Original Article

Comparison of Muscle Energy Technique versus Kinesio Taping Technique to Reduce Pain and Improve Lower Limb Functional Activity in Patients with Plantar Fasciitis

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ABSTRACT

Objective: To compare the effectiveness of muscle energy techniques versus calcaneal taping for reducing pain and Improve Lower limb Functional Activity in Patients with Plantar Fasciitis.

Study Design: Randomized clinical trial study

Place and Duration of Study: This study was conducted at the Haq Orthopaedic Hospital and Surraya Azeem Hospital, Lahore from July, 2018 to July, 2019 for a period of one-year.

Materials and Methods: Through non-probability convenient sampling technique 52 Subjects were recruited and allocated in two groups by using Lottery method of Randomization. Subjects diagnosed having plantar fasciitis for more than 6 months and age between 20-60 years were included in study. Those with any foot surgery or neurological deficit or with any referred pain to foot were excluded from the study. Group A received taping along with conventional treatment group B received MET along with Conventional physiotherapy protocol (therapeutic ultrasound, foot intrinsic muscles' strengthening exercises, TA stretching exercise). Total 7 sessions were given on alternate days with each session for about 30 minutes. Assessment was done prior to (pre) and at the end (post) of treatment through Visual Analogue Pain Scale (VAS) and Foot Function Index (FFI).

Results: The total mean±SD of total score of post treatment FFI was 13.5296±5.25312 for group A and 21.2712±9.30238 for group B with p value of 0.001. The pain measured on the VAS showed mean± SD of 1.42±0.758 for group A and 2.92±1.354 for group B with p-value of 0.000. Paired t-test shows p-value of 0.000 which is highly significant.

Conclusion: Taping is more effective than muscle energy techniques to reduce pain and improve lower limb functional activity when given along with conventional physiotherapy protocol.

Key Words: Plantar Fasciitis, Calcaneal Taping, Muscle Energy Techniques, Heel pain, Active stretching, Foot Function Index, Kinesio taping

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INTRODUCTION

'Plantar Fascitis' is a heel disorder with pain and inflammation which is triggered by repeated trauma on the bottom of calcaneum or at the plantar fascia's origin.[1] Plantar Fascitis (PF) was categorized as an overuse syndrome arising due to the plantar fascia's micro tear at its origin.[2]

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It happens mostly in those people who spend most of the time in standing position or have restricted dorsi flexion of ankle joint.[3] It is more prevalent in females, accounting for 11-15% of all pathologies of the foot. Plantar heel pain is the most prevalent disorder treated in physical therapy clinics and accounts for up to 40% of all patients in podiatric hospitals.[4] Taping is very effective for reducing pain in plantar fasciitis. It can be used both in acute and chronic stages of PF. It removes stress from the fascia, promotes the natural arch of the foot and gives support to the muscles around the foot.[5] There are several kinds of taping methods available efficient for relieving pain like windlass taping, medial longitudinal arch taping, calcaneal taping and mulligan taping. Patients receive immediate pain relief and increase in range of motion by calcaneal taping technique. Muscle Energy Technique (MET) is one of the neuromuscular re-education methods used for the treatment of musculoskeletal dysfunctions. It includes

soft tissue or joint manipulation or mobilization methods. MET eliminates trigger points and helps to reduce hypertonia and lengthens the muscles that are tight. This method is used for strengthening weakened muscles, reducing localized edema or mobilizing limited joints.[6] Calcaneal taping and MET both are efficient methods to manage heel pain in the plantar fasciitis. The basic aim of the research is to discover the influence of MET and taping in patients with plantar fasciitis and to compare their efficacy. These methods assist to manage the ankle joint's pain and to increase the functional movement of lower limbs.[7]

