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

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ABSTRACT

BACKGROUND: IASTM is done with ergonomically planned instruments that detect and treat fascial limitations, reassert 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. The anatomy of the foot is very complex with multiple structures needed for the support and to stabilize the joint and for proper function. 1 It may also be defined as the syndrome of many static and dynamic deformities with collapse of medial arch.2 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. A. An excessive pronation of the foot can affect the static and dynamic postural stability.4 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.5 Another cross-sectional study for prevalence of flexible flat feet in Indian young adults was found to be 13.6%, for bilateral flat feet. Another cross-sectional study for prevalence of flexible flatfoot in young individuals. Thus, 4 weeks of IASTM technique can be used for treatment of flexible flatfoot patients.

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, inversion and eversion 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 a 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. 1 It may also be defined as the syndrome of many static and dynamic deformities with collapse of medial arch.2 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. ‘An excessive pronation of the foot can affect the static and dynamic postural stability.’ 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 bilateral flat feet.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. It has Inter rate reliability = 0.81 – 0.94 and Validity = 0.85. 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.

INTERVENTION:

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

a. 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.

b. Stretching: to increase dorsiflexion and inversion range. held for 30 secs to 1 min as per the tolerance of the patient.

c. Strengthening: by using weights over towel and curling of toes, and also arching of foot to increase strength of intrinsic muscles.

d. Insoles or medial arch supports: to provide support to the lowlying 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.

**Figure 1: IASTM tool & GONIOMETER**

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

<table>
<thead>
<tr>
<th>ASSESSMENT PRE AND POST INTERVENTION</th>
<th>GROUP A</th>
<th>GROUP B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>T VALUE</td>
<td>P VALUE</td>
</tr>
<tr>
<td>FPI</td>
<td>16.02</td>
<td>0.0001</td>
</tr>
<tr>
<td>DORSIFLEXION</td>
<td>16.02</td>
<td>0.0001</td>
</tr>
<tr>
<td>PLANTARFLEXION</td>
<td>0.39</td>
<td>0.163</td>
</tr>
<tr>
<td>INVERSION</td>
<td>20.13</td>
<td>0.0001</td>
</tr>
<tr>
<td>EVERSION</td>
<td>1.71</td>
<td>0.1253</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>OUTCOME MEASURE ON COMPARING POST INTERVENTION SCORES</th>
<th>T VALUE</th>
<th>P VALUE</th>
<th>SIGNIFICANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>FPI</td>
<td>3.469</td>
<td>0.0001</td>
<td>EXTREMELY SIGNIFICANT</td>
</tr>
<tr>
<td>DORSIFLEXION</td>
<td>9.973</td>
<td>0.0001</td>
<td>EXTREMELY SIGNIFICANT</td>
</tr>
<tr>
<td>PLANTARFLEXION</td>
<td>0.355</td>
<td>0.124</td>
<td>NOT SIGNIFICANT</td>
</tr>
<tr>
<td>INVERSION</td>
<td>2.070</td>
<td>0.0001</td>
<td>EXTREMELY SIGNIFICANT</td>
</tr>
<tr>
<td>EVERSION</td>
<td>10.420</td>
<td>0.0001</td>
<td>EXTREMELY SIGNIFICANT</td>
</tr>
</tbody>
</table>

**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 ± 1.71years. (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: IASTM TECHNIQUE ISED IN GROUP A**

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.

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

**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. 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. According 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. 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. Advocates of IASTM proport 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 modification. 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. 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 vascularility, 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 stance phase and the foot pronates 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, 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.