



ISSN Print: 2394-7500
ISSN Online: 2394-5869
Impact Factor: 5.2
IJAR 2018; 4(1): 265-267
www.allresearchjournal.com
Received: 12-11-2017
Accepted: 13-12-2017

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Immediate effects of M²T blade on hamstring flexibility in elderly population: A pilot study

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Abstract

Background: Muscle tightness may be a common impact of aging caused because of cross-linking of fibers. The joints become stiffer and less flexible as we tend to age. The cartilage could begin to rub along and wear away with time. Hamstring muscle is one of the common muscles found to be tight in an individual and is the potential cause for low back issues altering the lumbopelvic rhythm in them. Flexibility may be hindered for a number of reasons, one of which is fascia restrictions. M2T blade is a new Instrument-assisted soft tissue mobilization (IASTM) new tool that enables clinicians to assess, detect, and treat individuals diagnosed with scar tissue, adhesions, and soft tissue dysfunction. Various studies have compared numerous techniques to see which technique is best for increasing joint range of motion (ROM). However, there is dearth of literature on use of IASTM on hamstring tightness in elderly.

Method: 12 subjects aged 65-75 years with hamstring tightness were assessed and treated with the M²T blade. Outcome measures used were Passive Knee Extension (PKE) and Sit and Reach Test (SRT) that was measured before and after the intervention.

Result: Statistical analysis showed that hamstring flexibility significantly improved post treatment using M²T blade. Independent sample t test was used for comparison of pre-post data. Level of significance was set at 5%.

Conclusion: Statistically significant difference was noted in pre-post data of SLR and PKE with the use of M²T blade on hamstring flexibility in elderly.

Keywords: M²T blade, hamstring tightness, elderly population, pre-post design

Introduction

Muscle tightness can develop from overuse injuries, trauma, stress, or illness. However, the progressive decline in flexibility with age is recognized as changes in physical property and reduced amount of physical activity [1]. For this reason, stretching of tight fascia is recommended for elderly individuals. Tight hamstring muscles can contribute to a loss of flexibility in knees and lumbar region with age leading to discomfort in these areas [2]. According to the IDEA Health and Fitness Association, flexibility decreases up to 50 percent as we reach our senior years [3]. Brown and Miller showed that sit-and-reach ROM decreased approximately 30% for women between 20 and 70-plus years of age [4]. Stretching the fascia helps in increasing flexibility by improving local circulation and there by breaking down adhesions if present. Various tools are available in releasing the fascia such as foam roller, Graston tools, Heskier one tool etc [5, 6]. M2T blade is a new Instrument-assisted soft tissue mobilization (IASTM) that enables clinicians to assess, detect, and treat individuals diagnosed with scar tissue, adhesions, and soft tissue dysfunction [7]. Mr. Adam Boger first invented M2T blade in Canada. It's a method of designing highly loaded blade to give a specified distribution of swirl is presented. The method is based on a newly developed, three-dimensional analysis [8]. However these techniques are widely used on young population as compared to elderly. There is no literature on use of M2T Blade on hamstring flexibility in elderly. Hence the present study is intended to determine the effect of M2T Blade in improving hamstring flexibility in elderly subjects.

Methods

Permission to conduct the study was granted by the Institutional Ethical Committee. A total number of participants participated in this study was 12(n=12), This study included subjects with tight hamstring muscle aged between 65-75 years recruited from old age home in Belagavi(India). Subjects were included with 20 to 50 degree passive knee extension loss

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with hip in 90 degree of flexion and a passive straight leg raise test (SLR) angle of less than 70°. Exclusion criteria included subjects with Subjects diagnosed with neurological condition, Diagnosed cases of Malignancy, Febrile state, subjects diagnosed with Peripheral Vascular Disease, any sutures or fracture in lower limb, subjects receiving physiotherapy treatment at the time of baseline assessment, subjects diagnosed with metabolic disorders and subjects with hypersensitive skin. The dominant side of the subjects was measured.

Outcome Measurements

Measurements of hamstring flexibility were obtained using the passive knee extension (PKE) test and straight leg raise test (SLR) Measurement of passive knee extension was obtained with the subject lying supine with the opposite lower extremity extended and the lower extremity being measured positioned at 90 degrees of hip flexion. The greater trochanter and the lateral epicondyle of the femur and lateral malleolus were landmarks during measurement. Hip flexion maintained at 90 degrees while the assistant moved the tibia into the terminal position of knee extension, which was the point at which the subject reported a feeling of discomfort. The goniometric value was then recorded. The PKE is the most reliable test for measuring hamstring tightness 9. Straight Leg Raise (SLR) was used to measure hamstring flexibility [11], while the subject lying supine on the examination table with the other limb secured by a Velcro strap. Subject’s lower extremity is lifted up passively by maintaining the knee extended, to the point where the subject can tolerate the resistance or stretch in the posterior part of the thigh. The examiner palpates the anterior rim of the pelvis to note the point at which the pelvis begins to posteriorly tilt because of hamstrings tightness. Measurements were taken with the help of goniometer. Optimal muscle length will permit degrees of flexion around 60-70 degree.