MATERIALS AND METHODS

This randomized clinical trial was ethically approved by the committee of University of Health Sciences, Lahore. All participants gave written informed consent. The data was collected from Surraya Azeem Hospital and Haq Orthopaedic Hospital, Lahore. The duration of this study was 1 year from 1-06-2018 to 1-06-2019. 52 patients diagnosed with plantar fasciitis were included. Non probability convenient sampling technique was used for the selection of patients. The inclusion criteria were patients diagnosed having plantar fasciitis for more than 6 months with the age of 20-60 years. Patients who had undergone any surgical procedure for feet in the last 6 months or if any Red flag signs were present in which manual therapy is contraindicated or if the patient had any neurological deficits or had referred pain e.g. sciatica or diabetes or who had used steroid injections for the management of PF before or the Individuals who had adhesive tape allergy and Prior foot taping exposure within last 6 months were excluded from the research.[8] The patients who had foot pain due to any other musculoskeletal issues e.g. gout or inflammatory joint diseases were also excluded from the research. The patients who were taking pain killers to manage the pain caused due to plantar fasciitis were also excluded from the research.[9]

Data Collection: Patients were divided in 2 groups. Group A patients were treated with calcaneal taping, applied to the plantar fascia, along with physiotherapy traditional program (therapeutic ultrasound, foot intrinsic muscles' strengthening exercises, TA stretching exercise).[10] Group B was treated with MET (applied to gastrocnemius and soleus) and conventional physiotherapy protocol. Total 7 sessions were given on alternate days with each session for about 30 minutes.[11] Therapeutic ultrasound was used at the painful area for 5 minutes and intensity was kept at 3 MHz.[12] Assessment was done prior to (pre) and at the end of the treatment (post) through Visual Analogue Pain Scale (VAS) and Foot Function Index (FFI) for measuring pain intensity and disability. Foot function index is a self-administered questionnaire and consists of 23 items and is divided into three subscales. It is used to measure the effect of foot pathology on function in terms of pain, disability and activity restriction.[12]

Technique to apply MET: MET was implemented with patient in the supine position and foot extended over the edge of the plinth holding the knee in extension for gastrocnemius and knee in flexion for soleus (figure 1). The therapist's hand dorsiflexed the ankle joint of the patient until a resistance or pain was felt. This position was kept and the subject was requested to exert effort (isometric contraction) towards plantar flexion for a period of 5-7 seconds, then resistance was released slowly and relaxation was provided for a period of 5 seconds. Ankle was passively dorsiflexed to a fresh barrier during this relaxation period. For each therapy session a set of 10 repetitions were provided individually for gastrocnemius and soleus muscle.[4]

Figure No.1: MET technique for Gastrocnemius and soleus

Technique to Apply Calcaneal Tape: Measurements were taken from heel to the ball of the foot. The tape was cut to that length. The last 2 inches were left as uncut as an anchor and remaining tape was cut in a fan like manner. The base of the tape was anchored to the tendoachilles. The tails of the tape were applied with a stretch of 75% to the toes. Then a piece of tape was measured around the foot. This strip of tape was anchored at the outside edge of the foot. The arch was taped from outside to inside, pulling up a little at the end with the tape. The end of the tape was laid on top of the foot without any strain. Then, the tape was rubbed to activate the glue. (figure 2) Both zinc oxide tape and kinesiological tape were used in this research.[13]

Figure No.2: Method of Calcaneal Taping

Strengthening exercises for foot muscles

1. Towel curl up exercise in which the person hold the towel in his hand and pulled it to his upper body.
2. Curl up exercise for the toes in which the marbles were picked from the ground and placed in the bucket.
3. Active range of motion exercises of the ankle in supine (it included dorsiflexion, plantarflexion, inversion and eversion)[14]

Stretching Exercises: Active stretching exercise of the TA was performed in standing position. The patient leaned against the wall to stretch the muscles. Each stretch was held for 20 seconds. All these exercises were repeated 10 times each.[14]

Statistical Analysis: IBM SPSS v20 was used to analyze the data. Before the application of statistical tests, data was screened for normal distribution. Qualitative variables (age and duration of symptoms) were evaluated as pie and bar charts. The data was found to be parametric so for comparing mean± standard deviation score at pre post level for Foot Function Index and VAS, independent sample t test was employed. A p-value less than 0.05 was considered significant. Paired t- test was used to analyze difference in mean values of VAS and FFI scores between group A and B

RESULTS

In this study 52 participants were enrolled of which 46.2% were males and 53.8% were females. Results showed that 19.2% of participants were of age 20-30 years, 34.6% were of 31-40 years, 30.8% were of 41-50 years and 15.4% were of 51-60 years of age group.

