ORIGINAL ARTICLE

COMPARATIVE EFFECTS OF MUSCLE ENERGY TECHNIQUE AND COUNTER STRAIN TECHNIQUE ON PAIN, FUNCTION STATUS AND SATISFACTION LEVEL IN PLANTAR FASCIITIS PATIENTS

Taliah Bashir Sandhu, Ayesha Jamil, Syed Asadullah Arslan

University Institute of Physical Therapy, Faculty of Allied Health Science, The University of Lahore, Punjab - Pakistan

ABSTRACT

Objectives: To compare the effects of muscle energy technique and counterstrain technique on pain, functional status, and satisfaction level in patients with plantar fasciitis.

Material and Methods: This randomized clinical trial was conducted from May to November 2022. A total of 66 patients were recruited using the purposive sampling technique. Clinically diagnosed patients of plantar fasciitis of age 20-50 years, both gender and history of pain≥4 weeks were randomly allocated into two groups. The muscle energy technique was applied to Group A and the Counterstrain technique was given to Group B with routine physiotherapy. Outcomes measured were Visual Analog Scales for pain, Foot and Ankle Ability Measure for functional level, and Patient Satisfaction Questionnaire-18 for satisfaction level. The assessment was conducted at baseline, 1st, and 2nd week. Independent t-test and Repeated Measure ANOVA were used for between and within-group differences respectively with $p \leq 0.05$ was significant.

Results: The results showed no significant difference between Group A and Group B in pain ($p=0.245$), functional status (ADL: $p=0.862$, Sport: $p=0.092$), and satisfaction level ($p=0.108$). However, significant within-group difference was observed with pain ($p=0.000$), functional status ($p=0.000$), and general satisfaction level ($p=0.000$).

Conclusion: Muscle Energy and Counterstrain Technique are equally beneficial in decreasing pain, and enhancing the functional status and patient satisfaction levels in plantar fasciitis patients.

Keywords: Counterstrain Technique; Functional Status; Foot and ankle ability measure, Muscle energy technique, Pain, Plantar fasciitis, Satisfaction Level, Visual analog scale

This article may be cited as: Sandhu TB, Jamil A, Arslan SA. Comparative effects of muscle energy technique and counter strain technique on pain, function status and satisfaction level in plantar fasciitis patients. J Med Sci 2023 October;31(4):270-275

INTRODUCTION

Plantar fasciitis (PF) is a degenerative foot condition that affects people universally, irrespective of their gender, age, ethnicity, or activity level. [1] Furthermore, both active young individuals and sedentary older adults may suffer from plantar heel pain, which can disrupt their quality of life. [2, 3] Recent research indicates that approximately 1 in 10 individuals may encounter Plantar fasciitis at some point in their lives. [4] The prevalence of this condition among those over 70 years of age ranges from 3.6% to 6.9%. [5] Job type and BMI are significant risk factors for plantar fasciitis. A study conducted in Peshawar revealed that 13.2% of security workers developed PF due to their long working hours, [6] while a separate study involving Pakistani teachers reported that 34.7% had plantar fasciitis. [7] Moreover, in the non-sports population, 70% experience unilateral symptoms, with 65% of this group being overweight. [8]

Anatomical abnormalities of the foot lead to biomechanical stress on the joints and the supporting soft tissues. These structures struggle to adapt due to the repetitive and prolonged nature of such demands, causing changes in their physiology. [9] Inflammation and degenerative alterations in the plantar fascia, primarily occurring in the region where it originates at the medial calcaneal tuberosity of the heel and the surrounding tissues, give rise to Plantar fasciitis (PF) and are central to the occurrence of medial plantar heel pain. [10] The plantar fascia is crucial for supporting the foot arch, distributing loads, storing energy, and absorbing shocks during the act of walking. [11]

Past research has suggested a range of physiotherapy treatment methods, encompassing rest, orthotic night splints, silicon heel pads, stretching exercises, myofascial release, positional release therapy, and taping. Additionally, various electrotherapy techniques such as

Correspondence
Dr. Ayesha Jamil
Assistant Professor
University Institute of Physical Therapy, Faculty of Allied Health Science, The University of Lahore,
Punjab - Pakistan
Cell: +92-324-4481031
Email: ayeshabutt031@gmail.com
Date Received: 28-12-2022
Date Revised: 15-6-2023
Date Accepted: 03 -10-2023

ultrasound, phonophoresis, laser therapy, iontophoresis, cryotherapy, contrast water therapy, and microwave diathermy have been experimented with for plantar fasciitis. [12]

