



Comparison of Myofascial Release and IASTM using M2T Blade on Heel Pain: A Randomized controlled trial.

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ABSTRACT **Background:** Heel pain is one of the most common pain observed in young adults heel pain can cause discomfort in performing day to day activities as there is complete weight bearing on ankle joint.

Materials and methodology: 36 participants with heel pain were selected and were allocated in two groups, group A and group B each consisting of 18 participants. Group A was given Myofascial Release (MFR) technique and group B was given Instrument Assisted Soft Tissue Mobilization (IASTM) using M2T blade. Foot Function Index (FFI) and Pain Pressure Threshold (PPT) were the two outcome measures used for pain assessment in this study and pre and post treatment readings were recorded.

Results: The study demonstrated differences in the outcome measures pre and post treatment. Both the groups showed reduction in heel pain on both the outcome measures ($p=0.0001^*$) which was statistically significant on Foot function Index and ($p=0.0290^*$) which was statistically significant on Pain Pressure Threshold. Comparatively there was higher reduction in Group B.

Conclusion: From the present study we can conclude that both MFR and M2T techniques are clinically effective. But M2T technique is more effective than MFR in reducing heel pain.

KEYWORDS : Myofascial Release, M2T, Heel Pain, Instrument Assisted Soft Tissue Mobilization, Foot Function Index, Pain Pressure Threshold, Calf, Tendo Achillis (TA).

INTRODUCTION:

Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage¹. Significant discomfort and a limp can be a problem because of difficulty in weight bearing in cases of plantar heel pain². High prevalence is seen in active, obese and military population. It is more commonly seen in women compare to men. Average age affected is approximately 45 years³. The prevalence of heel pain is increased due to decrease in the elasticity of plantar fascia and slowing of healing process with age⁴.

The soft tissues at the heel, functions as a shock absorber⁵. Inflammation of the structures associated with the heel bone, Gait abnormalities, a repetitive micro trauma of plantar fascia or inflammation of plantar fascia due to overuse and trauma leads to increase in thickness for about more than 3mm, Biomechanical faults in the foot and deformity associated with the foot such as abnormal pronation and neural pathology can be the causes of heel pain^{2,5,6}. The left heel gets affected first then right heel¹. The presenting symptoms which a patient usually observes, is the pain in the heel while taking the first step in the morning and gradually the pain decreases as the patient continues walking⁷.

There are various treatment options available such as conservative management, surgical intervention and physiotherapy management. **Physiotherapy** plays an important role in active self- management of heel pain. Primary role of physiotherapist is to help patients resume normal activities of daily living, as soon as possible. Exercise therapy forms part of the treatment for heel pain and during therapy sessions the patients are asked to carried out repeated static muscular contractions. Manual therapy techniques such as myofascial release, trigger point release, plantar fascia stretching, calcaneal mobilization, positional release technique etc. are used commonly for the treatment of heel pain⁴.

Myofascial release is a whole body hands on approach to the evaluation and treatment of human structure⁸. Instrument Assisted Soft Tissue Mobilization (IASTM) is a technique in which myofascial release is given through an instrument. There are many instruments such as fascial abrasion technique, foam roller, IASTM therapy, Graston technique etc., have been used previously⁷. **M2T blade** is a new equipment, developed in Canada by Mr. Adam Bogar which is used to reduce pain and to increase joint range of motion. The blade has 8 treatment planes⁸. 2, 3, 4 treatment plane numbers were used in this intervention.



Figure: 1

MATERIALS AND METHODOLOGY:

PROCEDURE:

- Ethical clearance was obtained from the Institutional ethical review board. The purpose of the study was explained to the participants. Subjects were screened based on inclusion criteria i.e., 1. Age group between 18 to 40 years. 2. Both the genders. 3. Subjects complaining of heel pain. 4. Subjects willing to participate, were included and exclusion criteria i.e., 1. Hypersensitive skin, 2. Any trauma to the ankle joint. 3. Fracture associated with foot. 4. Any neurological conditions and 5. Limb length discrepancy, were excluded and demographic data was collected. Written informed consent was obtained from those willing to participate in this study. Subjects were included under Group A and Group B (MFR and M2T). Assessment of pain and function was done by Pain Pressure Threshold using pressure algometer and Foot Function Index score. Data was collected from Tertiary care hospital, Belagavi. The duration of the study was 3 months.

