



A COMPARATIVE STUDY OF INSTRUMENT ASSISTED SOFT TISSUE MOBILIZATION WITH CONVENTIONAL PHYSIOTHERAPY TREATMENT IN PATIENTS WITH FLEXIBLE FLATFOOT ON ANKLE RANGE OF MOTION AND FOOT POSTURE INDEX

Physiotherapy

**Darshana Tanaji
Kendre**

Intern, Dr, A P.J Abdul Kalam College Of Physiotherapy, Pims-du, Loni, India

Dr. Tejas Borkar*

ASST. Prof, Dr, A. P. J Abdul Kalam College Of Physiotherapy, Pims-du, Loni, India
*Corresponding Author

ABSTRACT

BACKGROUND: IASTM is done with ergonomically planned instruments that detect and treat fascial limitations, reassure rapid localization and effectively treat parts exhibiting soft tissue fibrosis, chronic inflammation, or degeneration. Flat foot is a compound pathology defined as collapse of medial longitudinal arch of foot. It is an advanced deformity leading to various deformities of ankle and foot.

AIM: the present study was taken for comparison between the effect of instrument assisted soft tissue mobilization with conventional physiotherapy treatment vs. conventional physiotherapy treatment in patients with flexible flat foot on ankle range of motion and foot posture index.

METHOD: The study was a comparative study where effect of instrument assisted soft tissue mobilization was given along with conventional physical therapy in randomly classified into two groups, IASTM along with conventional physiotherapy (group A) and conventional physiotherapy (group B). Total 32 samples were given treatment for 4 weeks and the data was analysed based on foot posture index and ankle range of motion and the results were analysed using paired and unpaired t test.

RESULT: the comparison of post intervention score of group A and group B was extremely significant ($p = 0.0001$). also, the comparison for ankle dorsiflexion, eversion and inversion of group A and group B was extremely significant. The comparison of post intervention of group A and group B for plantarflexion was however not significant. ($p = 0.124$)

CONCLUSION: four weeks of IASTM technique has shown to improve foot posture index (FPI), dorsiflexion, inversion and eversion in flexible flatfoot in young individuals. Thus, 4 weeks of IASTM technique can be used for treatment of flexible flatfoot patients.

KEYWORDS

flexible flatfoot, instrument assisted soft tissue mobilization, foot posture index.

1.INTRODUCTION:

Flat foot is a compound pathology defined as collapse of medial longitudinal arch of foot.¹ It is an advanced deformity leading to various deformities of ankle and foot. The anatomy of the foot is very complex with multiple structures needed for the support and to stabilize the joint and for proper function.² It may also be defined as the syndrome of many static and dynamic deformities with collapse of medial arch² Pes planus not only contributes to foot problems but also to some serious other complications like shin splints, hammer toes, plantar fasciitis, bunions, heel pain and commonly the knee and low back pain.³ The process of maintaining the center of gravity within the body's base of support is termed as balance.⁴ An excessive pronation of the foot can affect the static and dynamic postural stability.⁵ A cross sectional study done in Indian population showed that the prevalence of flat feet in 18-25-year-old adults was 11.25% in participants with bilateral flat feet. Another cross-sectional study for prevalence of flexible flat feet in Indian young adults was found to be 13.6%, for males it was 12.8% and for females it was 14.4%.⁶ Restriction within the myofascial system may occur due to injury, poor posture, or lack of full range of joint motion.⁶ instrument assisted soft tissue mobilization is a technique used for relieving such restrictions. It is a technique that involves using instruments to address musculoskeletal pathology-related impairments and help heal soft tissues. Simply individuals diagnosed with soft tissue dysfunction.⁷ The IASTM is growing popular due to its immediate yet noninvasive treatment technique.⁸

Diminished soft tissue function following any injury makes it difficult to participate again in activities of daily living. Therefore, recovery of soft tissue function represents one of the most important goals in rehabilitation. IASTM has been studied mostly in relation to tendon injuries. it was discovered that IASTM can stimulate not only tendons but also other soft tissues, such as muscles, to help recover soft tissue functions in a chronic or an acute means.⁶

The purpose of the study was to detect how IASTM shows to be beneficial in many of the limitations found in flexible flat foot, and may help to reduce the severity of the disease if given along with the conventional physical therapy. But IASTM in adults with flexible type flat foot if given along with the physical therapy does not have enough literature and thus is needed to be studied further.