Table No.1: Pre and post treatment comparison between group A and B

Variables	Treatment groups		P-value
	Group A (taping)	Group B (MET)	
Total score of pre FFI (mean ± SD)	46.20±12.247	51.29±11.53	0.129
Total score of post FFI (mean ± SD)	13.53±5.25	21.27±9.30	0.001
Pre score of the pain on VAS(mean ± SD)	7±1.497	7.15±1.617	0.723
Post score of the pain on VAS (mean ± SD)	1.42±0.758	2.92±1.354	0.000

17 of the participants included in research had pain from last 6-12 months, 14 from last 12-18 months, 10 from 18-24 months while 11 participants had pain present in their foot since more than 2 years

The mean ± standard deviation for total score of foot function index and visual analogue pain scale measured before and after applying the treatment shows statistically significant difference as shown in table 1. The p-value measured after the treatment shows the results are highly significant.

Paired t- test was used to analyze difference in mean values of VAS and FFI scores between group A and B which shows p-value of 0.00. (Table 2)

Table No.2: Comparison between group A and B by paired sample t-test

	Mean	Std. Deviation	T	P value
Total score of pre FFI	48.7456	12.05583	29.364	.000
Total score of the post FFI	17.4004	8.43934		
Pre Score of the pain on VAS	7.08	1.545	26.841	.000
Post Score of the pain on VAS	2.17	1.324		

DISCUSSION

The aim of the current study was to compare the effectiveness of muscle energy techniques versus calcaneal taping for reducing pain and to increase the functional activity of lower limbs in the patients of plantar fasciitis. The majority of patients who presented in the current study of plantar fascitis were females. This is in accordance with the study by joschua dubin 2007 which suggests[15]. In current study it was found both MET and taping were beneficial in decreasing the VAS score in both groups. Pre VAS score of group A was found to be 7 and in group B it was found to be 7.15 after the treatment it was reduced to 1.42 for Group A and 2.92 for Group B.

Another study was conducted for comparing the effectiveness of calcaneal taping and muscle energy techniques with a common treatment of Ultrasound therapy, strengthening exercises of the intrinsic muscles of foot and TA stretch to both groups for the treatment of PF. The treatment was given for two weeks and the outcome measures were calculated with the help of Visual Analogue Scale (VAS) and Foot Functional Index (FFI).Improvement was found in both the Groups but calcaneal taping showed significant results than METS.[16] Another study conducted by Sweeting D in 2011, effects of taping and MET techniques were compared and it was found that both techniques improved the pain. Results also showed that Stretching and strengthening exercises are important for the management of PF. The purpose of the stretch is to reduce the stress placed on plantar fascia.[17] The study showed significant decrease in pain in both the groups but more decrease in painis seen in group A (p value = .000). Chitara 2015 concluded the similar results where taping technique is effective in reducing the pain.[18] The study showed statistically significant decrease in pain with the application of MET by using independent t test with the pre post values 7.15±1.617 and 2.92±1.354 respectively and improvement in lower limb functional

activity with the pre post values 51.29±11.53 and 21.27±9.30 respectively in patients with PF. It is in accordance with the chitara et al., 2017 who concluded the effectiveness of MET techniques in reduction of pain in patients with PF.[18] Taping is found to be very effective in reducing pain and for the improvement of lower limb functional activity. The study showed significant decrease in pain with the application of calcaneal taping technique with the pre post values 7±1.497 and 1.42±0.758 respectively and improvement in lower limb functional activity with the pre post values 46.20±12.247 and 13.53±5.25 respectively. It is according to the research of Selkow et al., 2009 which have hypothesized a neurological explanation for the analgesic effects of MET.[19]

CONCLUSION

In the patients of plantar fasciitis, two weeks of treatment at alternate days either with MET or taping is helpful to reduce pain and improve functional activity of lower limbs. But Calcaneal taping (along with physiotherapy traditional protocol) is found to be more efficient than MET in short term plantar heel pain management.

Author's Contribution:

Concept & Design of Study:	Fatima Tariq
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Conflict of Interest: The study has no conflict of interest to declare by any author.

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