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Research Article

COMPARISON OF CALCANEAL TAPING AND SHAM TAPING IN SHORT TERM MANAGEMENT OF PAIN IN PLANTAR FASCIITIS- A RANDOMIZED CLINICAL TRIAL

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Abstract:

Background: Heel and foot pain are most commonly caused by plantar fasciitis, it has been classified as an overuse syndrome that results in micro-traumas or injury of plantar fascia. Biomechanically, the decrease in arch height is caused by calcaneal eversion, plantar flexion/adduction of talus. This may cause plantar fascia to be stressed out. By repositioning calcaneus to neutral position may increase height of medial longitudinal arch leading to decreased stress and micro trauma of plantar fascia. Our technique is unique due to focus on rear foot instead of mid foot.

Objective: The objective was to compare effects of calcaneal and sham taping 4 relieve pain in improvement of plantar fasciitis.

Methods: It was experimental randomized controlled trial, single factor, pretest/post-test study. 50 Patients were included. Subjects were equally allocated in two groups with use of coin toss method of randomization. Group classification was such as Group 1, Calcaneal Taping and Group 2, Sham Taping. Improvement in Pain and functional limitations was measured at pre/post levels by Numeric Pain Rating Scale and Patient Specific Function Scale.

Results: Results showed a significant difference with p value 0.000, mean and standard deviation of patient specific function scale for calcaneal and sham taping group to be 3.240+0.730 and 5.107+0.533, respectively with mean difference of 1.867. Post Treatment measurements of pain showed a mean difference of 2.240 points on Numeric Rating Pain Scale and highly significant difference (p value 0.000 Patients in both calcaneal and sham taping groups showed a significant improvement for pain and specific function (p value 0.000) when analyzed with paired sample t test statistics.

Conclusion: The study concluded that calcaneal taping produced significantly better outcomes in improvement of pain and function in patients with plantar fasciitis.

Keywords: Planter Fasciitis, Calcaneal Taping, Sham Taping, Pain, Function

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INTRODUCTION:

Heel and foot pain are commonly caused by plantar fasciitis, only in America it affects up to two million people every year. It has been classified as an overuse syndrome that results in micro-traumas or tears of plantar fascia origin. It has been suggested that epicondylitis, inflammatory conditions, should be referred to as chronic pain syndromes. Therefore, similar to that of epicondylitis, plantar fasciitis should also be referred as plantar heel pain.(1-3)

The patients presenting with plantar heel pain complain of pain during first few steps in morning after waking up or first few steps they take after prolonged rest or without using feet e.g. during prolonged sitting. Plantar fasciitis is more prevalent in middle aged women, athletes, obese people and male runners. Most common causes of plantar fasciitis may be degenerative and mechanical, and these are believed to result from overuse from years and trauma.(4, 5)

Plantar fascia provides support and stability throughout the cycle walk. During loading phase plantar fascia provides flexibility of mid foot when meeting ground and help absorbing shock. The metatarsophalangeal joints are in extension at pre-swing phase, and height of the longitudinal increases that results foot supination and propulsion. If biomechanics become poor in any of these phases, it can lead to foot pathology and so plantar heel pain. The mechanism leading to Plantar fasciitis is usually excessive pronation resulting from adduction and flexion of talus in weight bearing, further resulting eversion at calcaneus. Adducted talus and eversion of calcaneus create tension in plantar fascia and structures on the plantar side of foot. It may cause collapse of arch and increased stress on plantar fascia.(6-8)

In a study, non-surgical treatments have been found pain relieving in about 89% of this study's subjects. Many other studies concluded stretching as the easiest technique to relieve plantar fasciitis pain. Other studies found stretching of Achilles tendon and plantar fascia in combination been proving more beneficial if applied 3 to 5 times daily. However, stretching would provide only temporary pain relief because it doesn't change underlying pathology.(9) The symptoms related to heel pain has long been relieved by several non-surgical ways including stretching, rest, strengthening, orthotics, splints, taping, cryotherapy, ultrasonic therapy, phonophoresis, electrical muscle stimulation, hydrotherapy and anti-inflammatory drugs or injections.(10)