METHOD OF DATA COLLECTION:

RESEARCH TYPE: Experimental

RESEARCH STUDY DESIGN: Randomized controlled trial

SAMPLING DESIGN: convenience sampling

SAMPLING METHOD: allocated via envelop method

SAMPLE SIZE: The sample size for this research study was (36) in which there were 18 subjects in each group.

INTERVENTION:

Subjects were added in two groups and were given 3 sessions of treatment every alternate days for 1 week. **Group A** was given MFR

followed by cryotherapy. Subjects were assessed for pain at the heel. The therapist passively dorsiflex the foot and extend the toes, MFR was given on the Tendo Achilles (TA) using thumbs, proceeding to the heel. The MFR was given on the lateral and medial aspect of the foot with the other hand using the thenar aspect of the palm followed by cryotherapy for 20mins. Position of the subject was supine lying. Position of the therapist was at the foot end of the subject. **Group B** was given M2T followed by cryotherapy. Subjects were assessed for pain at the heel. Initially M2T blade was given on the calf muscles using treatment plane no.2 to release the soft tissues, proceeding to Tendo Achilles (TA), using treatment plane no.4 and then to the heel using treatment plane no 3 and 4. Repetitive fast strokes were given for 30 secs. Cryotherapy was given for 20 mins after giving M2T blade to avoid muscle soreness and erythema. Position of the subject was prone lying. Position of the therapist was at the foot end of the subject. The outcome measure used for this study was Foot Function Index and Pain Pressure Threshold using Pressure Algometer. Both the scales are to evaluate pain and function of foot.

RESULTS:

STATISTICAL ANALYSIS:

Statistical analysis for the present study was done manually as well as using the statistical package of social science (SPSS) version 16 as to verify the results obtained. For this purpose the data was entered into Microsoft Excel Sheet, tabulated and subjected to statistical analysis. Mean, standard deviation and parametric tests were applied. Normal data from patient's demographic data i.e. age, gender, BMI, height, weight distribution were analyzed using t-test. Comparison of pre and post intervention outcome measures of Foot Function Index scores and Pain Pressure Threshold was done by using two way repeated measures of ANOVA. Pair wise comparison of two groups and time points with respect to Foot Function Index scores and Pain Pressure Threshold was done by using Bonferroni test. Probability values less than 0.05 were considered statistically significant and probability values less than 0.001 were considered highly significant.

Demographic profile:

Age and BMI distribution:

Age of the participants in the present study was between 18 to 40 years. The average age of the participants in Group A was 24.00±4.49 years and in Group B was 24.33± 3.96 years. The difference in mean of age was not statistically significant in both the groups. (p= 0.8145, t= - 0.2365). The difference in mean Body Mass Index of the participants in both the groups was not statistically significant (t=0.7204, p=0.4762) which means that all the participants in the present study were distributed in terms of Body Mass Index. (Table 1)

Gender distribution:

The present study had 18 participants in each group, where Group A had 6 males (33.33%) and 12 females (66.67%). Group B had 4 males (22.22%) and 14 females (77.78%). A total of 10 males and 26 females had participated in the study. When statistical comparison was done, the gender wise distribution was not statistically significant in both the groups. (Table 2)

OUTCOME MEASUREMENT:

ON COMPARISON OF GROUP A AND GROUP B AND TIME POINTS ON FOOT FUNCTION INDEX:

In this present study comparison is done and it was found that p value for group comparison is 0.2720 which is not statically significant. In time wise comparison p value found 0.0001* which is highly statistically significant. When comparison was done by considering both groups and time variants p values was found to be 0.0150* which is statistically significant. (Table 5)

PAIR WISE COMPARISON OF TWO GROUPS AND TIME POINTS:

When pair wise comparison was done the results were found same as when comparison of two groups and time points was done. It was found that both the groups showed similar effect. (Table 6)

ON COMPARISON OF GROUP A AND GROUP B AND TIME POINTS ON PAIN PRESSURE THRESHOLD:

In this present study comparison is done and it is found that p value for group comparison is 0.0290* which is statically significant. In time wise comparison p value found 0.0001* which is highly statistically significant. When comparison was done by considering both groups and time variants p values was found to be 0.1260 which is not statistically significant (Table 8)

PAIR WISE COMPARISON OF TWO GROUPS AND TIME POINTS:

When pair wise comparison was done the results were found same as when comparison of two groups and time points was done. It was also found that Group B showed better results than Group A. (Table 9)

