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Effect of muscle energy technique versus ischemic compression on pain and disability in patients with planter fasciitis

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Abstract

Background: Plantar fascia acts as a truss, maintaining the medial longitudinal arch of foot & assists during gait cycle, facilitates shock absorption during weight bearing activities. Plantar fasciitis is a common musculoskeletal condition that present with heel pain. Many treatment options are available that demonstrate variable levels of efficacy. Conservative therapies include rest and avoidance of potentially aggravating activities, stretching and strengthening exercises. Previous studies have reported that stretching of the calf musculature and the plantar fascia are effective management strategies for plantar fasciitis. However, it is unclear whether Muscle energy technique and Ischemic compression also can improve the outcomes.

Aim & Objective: To find the effect of Muscle energy technique versus Ischemic compression on pain and disability in patients with plantar fasciitis.

Method: 30 participants were allocated to the Muscle energy technique (n=15) and Ischemic compression (n=15). Both group received conventional exercise. The treatment was given 10 sessions for 2 weeks and the readings were taken on VAS for pain and FFI for functional disability.

Result: While applying Wilcoxon Signed Rank Test within the group, in Group A (Muscle energy technique) and Group B (Ischemic compression). Both group showing significant improvement in post intervention ($P < 0.05$). While applying Mann Whitney U test in-between groups Group A versus Group B there is no statistical difference in-between groups ($P > 0.05$).

Conclusion: The study shows that both the Technique Muscle energy Technique and Ischemic compression were individually effective in improving the flexibility and strength. While comparing both the technique there is no significant difference present in between the groups.

Keywords: Muscle energy technique, ischemic compression, plantar fasciitis

Introduction

The plantar fascia is a thick fibrous band or Aponeurosis that of originates at the medial calcaneal tubercle and extends anterior to the muscles on the plantar surface of the foot as it passes all metatarsals heads, then blends with the skin and subcutaneous tissue¹.

Aim & Objectives

Aim

To find out the Effect of Muscle energy technique versus Ischemic compression on Pain and disability in patients with plantar fasciitis.

Objectives

To determine the Effect of Muscle energy technique on Pain and disability in patients with plantar fasciitis.

To determine the effect of Ischemic compression on pain and disability in patients with plantar fasciitis.

To determine the effect of Muscle energy technique Versus Ischemic compression on pain and disability in patients with plantar fasciitis.

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Hypothesis

H01: There is no significant effect of Muscle energy technique on pain in patients with plantar fasciitis.

H02: There is no significant effect of Muscle energy technique on disability in patients with plantar fasciitis.

H03: There is no significant effect of Ischemic compression on pain in patients with plantar fasciitis.

H04: There is no significant effect of Ischemic compression on disability in patients with plantar fasciitis.

H05: There is no significant difference between Muscle energy technique and Ischemic Compression on pain in patients with plantar fasciitis.

H06: There is no significant difference between Muscle energy technique and Ischemic compression on disability in patients with plantar fasciitis.

Hypothesis

H11: There is significant effect of Muscle energy technique on pain in patients with plantar fasciitis.

H12: There is significant effect of Muscle energy technique on disability in patients with plantar fasciitis.

H13: There is significant effect of Ischemic compression on pain in patients with plantar fasciitis.

H14: There is significant effect of Ischemic compression on disability in patients with plantar fasciitis.

H15: There is significant difference between Muscle energy technique and Ischemic Compression on pain in patients with plantar fasciitis.

H16: There is significant difference between Muscle energy technique and Ischemic compression on disability in patients with plantar fasciitis.