Other conventional treatments include rest, exercise and modalities which are used to relieve symptoms of pain, while taping techniques and orthotics are used to correct poor biomechanics. For example, taping arch is used adjunct treatment to relieve pain by reducing foot pronation.(11)

Taping found useful in both acute and chronic stage, before or after orthotics. There is less literature about acute effects of taping for controlling position of calcaneus and Achilles tendon in weight bearing. Past studies on effects of taping mainly focused supporting arches, thus mid foot rather than maintaining and controlling rear foot calcaneus position. Biomechanical perspectives foot shows that decreased arch height is caused by calcaneal eversion, plantar flexion/adduction of talus. Therefore, the objective of this study was to test the role of calcaneal taping in improvement of pain and function of daily life activities.(12, 13)

OBJECTIVES:

The objective was to compare effects of calcaneal and sham taping 4 relieve pain in improvement of plantar fasciitis.

MATERIALS AND METHODS:

It was single blinded randomized controlled trial with pre and post-interventional level Convenience sampling techniques was used. An estimated sample of 25 patients was allocated in each of calcaneal and sham taping group. Patients were randomized by coin toss methods.

Patients inclusion criteria was 15 to 50 years of age, pain with first steps upon awaking in morning, equal or more than 3 on Numeric Pain Rating Scale, pain in heel or in plantar fascia of mid-foot and calcaneal eversion greater than 20. Patients excluded if found with surgical or medical treatment of plantar fascia in past 6 months, history of foot or ankle fracture, congenital ankle/ foot deformity, lower extremity spasticity, using assistive device during walk, bilateral plantar fasciitis.(14)

Local Cable ads were used for patient recruitment. In addition to cable ads, pamphlets explaining signs symptoms of plantar fasciitis were placed in gymnasiums and physicians' clinics, to ease them to attend clinical setups that was used as study setting. All participants were treated individually without knowing each other's treatment time, details and identity.

Cover Roll stretch band was applied in group receiving taping followed by application of Leukotape just lateral and distal to calcaneus that pulled calcaneus medially. Two other pieces of tape were applied to overlap one third of underlying tape. A fourth piece was applied back of heel, starting distally and moving to behind calcaneus. Its anchor was applied distal to medial malleolus.(15) While in sham taping group, foot and ankle biomechanics were not addressed or maintained. A conventional treatment package comprised of therapeutic ultrasound of 5-8 minutes, icing and fascia mobilization was given to both groups.(16)

Improvement in Pain and functional limitations were measured by Numeric Pain Rating Scale (NPRS) and Patient Specific Functional Scale (PSFS). No pain was indicated by 0 worst experienced pain was indicated by 10 on NPRS. PSFS was used to record difficulty of any 3 activities being faced because of foot pain.(17, 18)

RESULTS:

Independent samples t test showed that before treatment there was no significant difference in average scores of PSFS, mean difference 0.0668, P TABLES

value 0.774 (<0.05). mean and standard deviation for calcaneal taping group and sham taping groups were 6.200+0.839 and 6.134+0.793, respectively. After termination of treatment, mean and standard deviation of PSFS for calcaneal and sham taping group were 3.240+0.730 and 5.107+0.533, respectively with mean difference of 1.867 and p value of 0.000, showing a highly significant difference.

Pre-treatment measurements of pain on Numeric Pain Rating Scale showed mean and standard deviation for calcaneal and sham taping to be 5.92+0.702 and 5.64+0.638, respectively, while mean difference found to be 0.280 and p value 0.147 showing non-significant difference. Post-treatment measurements showed mean and standard deviation for calcaneal and sham taping to be 2.000+0.111 and 4.24+0.523, respectively, while mean difference found to be 2.240 and p value of 0.000 showing non-significant difference.

Patients in both calcaneal and sham taping groups showed a significant improvement for pain and specific function (p value 0.000) when analyzed with paired sample t test statistics.