Procedure

Subjects were assessed for hamstring tightness by passive SRT and using PKE, once the assessment was done patient was evaluated by M²T blade to find specific areas of restriction on the hamstring muscle. Treatment plane 1&2 was used superficially and treatment plane 3 or 8 was used for deeper tissue. Vaseline was applied on the skin of the subject to avoid friction. First, the subject lay prone and bent the knee joint to around 30° to 60°. M2T blade was rubbed holding it at 45° angle on each subject 30 times for 60 seconds from the gluteal line to the popliteal fossa. Subjects were asked to apply ice packs if any redness was noted after the intervention.



Fig 1: Fascia release using M2T blade

Results

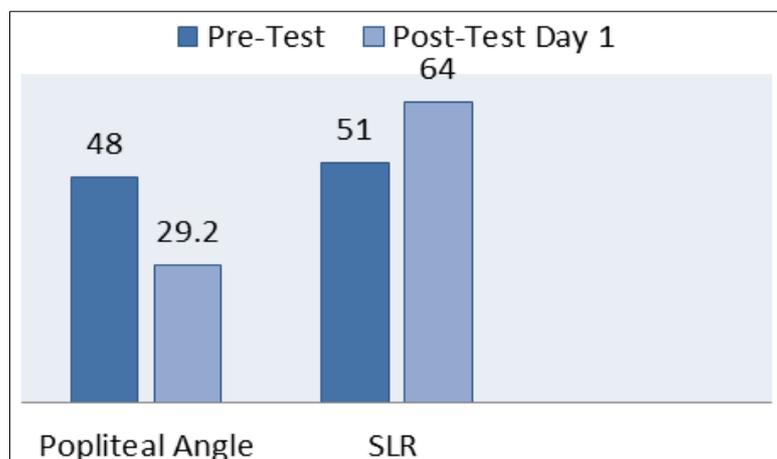
Data set was normally distributed as all the variables have indicated insignificant outcome at 5% level of significance using the small sample Kolmogorov-Smirnov test procedure indicating homogeneity. Independent t test was used for comparison of pre and post data. Paired t test was used to compare the mean difference between pre-post SLR and pre-post PKE values.

Table 1: comparison of pre and post intervention data for PKE and SLR

Particular	Pre Value		Post Value		Mean Difference	t-value	p-value
	Mean	SD	Mean	SD			
PKE	41.90	5.15	29.90	4.01	12	5.814	0.000*
SLR	56.00	3.71	66.70	5.41	-10.7	5.813	0.000*

*Significant at 5% level

In the above table, we could conclude subjects in post treatment outcome indicated significant difference as compared to pre treatment outcome.



Graph 2: Comparison of pre and post outcome values

Table 2: Comparison of mean difference between paired PKE and SLR

Particular		Paired Differences					T	DF	Sig. (2-tailed)
		Mean difference	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	PREPKE - POSTPKE	12.00	4.02768	1.27366	9.11877	14.88123	9.422	9	0.000*
Pair 2	PRESLR - POSTSLR	-10.70	3.46570	1.09595	-13.17922	-8.22078	-9.763	9	0.000*

*Significant at 5% level

Based on the results of the paired sample t-test analysis at 5% significance level, revealed a significant statistical reliable difference between the pre & post treatment values with p-value is less than the 5% significance level (i.e. $0.000 < 0.05$) in our study and therefore it justifies the acceptance of alternative hypothesis stating there's significant difference seen in post outcome values and increase in flexibility of hamstring.

Discussion

The present study provides positive results in PKE and SLR in subjects with tight hamstring muscles in elderly population. To our best knowledge this is the first time a clinical trial has been performed to check the immediate effect of M2T blade to release fascial tightness on elderly. M2T Blade works on the principle of Myofascial Release. As in myofascial, release there is a stretch applied on the tight fascia that is maintained for 90-120 seconds proves to lengthen the tight fascia. Similarly, M2T blade also causes a stretch of the tight fascia until the adhesion were broken leading to release of fascia ^[10]. Few studies have seen beneficial effect of IASTM at the cellular level, which includes increased fibroblast proliferation, reduction in scar tissue, increased vascular response, and the remodeling of unorganized collagen fiber matrix following IASTM application ^[11]. According to previous studies, IASTM was found to improve soft tissue function and ROM in acute or chronic sports injuries to soft tissues, while also reducing pain ^[12]. However most of the studies involved case reports or studies on young population however there is no study done on effects of M2T blade on elderly population. Therefore, this study concludes M2T blade effectively breaks down fascial restrictions and scar tissue and helps in improving the hamstring flexibility in elderly subjects. The ergonomic design of this instrument provides the clinician with the ability to locate restrictions and allows the clinician to treat the affected area with the appropriate amount of pressure, it provide clinicians with a mechanical advantage, thus preventing over-use to the hands. Further studies can study and compare the effect of M2T blade with various other myofascial release techniques and studying various other components like pain and functional assessment in elderly.

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