Review of literature**Muscle energy technique**

1. Ewan Thoma 2019 [27] the efficacy of muscle energy techniques in symptomatic and asymptomatic subjects: a systematic review. A literature search was performed using the following database: Cochrane Library, MEDLINE, NLM Pubmed and Science Direct. Studies regarding MET in asymptomatic and symptomatic patients were considered for investigation. The main outcomes took into account range of motion, chronic and acute pain and trigger points. Two trained investigators independently screened eligible studies according to the eligibility criteria, extracted data and assessed risk of bias. Randomized control trials (RCT's) were analyzed for quality using the PEDro scale. A total of 26 studies were considered eligible and included in the quantitative synthesis: 14 regarding symptomatic patients and 12 regarding asymptomatic subjects. Quality assessment of the studies through the PEDro scale observed a "moderate to high" quality of the included records. Study Concluded that MET are an effective treatment for reducing chronic and acute pain. MET can be applied to increase range of motion of a joint when a functional limitation is present. Other techniques seem to be more appropriate compared to MET for trigger points.
2. Bibhuti Sarkar, Anupam Kumar Mangalam June 2018 [9] Efficacy of Muscle Energy Technique as Compared to Myofascial Trigger Point Release in Chronic Plantar Fasciitis: A Double Blind Randomized Clinical Trial. 45 subjects of chronic plantar fasciitis were included and randomly assigned in to three different groups. Group-A received 12 sessions of MET along with self-stretching, Group-B received 12 sessions of MTrP release along with

self-stretching and Group-C received 12 sessions of self-stretching program for 4 weeks. Self-stretching of calf and plantar fascia were given as supervised, as well as home exercise program for all three groups. Outcome measures were Pain intensity was measured by VAS; Tenderness was assessed by PPT at MTrP of calf (PPT-Calf) and at medial calcaneal tubercle of heel (PPT-Heel) and functional status was evaluated by FFI scale at base line and at the end of fourth week. Study concluded that present study showed that MTrP release is more effective than MET in alleviation of pain & tenderness in subjects with chronic plantar fasciitis.

3. Viral Chitara 2017 [5] to Compare the Effectiveness of Muscle Energy Technique versus Myofascial Release in Pain and Lower Limb Functional Activity in Subjects Having Planter Fasciitis-A Randomized Control Trial. In this study 30 subjects with the clinical diagnosis of chronic plantar fasciitis were randomly allocated by coin method into two study groups. Group A-15 patients were given therapeutic ultra-sound, foot intrinsic muscles strengthening exercises, plantar fascia stretching exercises and MFR. Group B-15 patients were given therapeutic ultrasound, foot intrinsic muscles strengthening exercises, plantar fascia stretching exercises and MET for 10 consecutive days. Outcome measures were VAS, FAAM & Pressure Algometry. As per results, both MET and MFR technique are found to be effective on pain, pressure pain threshold and on lower limb functional activity.

Ischemic compression

1. María Benito-de-Pedro 2020 [28] Effectiveness of Deep Dry Needling vs. Ischemic Compression in the Latent Myofascial Trigger Points of the Shortened Triceps Surae from Triathletes on Ankle Dorsiflexion, Dynamic, and Static Plantar Pressure Distribution: A Clinical Trial. Triathletes with a latent MTrP in the shortened gastrocnemius. Triathletes were randomized to receive a single session of DDN (N = 17) or ICT (N = 17) in a latent MTrP of the shortened triceps surae. The primary outcome was ankle dorsiflexion range of motion (ROM) by a universal goniometer. Secondary objectives were distribution of dynamic and static plantar pressures by T-Plate platform pressure, with measurements both before and after five, 10, 15, 20, and 25 minutes of treatment. Study concluded that DDN vs. ICT carried out in latent MTrPs of the shortened gastrocnemius of triathletes did not present differences in terms of dorsiflexion ROM of the tibiofibular-talar joint or in static and dynamic plantar pressure changes before and immediately after treatment.