2.Procedure and outcome measures:

An approval of the study was obtained from the Institutional Ethical

Committee (IEC). The study was conducted in OPD setting of Dr. APJ Abdul Kalam College of Physiotherapy. All the undergraduate students and interns were screened for flexible type of flat foot with the tests like 'too many toes' and 'heel raise'. 32 participants of Dr. A.P.J. Abdul Kalam College of Physiotherapy aged 18-22 years, both males and females with flexible flat foot willing to participate were included in the study. Patients with diabetes mellitus or Any recent surgery or scar or open wound or tattoos or Clotting or vascular disorders. Individuals taking blood thinners and Patients with any foot deformity other than pes planus were excluded from the study. The 32 participants were then assessed for two outcome measures Foot Posture Index (FPI) and ankle range of motion. FPI is a diagnostic tool aimed at quantifying the degree to which a foot can be considered to be in a pronated, supinated or neutral position. It consists of six validated, criterion-based observations of the rearfoot and forefoot of a subject standing in a relaxed position. Neutral foot postures are graded as zero, while pronated foot is given a positive value more than four and supinated features a negative value.⁷ It has Inter rate reliability = 0.81 – 0.94 and Validity = 0.85⁹ The range of motion of ankle is measured by universal goniometer for the range dorsiflexion, plantarflexion, inversion and eversion. Before commencement of the study written consent was taken from all participants and were divided into two groups: group A – IASTM with conventional physiotherapy and group B – conventional physiotherapy via simple random sampling. The intervention was given for 4 weeks to both the groups.¹⁰

INTERVENTION:

The conventional physical therapy protocol for flexible flat foot to be administered in group A and group B was :

- Contrast bath: to increase circulation. The ratio of 3:1 is followed, where start with hot and end with hot for 15 mins wherein 3 mins hot 1 min cold water immersion was given.
- Stretching: to increase dorsiflexion and inversion range. held for 30 secs to 1 min as per the tolerance of the patient.
- Strengthening: by using weights over towel and curling of toes, and also arching of foot to increase strength of intrinsic muscles.
- Insoles or medial arch supports: to provide support to the low-lying arch of the foot and to minimize the pressure effects and relieve the pain.

In the group A i.e. the intervention group IASTM technique was added to study its effect. IASTM session begins immediately after the warmup exercises. Apply some lotion, on the targeted muscle, and

apply the instrument at the pressure patient can tolerate. At the angle suitable for the muscle to be treated. The strokes should be parallel to the muscle fibre, given for < 30 secs and in much specific and quick way. Cross-friction stroking technique is applied perpendicular to the fibres mostly on tendon, muscular tendinous junctions' ligaments and capsules. Moderate to deep pressure is applies without emolium to stroke back and forth having firm placement of the tool. This was followed by cool down protocol i.e. CRYO for 15 mins.



Figure1: IASTM tool & GONIOMETER

TABLE 1: COMPARISON OF PRE AND POST INTERVENTION VALUES OF INDIVIDUAL OUTCOME MEASURE FOR GROUP A AND GROUP B.

ASSESSMENT PRE AND POST INTERVENTION	GROUP A			GROUP B		
	T VALUE	P VALUE	SIGNIFICANCE	T VALUE	P VALUE	SIGNIFICANCE
FPI	16.02	0.0001	Extremely significant	0.661	0.113	Not significant
DORSIFLEXION	16.02	0.0001	Extremely significant	5.33	0.0001	Extremely significant
PLANTARFLEXION	0.39	0.163	Not significant	3.18	0.0001	Extremely significant
INVERSION	20.13	0.0001	Extremely significant	4.46	0.0001	Extremely significant
EVERSION	1.71	0.1253	Not significant	4.93	0.0001	Extremely significant

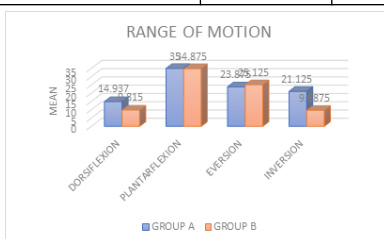


Figure 1: the comparison of post intervention ranges of group A and group B shows that the group A has significant improvement in ankle dorsiflexion and inversion with p value 0.0001