Strain-counter strain (SCS) is a form of "passive positional release" therapy created by Lawrence Jones, D.O. in the early 1960s. This manual technique employs precise methods to alleviate muscle and connective tissue tightness. Urse recommended the Heinking counter-strain method for addressing tender points, while Wynne et al. applied counter-strain therapies to alleviate discomfort in the foot, ankle, and leg. [13] While, Muscle Energy Technique (MET) is an active positional release musculoskeletal technique that is used to extend shortened structures, increase range of motion, and resolve trigger points in a variety of musculoskeletal problems. [14] Muscle Energy Technique not only eliminates muscle trigger points, but also discomfort, relieve discomfort due to stressed ligaments and periosteum. It also aids in the reduction of hypertonia and the lengthening of tense muscles. [15]

In previous studies, the impacts of the muscle energy technique and counterstrain technique on upper trapezius and lower back pain were investigated. However, there is a noticeable gap in the literature regarding the comparative effects of these two techniques in patients with plantar fasciitis. Therefore, the primary objective of this study is to assess and compare the effects of the muscle energy technique and counterstrain technique, in conjunction with routine physiotherapy, on pain levels, functional status, and patient satisfaction among individuals diagnosed with plantar fasciitis.

MATERIAL AND METHODS

The randomized clinical trial was conducted following the guidelines of the Consolidated Standard of Reporting Trials (CONSORT). The trial was registered in ClinicalTrial.gov with ID: NCT05424341, before the recruitment of participants. The study was approved by the Research Ethical Committee of The University of Lahore (Ref Id: REC-UOL-/127-05/2022). At the beginning of the study, informed consent was requested from the participants. Anonymity and confidentiality of data were ensured. The objectives of the study were explained to the participants. And the right to withdraw from the study was reserved.

The study was conducted at the University of Lahore Teaching Hospital from May 2022 to December 2022. The sample size was 66 patients (33 in each group) calculated using OpenEpi Software using the mean value of VAS, 95% level of significance, and 80% power of the study. The sample was selected by purposive sampling technique. [14] Patients of Plantar fasciitis with an age range from 20-50 years,[13] both male and female, diagnosed by the orthopedic surgeon [15] with a history of pain in the heel and plantar surface of the foot from more than four weeks,[16] and during the first few steps after inactivity were included in the study.[14] Patients with a history of ankle and foot fracture, arthritis, congenital or acquired deformity of ankle and foot. Previous history of foot surgery or corticosteroid injection in the heel and on an assistive device for walking were excluded from the study.

Outcome measures used were pain, functional status, and satisfaction level observed using Visual Analog Scales (VAS), [17] Foot and ankle ability measure (FAAM) [18, 19] and Patient Satisfaction Questionnaire-18 respectively. [20] In group A, the Muscle Energy Technique was given with routine physiotherapy whereas, in group B, Counterstrain technique with routine physiotherapy was applied. In routine physiotherapy, therapeutic ultrasound, contrast bath, intrinsic foot muscle exercises like towel cur-up, active ankle exercise, Tendoachilles (TA) stretching, and plantar fascia stretching with a tennis ball were included. The muscle energy technique was performed with the patient in supine lying, while the therapist held the ankle in dorsiflex position for 5 to 7 seconds, meanwhile, 20% force was exerted toward plantar flexion by the patient, with 5sec relax times in-between and five repetitive sets. In the counterstrain technique, the physiotherapist placed a thumb on the plantar fascia to palpate the tender point then curled around the tender area and added supination or pronation of the foot. This position was maintained for 90 sec until the tissue relief tenderness, 3 repetitions with 30 second resting interval were applied. Around three sessions were given on an alternate basis session for two weeks. Measurements were collected at baseline, at the end of 1st week and 2nd week. The details of participant screening, allocation, and follow-up have been given in Figure no 1.

Data analysis was done using Statistical Package of Social Sciences (SPSS) version 24. Numerical data was expressed using mean ±SD and categorical variables were presented as frequency /percentage. The Kolmogorov-Smirnov test was used to determine the normality of the data. After fulfilling the assumptions of normality, the independent sample t-test was applied for the comparison of means of outcome variables between two groups, and Repeated Measure ANOVA was used for within-group comparisons of measurements at baseline, 1^{st,} and 2nd-week follow-up.