Table 1 Demographics Characteristics

	Calcaneal Taping N=25	Sham Taping N=25
Gender		
Male	14 (56)	13 (52)
Female	11 (44)	12 (48)
Education		
Intermediate	5 (20)	6 (24)
Bachelors	12 (48)	12 (48)
Masters	8 (32)	7 (28)
Pain Level		
Moderate	5 (20)	12 (48)
Severe	20 (80)	13 (52)
Body Mass Index		
Normal	14 (56)	17 (68)
Overweight	9 (36)	7 (28)
Obese	2 (8)	1 (4)

Table 2 Patient Specific Function Scale before Treatment

	Treatment Group	Mean	Std. Deviation	Mean Difference	P Value
PSFS 1	Calcaneal Taping	5.8800	1.56312	-0.08000	0.857
	Sham Taping	5.9600	1.56738		
PSFS 2	Calcaneal Taping	6.3600	1.35031	-0.32000	0.383
	Sham Taping	6.6800	1.21518		
PSFS 3	Calcaneal Taping	6.3600	1.46856	0.60000	0.129
	Sham Taping	5.7600	1.26754		
PSFS	Calcaneal Taping	6.2008	0.83989	0.06680	0.774
	Sham Taping	6.1340	0.79326		
NPRS	Calcaneal Taping	5.92	0.702	0.280	0.147
	Sham Taping	5.64	0.638		

Table 3 Patient Specific Function Scale after Treatment

	Treatment Group	Mean	Std. Deviation	Mean Difference	P Value
PSFS 1	Calcaneal Taping	3.2400	1.16476	-1.76000	0.000
	Sham Taping	5.0000	0.81650		
PSFS 2	Calcaneal Taping	3.2800	1.10000	-2.00000	0.000
	Sham Taping	5.2800	0.73711		
PSFS 3	Calcaneal Taping	3.2000	1.11803	-1.84000	0.000
	Sham Taping	5.0400	0.61101		
PSFS	Calcaneal Taping	3.2404	0.73010	-1.86720	0.000
	Sham Taping	5.1076	0.53384		
NPRS	Calcaneal Taping	2.000	0.1118	2.240	0.000
	Sham Taping	4.24	0.523		

Table 4 Paired Sample Statistics

Treatment Group		Mean Difference	Std. Deviation	P value
Calcaneal Taping	PSFS Pre/ Post	2.960	0.486	0.000
Sham Taping	PSFS Pre/ Post	1.026	0.700	0.000
Calcaneal Taping	NPRS Pre/ Post	3.920	1.412	0.000
Sham Taping	NPRS Pre/ Post	1.400	0.816	0.000