Conventional Treatment

1. Phoomchai Engkananuwat, Rotsalai Kanlayanaphotporn and Nithima Purepong January 2018 [32] Effectiveness of the Simultaneous Stretching of the Achilles tendon and Plantar Fascia in Individuals with Plantar fasciitis. In This study fifty participants aged 40 to 60 years with a history of plantar fasciitis greater than 1 month were recruited. They were prospectively randomized into 2 groups. Group 1 was instructed to stretch the Achilles tendon while group 2 simultaneously stretched the Achilles tendon and plantar fascia. Outcome measures were pressure pain threshold, visual analogue scale-foot and ankle score, and range of motion. After 4 weeks of both stretching protocols, study concluded that the simultaneous stretching of the Achilles tendon and plantar fascia for was a more effective

intervention for plantar fasciitis.

Review of Vas (Visual analogue scale)

1. Goldsmith, E.S., Taylor, B.C., Greer, N. May 2018 ^[36] Focused Evidence Review: Psychometric Properties of Patient-Reported Outcome Measures for Chronic Musculoskeletal Pain. Pain experts of the VAS Pain Measurement Outcomes Workgroup identified 17 pain measures to undergo systematic review. In addition to a MEDLINE search on these 17 measures (1/2000-1/2017), they hand-searched (without publication date limits) the reference lists of all included studies, prior systematic reviews, and Web sites dedicated to each measure. Primary outcome was the measure's minimal important difference (MID). Secondary outcomes included responsiveness, validity, and test-retest reliability. Outcomes were synthesized through evidence mapping and qualitative comparison. In this focused evidence review, the most evidence on key psychometric properties in chronic musculoskeletal pain populations was found for the ODI, RMDQ, SF-36 BPS, NRS and VAS.

FFI (Foot Function Index)

1. Van der Zwaard B. 2014 ^[41] Foot Function Index. The foot function index (FFI) is a self-administered questionnaire which can be used to evaluate the extent of foot pain and stiffness, the effect on daily foot-related activities, and the quality of life. The original questionnaire (23 items) intends to measure three constructs of foot-related problems: foot pain, disability and limitation of activities.
2. William J. Hanney April 2018 ^[37] Concurrent validity of pain scales in individuals with Myofascial pain and fibromyalgia. This investigation explored the concurrent validity of the NPRS and VAS in sixty participants with MPS (N = 30) and FM (N = 30). All participants underwent one day of testing using the American College of Rheumatology criteria for classifying FM. For each tender point (18-total), A participants graded tenderness using the NPRS and VAS. Results showed that an excellent relationship was found between the NPRS and VAS for the MPS group and the FM group.
3. Paula Kersten, Peter J. White, Alan Tennant June 2014 ^[38] Is the Pain Visual Analogue Scale Linear and Responsive to Change? An Exploration Using Rasch Analysis. In this study Patients (n=221, mean age 67, 58% female) with chronic stable joint pain (hip 40% or knee 60%) of mechanical origin waiting for joint replacement were included. Pain was scored on seven daily VAS. Rasch analysis was used to examine fit to the Rasch model. The study concluded that pain VAS is a valid tool for measuring pain at one point in time. However, the pain VAS does not behave linearly and SRMs vary along the trait of pain.
4. Mark Kliger, Shy Stahl, May Haddad, Erica Suzan, Rivka Adler, Elon Eisenberg April 2014 ^[39] Measuring the Intensity of Chronic Pain: Are the Visual Analogue Scale and the Verbal Rating Scale Interchangeable? Seven hundred and ninety-six patients were requested to rate the present intensity of their chronic pain on the two scales. VAS and VRS were calculated. For testing interchangeability, VAS was transformed into a discrete ordinal scale by dividing the entire VAS into five categories, either equidistantly (biased) or agreement between discrete VAS and VRS suggest that they are not interchangeable.

5. Boonstra *et al.*, 2008 ^[40] did a study on reliability and validity of VAS for disability in patients with chronic musculoskeletal pain and concluded that reliability of the VAS for disability is moderate to good. Because with the weak correlation with other disability instruments and a strong correlation with the VAS for pain, however, its validity is questionable.