RESULTS

The mean age of participants was 39.65 ± 10.82 years. Among 66 participants, there were 19.7% males and 80.3% were females. Mean of BMI was 26.28 ± 3.80 kg/m^2. Around 30.3% had right-sided plantar fasciitis, 33.3% had left-side involvement and 36.4% had bilateral symptoms. Group-wise comparison of demographic details with the p-value has been mentioned in Table 1, representing both groups were the same at the baseline of recruitment in the study. The between-group comparison using independent t-test results showed that both groups had equal effects on reducing pain, and improving func-

Table 1: Demographic Details of the Both Groups at Baseline

Variables	Characteristics	Group A (MET)	Group B (Counter Strain Technique)	p-value
Age (Years)		42.61±12.02	36.70±8.66	0.718
Gender	Male	18.2%	21.2%	0.000
	Female	81.8%	78.8%	
BMI (kg/m2)		26.77±4.03	25.79±3.53	1.000
Effected side	Right	18.2%	42.4%	0.834
	Left	42.4%	24.2%	
	Bilateral	39.4%	33.3%	
Pain (at VAS)		70.91±7.75	67.58±8.94	0.235
Functional Status	ADL	34.58±14.51	36.26±20.11	0.513
	Sport	36.54±12.29	38.17±12.09	0.869
Satisfaction Level		64.00±5.34	65.15±6.52	0.496

Table 2: Between-group Comparison of Pain Intensity, Functional Status and Satisfaction level

Treatment group				Mean ± SD	p-value
Pain	**At Baseline**		Group A	70.91 ± 7.75	0.235
			Group B	67.58 ± 8.94	
	At 1st week		Group A	55.30 ± 8.92	0.440
			Group B	53.48 ± 10.02	
	At 2nd week		Group A	36.52 ± 10.12	0.245
			Group B	33.03 ± 11.25	
Functional status	At Baseline	ADL	Group A	34.58 ± 14.51	0.513
			Group B	36.26 ± 20.11	
		Sport	Group A	36.54 ± 12.29	0.869
			Group B	38.17 ± 12.09	
	At 1st week	ADL	Group A	58.22 ± 14.71	0.788
			Group B	54.09 ± 21.17	
		Sport	Group A	52.06 ± 8.30	0.808
			Group B	54.13 ± 5.11	
	At 2nd week	ADL	Group A	76.83 ± 13.32	0.862
			Group B	74.39 ± 20.18	
		Sport	Group A	69.33 ± 6.97	0.681
			Group B	70.91 ± 4.69	
Satisfaction level	At Baseline		Group A	64.00 ± 5.34	0.496
			Group B	65.15 ± 6.52	
	At 1st week		Group A	68.21 ± 5.13	0.136
			Group B	70.66 ± 6.95	
	At 2nd week		Group A	72.52 ± 6.43	0.108
			Group B	75.91 ± 7.26	

Table 3: Within-Group Comparison of Both Groups at Baseline, at 1st week and 2nd week using Repeated Measure ANOVA of variable

Variables			Group A		Group B	
			Mean ± SD	p-value	Mean ± SD	p-value
Pain	At Baseline		70.91±7.75		67.58±8.94	0.000
	At 1st week		55.30±8.92		53.48±10.02	
	At 2nd week		36.52±10.12		33.03±11.25	
FUNCTIONAL STATUS	ADL	At Baseline	35.58±15.14		36.26±20.11	0.000
		At 1st week	58.22±14.71		54.10±21.17	
		At 2nd week	76.83±13.32		74.39±20.18	
	SPORT	At Baseline	36.54±12.29		38.17±12.19	0.002
		At 1st week	52.06±8.30		54.13±5.11	
		At 2nd week	69.33±6.97		70.92±4.69	
Satisfaction Level		At Baseline	64.00±5.34		65.15±6.52	0.000
		At 1st week	68.21±5.13		70.66±6.95	
		At 2nd week	72.52±6.43		75.91±7.26	

