There were 40 subjects; 11 males and 6 females in IASTM, and 16 females and 7 males in PNF. There was significant improvement in hip flexion in IASTM group.²³ In a case report Chuna Manual Therapy (CMT) and Graston technique was used in combination for fibromyalgia. The study used this combined approach with acupuncture, herbal medicine and physical therapy. Fibromyalgia impact and numeric pain of back and lower limb were decreased.²⁴

In acute and sub-acute ankle inversion sprain rehabilitation, Functional and Kinetic Treatment with Rehabilitation (FAKTR) with cryotherapy protocol was used on 45 subjects. The outcomes measured were numeric pain

Table: Available Evidence on IASTM Efficacy.

| Author | Type of Study | Outcome | Results | Level of Evidence | Pedro Rating |
|----------------------------------------------|----------------|--------------------------------------------------|-----------------------------------------------------------------------------------|-------------------|------------------------------------|
| Mathew Lambert ³³ | 7 RCTS | Pain and Disability in Msk Impairment | Pain and function in three months | 1a | 4/10 |
| Seffrin, Cattano ³⁴ | 13 RCTS | Pain, ROM and Patient Function s | Improved outcome on uninjured patients | 1a | 5-7/10 uninjured 3-7/10 injured |
| Harmanpreet Kaur and DT Gulick ³⁵ | RCT | Pain, ROM of in Non Mechanical Neck Pain | Significant Improvement in ROM and Decreased Pain intensity | 1b | 3/10 |
| Burke J ³⁶ | Clinical Trial | Pain, Sensory and Motor functions of hand in CTS | GISTM improvements noted Control group did not change measurements at time points | 1b | 5/10 |
| Stanek J, Sullivan ³⁷ | RCT | Ankle Dorsiflexion | IASTM compared to Control Both improved equally | 1b | 5/10 |

RCTs: Randomized controlled trials; ROM: Range of motion; DVT: Deep venous thrombosis; Msk: Musculoskeletal; GISTM: Graston instrument soft tissue mobilisation; IASTM: Instrument-assisted soft tissue mobilisation.

rating, foot functional index (FFI), stroke balance stand test score (SBSTS) and digital inclinometer reading (DIR). One group was given FAKTR and other Sham and cryotherapy with 4 treatment sessions over two weeks. Statistically significant improvement was noted in the FAKTR group ($p < 0.05$). The study concluded that combined approach using FAKTR with cryotherapy was more effective compared to single strategy of management of ankle sprain.²⁵

A study on chronic heel pain management had 11 participants receiving Graston and other exercises who were followed up for 3 months. The results showed that the Graston group had better outcome, but the treatment should be carried out for >6 weeks for improving pain and function.²⁶ Another study added new evidence to the Neck Pain Task Force (NPTF) and suggested that mobilisation, manipulation and clinical massage were effective interventions for the management of neck pain due to stiffness. Results suggested that electro-acupuncture, massage, strain-counter-strain and some of the electro-physiological modalities, like heat, cold, diathermy, hydrotherapy and ultrasound, were not effective and should not be used to manage neck pain.²⁷

A study on hamstring flexibility aimed at finding the effects of Ergon Technique for lower back-line. It had 60 participants. The experimental group was treated with Ergon (IASTM), while the control group received exercises. The outcome of hamstring flexibility was measured by Straight Leg Raise (SLR) and range of hip motion (ROHM) was measured using smart-phone goniometry. The result showed significant difference for IASTM group compared to the control group.²⁸

A randomised study on chronic musculoskeletal neck pain used Gua Sha in 48 subjects in two equal groups. The enrolled subjects were followed up for neck pain, neck disability and ROM. There was significant improvement in the Gua Sha group compared to the thermal pad group.

There was reduction of pain, improvement in neck disability and neck ROM ($p < 0.001$).²⁹

Advantages of IASTM for practitioners

Musculoskeletal disorders can be avoided by the use of this technique as less force is required with use of mechanical force through use of instruments. A study in Africa stated that the risk of thumb injury was 66% among manual therapists.^{30,31} Nearly 50% therapists develop discomfort with similar specialty with greater risk in young age as the main role in the development of such disorders lies in the risk of high force and direct pressure.³² Evidence on IASTM efficacy is found frequently in literature.³³⁻³⁶

Implementation

There is need to focus on rehabilitation protocols having early rehabilitation with good prognosis level. This technique is being used far less by physiotherapy practitioners in Pakistan. There should be trainings, workshops and seminars on its efficacy and basic learning skills in the form of modules. High-quality clinical studies are also lacking in this critical area.

Conclusion

IASTM is effective for early rehabilitation, which is time-saving both for patients and practitioners. It is energy-efficient and has its own indications, contraindications and precautions. In some cases, conservative management limits surgical requirements if properly managed. Risk of discomfort and pain due to overuse while applying manual techniques can be avoided by the use such instrumental techniques.

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