FFI (Foot Function Index)

1. Van der Zwaard B. 2014 ^[41] Foot Function Index. The foot function index (FFI) is a self-administered questionnaire which can be used to evaluate the extent of foot pain and stiffness, the effect on daily foot-related activities, and the quality of life. The original questionnaire (23 items) intends to measure three constructs of foot-related problems: foot pain, disability and limitation of activities.
2. Elly Budiman-Mak, Kendon J Conrad, Jessica Mazza and Rodney M Stuck 2013 ^[42] A review of the foot function index and the foot function index-revised. Seventy-eight articles qualified for this review, Subscales and FFI-R were used as outcome measures in various studies; new instruments were developed based on FFI subscales. FFI is used extensively worldwide; this instrument pioneered a quantifiable measure of foot health, and thus has shifted the paradigm of outcome measure to subjective, patient-centered, valid, reliable and responsive hard data endpoints.

Karl B. Landorf, Joel A. Radford 2008 ^[43] Minimal important difference

Values for the Foot Health Status Questionnaire, Foot Function Index and Visual Analogue Scale. Data from 175 participants from two trials that evaluated conservative interventions for plantar fasciitis were used to determine minimal important differences for the following outcome measures: the Foot Health Status Questionnaire, the original Foot Function Index and a Visual Analogue Scale used to measure pain. Our findings can be used to help interpret results from clinical trials.

Methodology

Study design: Experimental study.

Study setting: General hospitals.

Study duration: Total duration of the study was 1 year.

Sampling technique: Purposive sampling.

Sample size: 30

N = 30

Group A = 15 Patients (Muscle energy Technique + Conventional treatment).

Group B=15 Patients (Ischemic compression Conventional treatment).

Procedure

Subjects were taken from various general hospitals. Patients referred from orthopaedic department of hospital were taken in the study. Those patients with plantar fasciitis fulfilling inclusion criteria were asked to sign the written consent form for voluntary participation in the study. They were explained about the nature of the study and intervention. Both males and females were taken in the study.

On first visit, complete musculoskeletal assessment was done according to the Performa. VAS and FFI explained in the local language of Gujarati and Hindi and then pre participation VAS and FFI were documented.

- Subjects who were included in protocol were not permitted to administer any other forms of electrotherapy or other techniques (steroids or acupuncture) during the intervention period.
- A total number of 30 patients were selected for study.

Patients were randomly divided into three groups of 15 patients in each group.

Each patients of the study was treated for 2 weeks, 5 days per week, 1 day per session.

Group ‘A’ received Muscle energy technique with conventional treatment.

Group ‘B’ received Ischemic compression with conventional treatment.

Result

The present study conducted to find out the effect of Muscle energy technique Versus Ischemic compression on pain and disability in patients with plantar fasciitis.

The study comprised of total 30 subjects with plantar fasciitis with age distribution between 20-70 years. They were divided into 2 groups; 15 in each group.

The data was analysed using statistical package for the social science software (SPSS) 20 version. Before applying statistical tests, data was screened for normal distribution by Shapiro-Wilk test. In this study power was kept at 95% and level of significance was kept at 5%.

All outcome measures were analysed at base line and after 10 days of treatment, using appropriate statistical test. Changes in outcome measures were analysed within group as well as between groups.

The outcome measure were

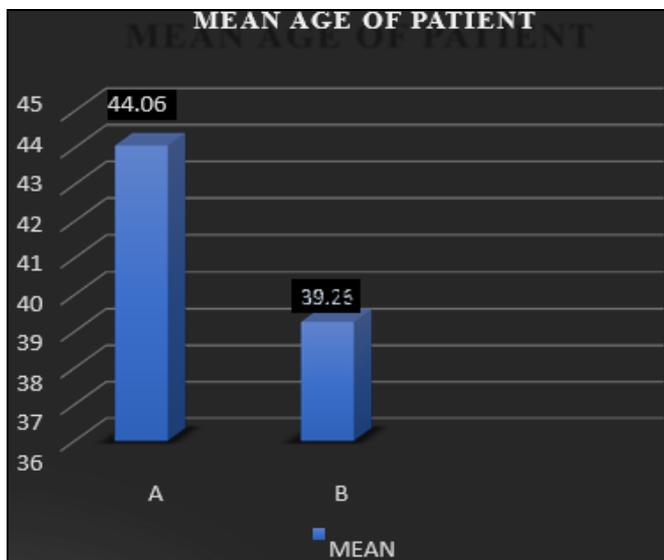
Pain-by VISUAL ANALOGUE SCALE (VAS), Function- by FOOT FUNCTION INDEX (FFI).