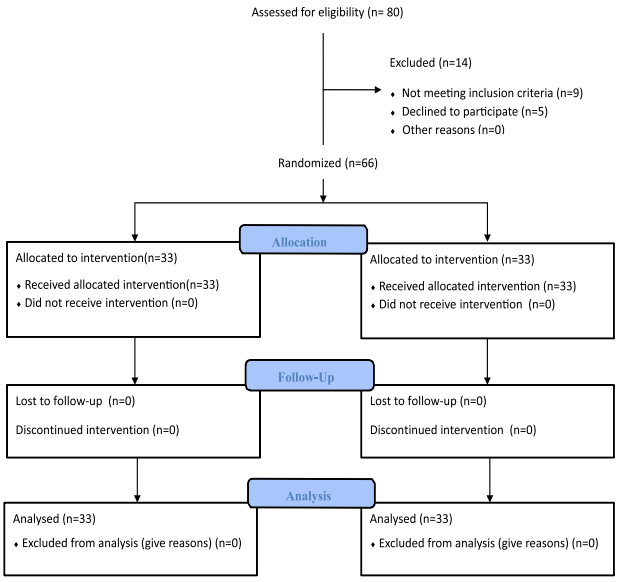

Fig 1: Consort Flow Diagram

tional status and satisfaction level with p-value > 0.005 as shown in Table 2.

The Repeated Measure ANOVA results for within-group comparison on effects of intervention within two weeks follow-up depicted that pain (p=0.000), functional status (p=0.000), and satisfaction level (p=0.000), were improved with the application of muscle energy technique and counterstrain along with routine physiotherapy respectively as given in Table 3.

DISCUSSION

This study aimed to determine the comparative effects of muscle energy technique and counterstrain technique in combination with routine physiotherapy. The results showed that both these techniques were equally effective in alleviating pain, improving ankle function, and patient satisfaction with the treatment approach. The mean age of participants in this study was 39.65 ± 10.82 years whereas the results of previous studies showed Plantar fasciitis was common in ≥50 years of age. [21] The results of the current study were based on a population with the majority of females i.e. around 80% whereas the previous studies determined the results on equal numbers of males and females affected by plantar fasciitis. [7, 22] The mean of BMI of this study was 26.28 ± 3.80 kg/m2 representing the patients with Plantar fasciitis included in this study were overweight, in contrast to the findings of this study the previous studies show that 70% people diagnosed with plantar fasciitis, were obese, which was the significant risk factor for developing this disorder. [23]

Pain is one of the prominent features of a patient with plantar fasciitis, the findings of this study showed parallel effects of MET and CS on relieving the discomforts of this condition, while a previous study showed that muscle energy technique was not effective in comparison to myofascial trigger point release in treating pain in Plantar fasciitis patients.[14] Another study showed no measurable difference between muscle energy technique and myofascial release technique to pain and lower limb functional status in patients with plantar fasciitis.[24] However, the combination of muscle energy technique with ischemic compression was found to have equal effects on plantar fasciitis. [25]

Functional status including ADLs and Sports related task were shown to improve by application of MET and CS technique along with routine physiotherapy in this study, whereas, in a previous study, no significant difference between muscle energy technique and myofascial release technique about lower limb functional status in patient with Plantar fasciitis was observed.[15] Another study showed that the muscle energy technique was not more

effective on pain and functional activity as compared to Cyriax 's Transverse Frictional Massage on plantar fasciitis.[16]

Consistent with the findings of this study, a previous study concluded that muscle energy technique and counter strain were equally effective in patients with chronic lower back pain for lowering discomfort and functional impairment. [13] Another study reported statistically significant improvement after the second session. [26] A study found that the muscle energy technique was more effective than the ischemic compression and strain counter strain technique in the treatment of upper trapezius trigger points. [27]

The majority of the population of this study were females which can affect the generalizability of results. The subjective nature of outcome variable tools may be another limitation of this study. Future researchers are recommended to reproduce this study to determine the long-term effects of the muscular energy technique and the counter strain technique on patients with plantar fasciitis.

CONCLUSION

It was concluded that Muscle Energy and Counterstrain Technique, along with routine physiotherapy are equally effective at easing pain, enhancing functional status, and patient satisfaction levels in patients with plantar fasciitis.

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CONFLICT OF INTEREST: Authors declare no conflict of interest

GRANT SUPPORT AND FINANCIAL DISCLOSURE: NIL

AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under

Sandhu TB: Data collection, Data analysis, Manuscript writing

Jamil A: Drafting manuscript, revising it critically, data analysis

Arslan SA: Execution of study, Assistance in lab work, Compilation of results

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.