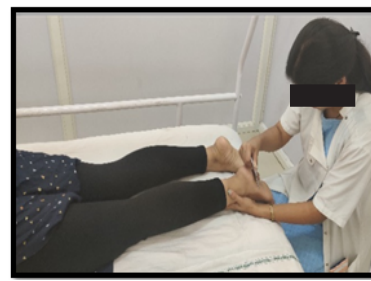


Figure 2: IASTM TECHNIQUE USED IN GROUP A

3. DATA ANALYSIS and RESULTS:

DATA ANALYSIS: the average age of group A is 19.6875 ± 1.537 years and the average of group B is 20.125 ± 1.893 years. The total mean of 32 participants was 19.0625 ± 1.71 years. (t = 0.717 and p = 0.4785). There were 15 girls in group A (93.75%) and 12 girls in group B (75%) and 1 boy in group A (6.25%) and 4 boys in group B (25%).

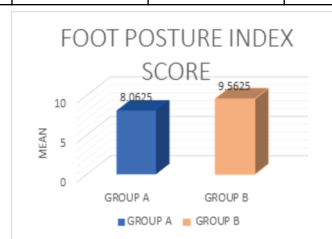


Figure 2: the comparison of post values of foot posture index (FPI) of group A and group B show that there is significant change in the scores of group A with p = 0.0001

TABLE 2: COMPARISON OF POST INTERVENTION VALUES OF GROUP A WITH GROUP B.

OUTCOME MEASURE ON COMPARING POST INTERVENTION SCORES	"t" VALUE	P VALUE	SIGNIFICANCE
FPI	3.469	0.0001	EXTREMELY SIGNIFICANT
DORSIFLEXION	9.973	0.0001	EXTREMELY SIGNIFICANT
PLANTARFLEXION	0.355	0.124	NOT SIGNIFICANT
INVERSION	2.070	0.0001	EXTREMELY SIGNIFICANT
EVERSION	10.420	0.0001	EXTREMELY SIGNIFICANT

1.4. RESULT:

The comparison of post intervention scores of all outcome measures show that the IASTM technique along with conventional physiotherapy treatment (group A) is extremely significant in increasing ankle dorsiflexion, inversion and eversion. Also, it shows extremely significant changes in foot posture index of flatfoot patients in group A.

5. DISCUSSION:

The current study was aimed to compare the effects of instrument assisted soft tissue mobilization along with conventional physiotherapy (group A) and conventional physiotherapy (group B).

Range of motion in flatfoot patients have always been affected due to structural and functional limitations. According to a study conducted on foot and ankle kinematics in posterior tibial tendon dysfunction patients, patients with pes planus, due to posterior tibial tendon dysfunction have reduced dorsiflexion and increased eversion.¹¹ In another study IASTM has shown to increase range of motion on an immediate purpose. So, it could be considered that the range of motion of dorsiflexion is significantly increased in this study whereas the eversion range is not significantly increased. Accordance to an article Therapeutic effectiveness of instrument-assisted soft tissue mobilization for soft tissue injury by Jooyoung Kim¹, Dong Jun

Sung², Joohyung Lee¹, Instruments effectively break down fascial restrictions and scar tissue.¹⁰ A study conducted on effect of IASTM using foam roller on hip rom suggest that There are three theories projected to explain changes in ROM after FR. Most prevalent is that myofascial adhesions develop over time, resulting in reduced ROM.¹² Advocates of IASTM proprot that IASTM by foam roller is able to lessen fascial adhesions, thus refining ROM. Second, modifications in blood flow and vascularization in the fascia are exposed to modification as a result of IASTM, which may lead to compact neural inhibition.¹³ Finally, there is a projected neurological mechanism that involves the facilitation of muscle relaxation / inhibition, which would occur to a greater degree in myofascial tissue than fascia alone.¹⁴ similar changes are seen on plantar fascia on application of IASTM technique in this study. Thus, reduction of myofascial adhesions, modification in blood flow and vascularity, or facilitation of muscle relaxation/inhibition may be the primary reason for the extremely significant results in the IASTM group. The range for eversion and plantarflexion of group A is seen not to be significantly improved after comparing with the group B. according to the article published in journal of orthopedics and sports physical therapy, by Robert Donatelli, MA, PT, he states that extreme pronation is achieved at flatfoot stage of gait cycle and the extreme pronation is past 25% of stance phase and the foot repronates at the off-beam time leading to abnormal movements. The functional orthotic device is designed to