Table 1: AGE AND BMI DISTRIBUTION AMONG A AND B

Variable	Group	Mean	SD	SE	t-value	p-value
Age in years	Group A	24.00	4.49	1.06	-0.2365	0.8145
	Group B	24.33	3.96	0.93		
Weight	Group A	65.06	17.13	4.04	1.2776	0.2101
	Group B	59.28	8.64	2.04		
Height	Group A	161.56	9.49	2.24	1.3272	0.1933
	Group B	157.83	7.18	1.69		
BMI	Group A	24.89	5.80	1.37	0.7204	0.4762
	Group B	23.77	3.11	0.73		

Table 2: GENDER DISTRIBUTION AMONG GROUP A AND B

Gender	Group A	%	Group B	%	Total	%
Male	6	33.33	4	22.22	10	27.78
Female	12	66.67	14	77.78	26	72.22
Total	18	100.00	18	100.00	36	100.00

Chi-square= 0.5542 P = 0.4571

Table 4: MEAN AND SD OF FOOT FUNCTION INDEX SCORES IN TWO GROUPS

Groups	Time points	N	Mean	SD	SE
Group A	Pre treatment	18	86.33	39.34	9.27
	Post treatment	18	46.17	34.55	8.14
Group B	Pre treatment	18	88.44	25.86	6.10
	Post treatment	18	23.89	13.45	3.17

Table 5: COMPARISON OF TWO GROUPS (A AND B) AND TIME POINTS (PRE AND POST TREATMENT) WITH RESPECT TO FOOT FUNCTION INDEX SCORES BY TWO WAY REPEATED MEASURES OF ANOVA

Source	Type III Sum of Squares	df	Mean Square	F-value	p-value	Effect size
Group	1830.13	1	1830.13	1.29	0.2720	0.0710
Time	49350.35	1	49350.35	287.82	0.0001*	0.9440
Group * Time	2676.68	1	2676.68	7.25	0.0150*	0.2990

*p<0.05

Table 6: PAIR WISE COMPARISON OF TWO GROUPS (A AND B) AND TIME POINTS (PRE AND POST TREATMENT) WITH RESPECT TO FOOT FUNCTION INDEX SCORES BY BONFERRONI

(I) Group	(J) Group	Difference	Std. Error	p-value	95% CI for Difference	
					Lower Bound	Upper Bound
Group A	Group B	10.08	8.88	0.2720	-8.64	28.81
Pre treat	Post treat	52.36	3.09	0.0001*	45.85	58.87

*p<0.05

Table 7: MEAN AND SD OF PAIN PRESSURE THRESHOLD SCORES IN TWO GROUPS

Groups	Time points	N	Mean	SD	SE
Group A	Pre treatment	18	3.89	1.53	0.36
	Post treatment	18	8.00	2.91	0.69
Group B	Pre treatment	18	4.61	1.69	0.40
	Post treatment	18	10.11	2.17	0.51

Table 8: COMPARISON OF TWO GROUPS (A AND B) AND TIME POINTS (PRE AND POST TREATMENT) WITH RESPECT TO PAIN PRESSURE THRESHOLD SCORES BY TWO WAY REPEATED MEASURES OF ANOVA

Source	Type III Sum of Squares	df	Mean Square	F-value	p-value	Effect size
Group	36.13	1	36.13	5.71	0.0290*	0.2510
Time	415.68	1	415.68	128.32	0.0001*	0.8830
Group * Time	8.68	1	8.68	2.59	0.1260	0.1320

*p<0.05

Table 9: PAIR WISE COMPARISON OF TWO GROUPS (A AND B) AND TIME POINTS (PRE AND POST TREATMENT) WITH RESPECT TO PAIN PRESSURE THRESHOLD SCORES BY BONFERRONI

(I) Group	(J) Group	Difference	Std. Error	p-value	95% CI for Difference	
					Lower Bound	Upper Bound
Group A	Group B	-1.4170	0.59	0.0290*	-2.67	-0.17
Pre treat	Post treat	-4.8060	0.42	0.0001*	-5.70	-3.91

*p<0.05

DISCUSSION:

The present study was conducted with an objective of determining the effect of two techniques (MFR versus M2T) in reducing heel pain and improving functional activity of foot in subjects with heel pain.

Heel pain is majorly seen in patients of age group between 40 to 60 years of age⁹. A similar study reported that heel pain is commonly seen in orthopaedic conditions, which generally occurs in persons ranging from 18 to 65 years of age and in the present study the age group was taken ranging from 18 to 40 years for both the groups¹⁰.