VAS and FFI is subjective outcome measure.

Table 6.1 and Graph 6.1 Shows mean age of patients in both the groups

Table 6.1

Groups	No.	Mean	SD
Group A	15	44.06	16.96
Group B	15	39.26	8.5



Graph 6.1

Groups

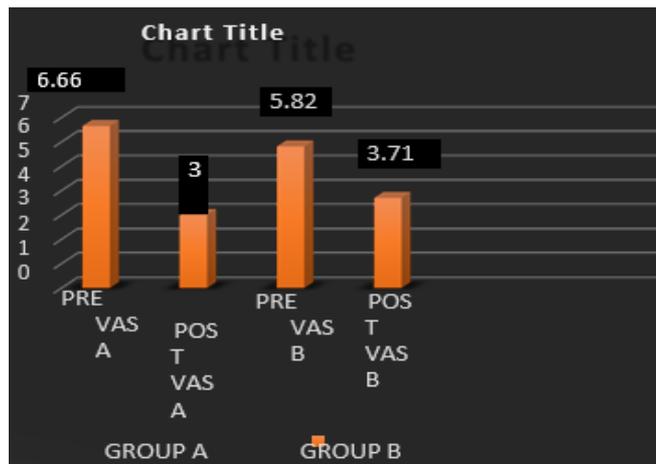
Table 6.2: Tests used to Compare Within and between

Group	Within the group analysis	Between the group comparison
Group A	Wilcoxon Signed Rank Test	Mann Whitney U Test
Group B	Wilcoxon Signed Rank Test	Mann Whitney U Test

Groups

Table 6.3: Mean and SD of pre and post vaswithin

Groups	Pre Treatment		Post Treatment		Z Value	P Value
	Mean S	D	Mean SD			
Group A	6.66	1.3	3	1.53	-3.408	<0.001
Group B	5.82	1.93	3.71	1.67	-3.412	<0.001



Graph 6.3: Mean of Pre and Post Vas within Groups

Here the within group comparison of VAS was done by using Wilcoxon signed rank T test in both groups, and ‘p’ value was <0.001, which showed statistically Significant difference in VAS for both the groups. So, both groups showed significant improvement on pain in VAS score after intervention.

Conclusion

Results show that all three groups GROUP A (Muscle Energy technique), GROUP B (Ischemic compression) were individually effective in improving in pain and disability.

The present study was conducted to find out the effect of Muscle energy technique Versus Ischemic compression on pain and disability in plantar fasciitis.

These comparative studies were conducted on 30 subjects with age group of 20-70 years and were divided into two groups. Baseline measurement for Pain (VAS), and Function (FFI) were taken on day 1.

Group A subjects were given Muscle Energy technique along with conventional therapy, Group B subjects were given Ischemic compression along with conventional therapy Post data were collected after 10 days. (5 days per week/2 weeks)

At the end of the 2 weeks, patients in all the three groups showed reduction in pain and FFI on statistical analysis.

Patients with plantar fasciitis present with reduced ankle range of motion and great toe dorsiflexion due to pain and a concomitant tight Achilles. Restricted movement in ankle may also be due to hyperactivity of the myotatic reflex arc which is caused by excessive gamma gain 48.

Summary

The present study was conducted to find out the effect of

Muscle energy technique Versus Ischemic compression on pain and disability in plantar fasciitis.

Results show that all three groups GROUP A (Muscle Energy technique), GROUP B (Ischemic compression) were individually effective in improving in pain and disability.

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