store standard alignment and regulate excessive pronation by reducing the abnormal forces acting on the ankle. If the foot pronates during final phase of stance then it is difficult to establish rigid lever to push from. Thus, orthotics should be included in the study.¹⁵ in this study both the groups were given custom made foot orthosis for four weeks and that may be one of the reasons for the significant improvement in both the groups.

6.CONCLUSION:

We can conclude that four weeks of IASTM technique has shown to improve foot posture index (FPI), dorsiflexion, inversion and eversion in flexible flatfoot in young individuals. Thus, four weeks of IASTM technique can be used for treatment of flexible flatfoot patients.

7.REFERENCES:

1. Abdul Arain; Michael C. Harrington; Andrew J. Rosenbaum. Adult acquired flat foot.
2. Toullec E. Adult flatfoot. *Orthopedics & Traumatology: Surgery & Research*. 2015 Feb 1;101(1):S11-7.
3. Fatima S, Arsh A, Rahman N, Ullah A. Frequency and Associated Factors of Knee and Low Back Pain among Adults with Pes Planus. *Journal of Dow University of Health Sciences*. 2018 Dec 19;12(3).
4. Guskiewicz KM, Perrin DH et al. Research and clinical applications of assessing balance, 1996.
5. Aenumalappalli A, Kulkarni MM, Gandotra AR. Prevalence of flexible flat foot in adults: A cross-sectional study. *Journal of Clinical and Diagnostic Research: JCDR*. 2017 Jun;11(6):AC17.
6. MacDonald N, Baker R, Cheatham SW. The effects of instrument assisted soft tissue mobilization on lower extremity muscle performance: a randomized controlled trial. *International journal of sports physical therapy*. 2016 Dec;11(7):1040.
7. Redmond AC, Crane YZ, Menz HB. Normative values for the foot posture index. *Journal of Foot and Ankle research*. 2008 Dec;1(1):6.
8. Physiopedia contributors. Instrument Assisted Soft Tissue Mobilization [Internet]. Physiopedia, ; 2019 Jul 19, 14:54 UTC [cited 2020 Jan 22]. Available from: [https://www.physio-pedia.com/index.php?title= Instrument_ Assisted_ Soft_ Tissue_ Mobilization&oldid=217263](https://www.physio-pedia.com/index.php?title=Instrument_Assisted_Soft_Tissue_Mobilization&oldid=217263)
9. Reliability and validity of the Microsoft Kinect for evaluating static foot posture. Benjamin F Mentiplay, Ross A Clark, Alexandra Mullins, Adam L Bryant, Simon Bartold & Kade Paterson *Journal of Foot and Ankle Research* Volume 6, Article number: 14 (2013)
10. Effect of IASTM:- Kim J, Sung DJ, Lee J. Therapeutic effectiveness of instrument-assisted soft tissue mobilization for soft tissue injury: mechanisms and practical application. *Journal of exercise rehabilitation*. 2017 Feb;13(1):12.
11. Ness ME, Long J, Marks R, Harris G. Foot and ankle kinematics in patients with posterior tibial tendon dysfunction. *Gait & posture*. 2008 Feb 1;27(2):331-9.
12. Markovic G. Acute effects of instrument assisted soft tissue mobilization vs. foam rolling on knee and hip range of motion in soccer players. *Journal of bodywork and movement therapies*. 2015 Oct 1;19(4):690-6.
13. Okamoto T, Masuhara M, Ikuta K. Acute effects of self-myofascial release using a foam roller on arterial function. *J Strength Cond Res*. 2014;28:69-73.
14. Markovic G. Acute effects of instrument assisted soft tissue mobilization vs. foam rolling on knee and hip range of motion in soccer players. *Journal of bodywork and movement therapies*. 2015 Oct 1;19(4):690-6.
15. Donatelli R. Abnormal biomechanics of the foot and ankle. *Journal of Orthopaedic & Sports Physical Therapy*. 1987 Jul;9(1):11-6.