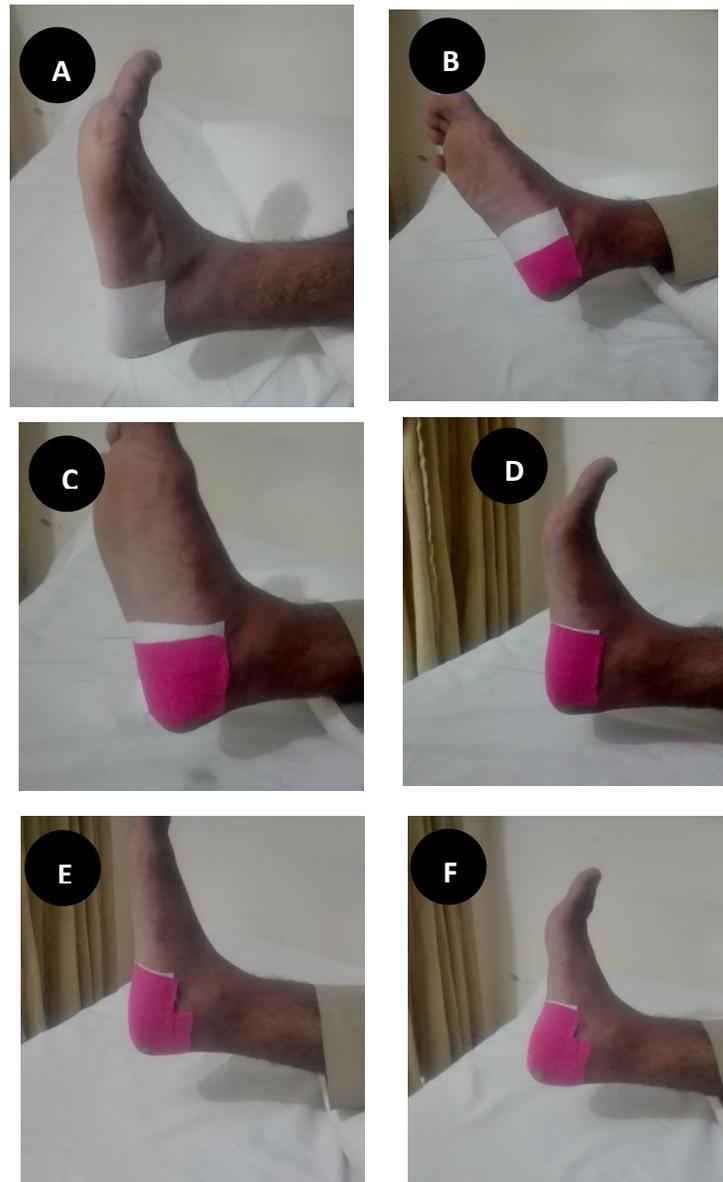


FIGURE 1. Calcaneal –taping technique. Cover roll was applied (Figure A), taping with leuko tape follow. Piece 1 was applied distal to lateral malleolus, pulling the calcaneous medially, and was attached to distal to medial malleolus (B). Pieces 2 and 3 followed the same pattern with overlap of approximately one third of tape width (C&D). Piece 4 went around the back of heel distal to lateral malleolus, around the posterior aspect of calcaneous, anchoring distal to medial malleolus (E). Piece 4 also serve as an anchor for the first 3 pieces (F)



FIGURE 2. Sham taping technique, sham group was applied taping without addressing and maintaining ankle, foot and calcaneus biomech

DISCUSSION:

Results showed calcaneal taping at the best of performance but surprisingly the participants in sham taping also reported significant improvement in terms of pain and dysfunction. This is a big question mark on subjective assessment model being utilized especially in the counties with less patient education. Just due to the satisfaction that the treatment is being provided because here in our country health care facility is costly and in difficult access.(1)

In general, there was no significant difference in all treatment parameters, however, there is details showing that in first post-operative assessment these did not performed well comparatively i.e. after two weeks of assessment. Still this group performed equal at second post treatment assessment. Patients taking calcaneal taping sessions, however, performed with significant improvement at both initial and second, assessments. All techniques showed statistically significant results when analyzed within group. This was the core of contention that exactly which method is optimal when improvement can be achieved by every possible set of number. Well its highly debatable. Current study however, suggest calcaneal taping method is the best of all and patient can be put home plan for exercises.(1)

One aspect of previous literature depicted the similar findings that prognostic factors matter a lot in response of physical therapy interventions. There has been found inverse relationship between dosage of taping derating and age, BMI and gender. More the age, less the effect of calcaneal taping and vice versa. BMI have also inversely associated relationship with manual therapy outside. Other factor also count such as co-morbidities, mental condition, Gender also have association with dosage, with female require more dosage to get same effects as that of males.(19)

Factors which indicated pain scale and functional activities before and after treatment showed significant results that describes the authenticity of my study regarding comparison of calcaneal and sham taping group in planter fasciitis. Taping found useful in both acute and chronic stage, before or after orthotics.

Even the orthotics are used to decrease load of arch thus to decrease strain on plantar fascia, and this results in pain reduction. The strain on plantar fascia was found the least when load applied to higher medial arch as compared to flat arch, in cadaver studies. Calcaneal eversion and over pronated foot, both are considered pain causing factors and orthotics have been found correcting both these factors. Orthotics help main alignment and calcaneal neutral

position. However, high cost of orthotics and limitation not to be used in acute conditions are limitations for orthotics. So the taping applied initially largely contribute in relieving pain. If taping have been used in early stage, it is strong indicator of long-term use of orthotics, it is easy to apply but comfort with taping patient varies greatly.(20-22)

CONCLUSION:

The study concluded that calcaneal taping produced significantly better outcomes in improvement of pain and function in patients with plantar fasciitis.

Conflict of Interest: There is no conflict of interest among authors.

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