In a case study on chronic plantar fasciitis, the mean BMI of all the subjects where between the normal ranges i.e, according to WHO standards ideal BMI is in the range of 18.5-24.9¹¹, and were well matched¹⁰. Similarly in the present study, Mean body mass index (BMI) of the subjects in both the groups were 24.89±5.80 for group A and 23.77±3.11 for group B. The BMI in both the groups were well matched.

M2T technique has been proved to lengthen the tight fascia. Myofascial release using an instrument causes stretch of tight fascia resulting in breaking of adhesions leading to lengthening and release of fascia¹². In the present study instrument assisted soft tissue mobilization was done using M2T blade on tight fascia around ankle joint i.e on calf, Tendo Achilles, and plantar fascia which caused softening and release of fascia. A case study was conducted to determine the effect of M2T blade in 30 recreational badminton shoulder pain subjects. Post treatment readings showed improvement as the fascia around shoulder joint was released which showed immediate increase in shoulder range of motion and significant reduction in pain¹². In the present study, 18 subjects with heel pain were treated with M2T blade and post treatment readings showed significant improvement in pain reduction as the tighten fascia was immediately released with increased blood supply to that area causing improved functional activity of ankle joint.

Another study was done to compare IASTM fascial abrasion technique to foam rolling on hip and knee range of motion (ROM). ROM was assessed immediately after treatment. The results revealed immediate increase in joint range of motion as. There was immediate release of fascia when compared to control group. Similarly in present study, group B was treated using M2T blade on the tighten fascia around ankle joint and the effect of M2T blade were assessed which showed significant improvement on Foot Function Index and Pain Pressure Threshold in pain reduction as there was immediate increase in blood supply in the treatment area which causes immediate flushing and softening of myofascia leading to easy break down of adhesions causing release of tighten fascia.

Soft tissue restriction is a part of etiology of plantar heel pain. Soft tissue mobilization is an effective technique for treating plantar heel pain¹³. In the present study, MFR is given on tight fascia around ankle joint i.e calf muscles, Tendo Achilles and plantar fascia which causes release of tight fascia reducing pain and joint restriction and improve functional activity of foot. The purpose of myofascial release technique is to release the restrictions within the deeper layers of fascia. This is done by stretching of the muscular elastic component of fascia¹⁴. The effectiveness of MFR technique for pain reduction and improving functional activity of a particular joint requires certain amount of time. One randomized control trail was done to check the effectiveness of MFR in pain reduction and disability evaluation associated with plantar heel pain. 12 sessions were given for over 4 weeks per client and post intervention readings were noted which showed improvement in pain reduction. Pre and post treatment readings were noted on Foot Function Index (FFI) and Pain Pressure

Threshold (PPT). Foot Function Index was used to evaluate the pain assessment and functional disability and Pain Pressure Threshold readings were taken using pressure algometer to evaluate pain tolerance in subjects with heel pain. Similarly in the present study MFR was given for 3 sessions in 1 week per client and post treatment values were noted which showed significant improvement in pain reduction and improved functional ability of ankle joint in 1 week. Similar outcome measures were used i.e, Foot Functional Index (FFI) and Pain Pressure Threshold (PPT) scales to evaluate pain and functional ability of foot¹⁵.

Another study was done on chronic plantar fasciitis subjects to find out the effectiveness of MFR and Position release Technique (PRT) in reduction of pain and improved functional ability. 60 participants were randomly assigned in 2 groups and were treated for 10 days. Pre and post intervention values were noted and the conclusion of the study revealed that both the techniques showed significant improvement in pain reduction and improved functional ability as per the outcome measures used i.e on Visual Analogue Scale (VAS) and Foot Function Index (FFI), as the tighten fascia was released leading to elongation and relaxation of the fascia. Similarly in this study, 36 participants were assigned in 2 groups and were treated for 3 sessions in 1 week. Both the techniques (MFR and M2T) showed significant improvement in pain reduction and improved functional activity of ankle joint as the adhesions were broken and myofascia around ankle joint¹⁶.

As per the review of literature no study has compared the effects of MFR and M2T to relieve heel pain. The present study showed positive results in both the groups by reducing pain and improving functional activity of foot. Clinically, both the techniques are equally effective in reducing pain and improving functional activity of foot in subjects with heel pain. But when the comparison was done in two groups, statistically, group B showed significant improvement in pain reduction and improvement in functional ability of foot.

CONCLUSION:

From the present study we can conclude that both MFR and M2T techniques are clinically effective. But M2T technique is more effective than MFR in reducing heel pain.

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